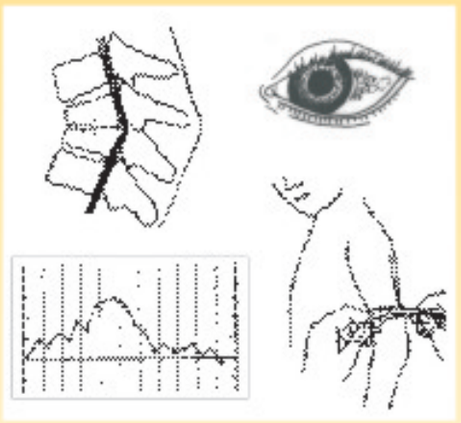
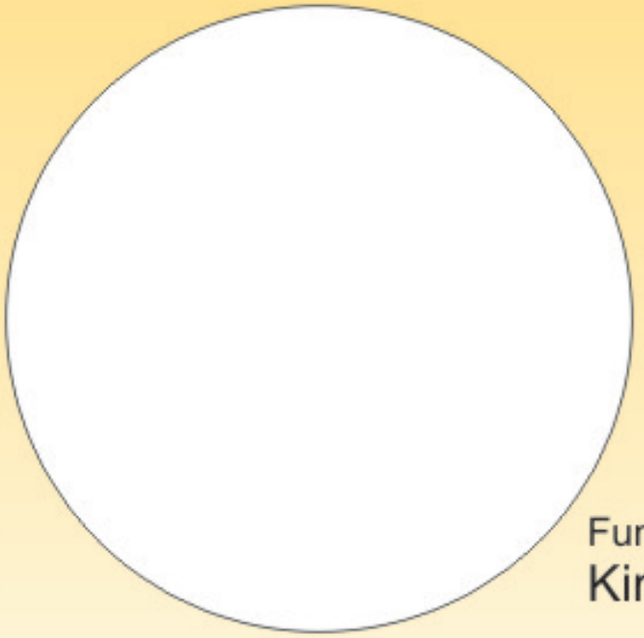
د ماشومانو د ناروغيو عملي لارښود

(انګليسي)

ډاکټر مالټې ايل وان بلومرودر

Afghanic





ننګرهار طب پوهنځی

Pashto PDF
2014

Funded by
Kinderhilfe-Afghanistan

Practical Paediatric Guide

(in English)

Dr. Malte L von Blumroeder

Download: www.ecampus-afghanistan.org

ننگرهار طب پوهنځی

د ماشومانو د ناروغيو عملي لارښود

(انګليسي)

ډاکټر مالټي ايل وان بلومرودر

ISBN 978-0747595823 -3

9 780747 595823 >

سی پی سره

۱۳۹۳

د ماشومانو د ناروغيو عملي لارښود (انګليسي)

Practical Paediatric Guide (in English)

ډاکټر مالټي ايل وان بلومرودر

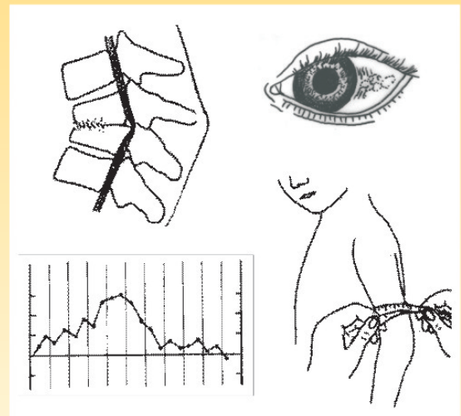
Afghanic

Nangarhar Medical Faculty

Dr Malte L von Blumroeder

Practical Paediatric Guide

(in English)



Funded by
Kinderhilfe-Afghanistan

With

iam
International Assistance Mission
Serving Afghans - Building Capacity, since 1966

2014

Book Name	Practical Pediatric Guide (English)
Author	Dr Malte L von Blumroeder
Email	iam.med.books@gmx.net
Publisher	Nangarhar Medical Faculty
Website	www.nu.edu.af
No of Copies	1000
First Published	by the International Assistance Mission (IAM), 1999
4th Reprint	2014
Download	www.ecampus-afghanistan.org
Printed by	Afghanistan Times Printing Press

This Publication was financed by German Aid for Afghan Children, a private initiative of the Eroes family in Germany.

Administrative and Technical support by Afghanic.

If you want to publish your textbooks please contact us:

Dr. Yahya Wardak, Ministry of Higher Education, Kabul

Office 0756014640

Email textbooks@afghanic.org

Printed in Afghanistan 2014

ISBN 978 – 99969 – 0 – 026 – 6

Message from the Ministry of Higher Education

In history books have played a very important role in gaining knowledge and science and they are the fundamental unit of educational curriculum which can also play an effective role in improving the quality of Higher Education. Therefore, keeping in mind the needs of the society and based on educational standards, new learning materials and textbooks should be published for the students.

I appreciate the efforts of the lecturers of Higher Education Institutions and I am very thankful to those who have worked for many years and have written or translated textbooks.

I also warmly welcome more lecturers to prepare textbooks in their respective fields so that they should be published and distributed among the students to take full advantage of them.

The Ministry of Higher Education has the responsibility to make available new and updated learning materials in order to better educate our students. Finally I am very grateful to German Committee for Afghan Children and all those institutions and individuals who have provided opportunities for publishing medical textbooks.

I am confident that this project should be continued and textbooks can be published in other subjects too.

Sincerely,

Prof. Dr. Obaidullah Obaid

Minister of Higher Education

Kabul, 2014

Publishing Medical Textbooks

Honorable lecturers and dear students!

The lack of quality textbooks in the universities of Afghanistan is a serious issue, which is repeatedly challenging students and teachers alike. To tackle this issue we have initiated the process of providing textbooks to the students of medicine. In the past three years we have successfully published and delivered copies of 136 different books to the medical colleges across the country.

The Afghan National Higher Education Strategy (2010-1014) states:

"Funds will be made available to encourage the writing and publication of textbooks in Dari and Pashtu. Especially in priority areas, to improve the quality of teaching and learning and give students access to state – of – the – art information. In the meantime, translation of English language textbooks and journals into Dari and Pashtu is a major challenge for curriculum reform. Without this facility it would not be possible for university students and faculty to access modern developments as knowledge in all disciplines accumulates at a rapid and exponential pace, in particular this is a huge obstacle for establishing a research culture. The Ministry of Higher Education together with the universities will examine strategies to overcome this deficit. One approach is to mobilize Afghan scholars who are now working abroad to be engaged in this activity."

Students and lecturers of the medical colleges in Afghanistan are facing multiple challenges. The out-dated method of lecture and no accessibility to updates and new teaching materials are the main problems. The students use low quality and cheap study materials (copied notes & papers), hence the Afghan students are deprived of modern knowledge and developments in their respective subjects. It is vital to compose and print the books that have been written by lecturers. Taking the situation of the country into consideration, we desperately need capable and professional medical experts who can contribute to improving the standard of medical education and Public Health throughout Afghanistan. Therefore enough attention should be given to the medical colleges.
For this reason, we have published 136 different medical textbooks from Nangarhar, Khost, Kandahar, Herat, Balkh and Kapisa medical colleges and Kabul Medical University. Currently we are working to publish 20 more medical textbooks for Nangarhar Medical Faculty. It should be mentioned that all these books have been distributed among the medical colleges of the country free of cost.

All published medical textbooks can be downloaded from www.ecampus-afghanistan.org

The book you are holding in your hands is a sample of a printed textbook. We would like to continue this project and to end the method of manual notes and papers. Based on the request of Higher Education Institutions, there is the need to publish about 100 different textbooks each year.

As requested by the Ministry of Higher Education, the Afghan universities, lecturers & students want to extend this project to the non-medical subjects e.g. Science, Engineering, Agriculture, Economics, Literature and Social Science. It should be remembered that we publish textbooks for different colleges of the country who are in need.

I would like to ask all the lecturers to write new textbooks, translate or revise their lecture notes or written books and share them with us to be published. We will ensure quality composition, printing and distribution to the medical colleges free of cost.
I would like the students to encourage and assist their lecturers in this regard. We welcome any recommendations and suggestions for improvement.

It is worth mentioning that the authors and publishers tried to prepare the books according to the international standards but if there is any problem in the book, we kindly request the readers to send their comments to us or the authors in order to be corrected for future revised editions.

We are very thankful to German Aid for Afghan Children and its director Dr. Eroes, who has provided fund for this book. We would also like to mention that he has provided funds for 40 other medical textbooks in the past three years which are being used by the students of Nangarhar and other medical colleges of the country.

I am especially grateful to GIZ (German Society for International Cooperation) and CIM (Centre for International Migration & Development) for providing working opportunities for me during the past four years in Afghanistan.

In Afghanistan, I would like to cordially thank His Excellency the Minister of Higher Education, Prof. Dr. Obaidullah Obaid, Academic Deputy Minister Prof. Mohammad Osman Babury and Deputy Minister for Administrative & Financial Affairs Prof. Dr. Gul Hassan Walizai, Chancellor of Nangarhar University Dr. Mohammad Saber, Dean of Medical Faculty of Nangarhar University Dr. Khalid Yar as well as Academic Deputy of Nangarhar Medical Faculty Dr. Hamayoon Chardiwal, for their continued cooperation and support for this project.

I am also thankful to all those lecturers that encouraged us and gave us all these books to be published and distributed all over Afghanistan. Finally I would like to express my appreciation for the efforts of my colleagues Ahmad Fahim Habibi, Subhanullah and Hekmatullah Aziz in the office for publishing books.

Dr Yahya Wardak
CIM-Expert at the Ministry of Higher Education, February, 2014
Karte 4, Kabul, Afghanistan
Office: 0756014640
Email: textbooks@afghanic.org
wardak@afghanic.org

Practical Paediatric Guide

Dr Malte L von Blumröder

This unique book covers the most common and important paediatric problems. It has been written for doctors and other health professionals who have to provide medical care for children where resources are limited. This guide takes a syndromic approach, taking the reader through the different causes of a childhood problem and then enabling him to make a diagnosis based on clinical signs and basic investigations.

Main features:

- Clear management guidelines for all conditions
- More than 150 figures and diagrams explaining disease processes, clinical features and practical procedures
- Essential drug list on coloured pages as a quick reference
- Practical and relevant advice about rehabilitation and physiotherapy, from how to care for painful joints to positioning in cerebral palsy
- Always including health promotion and education, from feeding during diarrhoea to the advice for a family with an epileptic child

From the prefaces:

"This is a practical guide and will be used on a daily basis. It contains all the information that a health professional will need... No child is excluded from this book."

Dr Paul D Eunson, Consultant Paediatric Neurologist, Royal Hospital for Sick Children, Edinburgh

"This important text provides information, which takes the reader straight to the heart of the diagnosis and if this knowledge is applied, child survival and quality of life will improve enormously."

Prof Andrew Tomkins, Professor of International Child Health, Institute of Child Health, London

*The **Practical Paediatric Guide** is available in English and Dari.*

A title of related interest
– available in English, Dari and soon in Pashto:

PRACTICAL DRUG GUIDE

A handbook for the correct prescribing of essential drugs

Dr Malte L von Blumröder
International Assistance Mission 1999

This guide contains all clinically important details and many practical tips needed for prescribing drugs in a rational (logical) way. Designed in a very user-friendly form, it is invaluable for everyone prescribing drugs.

Available through bookstores or directly from IAM

International Assistance Mission
P.O.Box 1167, Peshawar, Pakistan
P.O.Box 625, Kabul, Afghanistan

ORA International
P.O.Box 594, Peshawar, Pakistan

ISBN 969-8485-02-3

I praise you, Almighty God, because man is fearfully and wonderfully made;
your works are wonderful.

(from Psalm 139)

This book is dedicated to the wonderful and precious Afghan children
and to all those who care for their needs

Contents

Acknowledgements

This paediatric guide would not have been possible without the help and advice of several specialists in different fields. I am particularly indebted to Dr Paul Eunson, Consultant Paediatric Neurologist, Hospital for Sick Children, Edinburgh who patiently and repeatedly reviewed all chapters of the book throughout the different stages of the writing process. I would like to thank Dr Graeme Campell, General Paediatric Surgeon, Hamilton, New Zealand for reviewing all parts of the book connected with paediatric surgery and writing "How to perform a safe circumcision". Mrs Miriam E Krantz, Consultant Nutritionist from Nepal, gave very helpful comments on the malnutrition chapter. Dr Epco Hasker, Medical Co-ordinator from LEPCO, reviewed the chapter on tuberculosis and the paragraph on leprosy. Dr David Hanson, Consultant ENT Surgeon, Leeds General Infirmary, gave valuable input to the chapter on ear nose and throat problems, and Dr William Cutting to the diarrhoea chapter. Dr Hugh Reyburn from HealthNet in Afghanistan advised on the management of cutaneous leishmaniasis and Dr Sayed M Saeed from HealthNet on malaria prophylaxis in pregnancy. Dr M Karim Sharif, Senior IAM Ophthalmologist, gave helpful comments on the chapter on eye diseases. I thank Mrs Anne Yeardsley, Counseller from InterHealth London who visited Afghanistan on several occasions, for reviewing the chapter on "How to help children in distress", and Dr John Thomlinson, Senior Registrar in Gynaecology and Obstetrics from Leeds, for his help with the chapter "The importance of maternal health".

It was most useful to discuss many aspects of the book with Afghan colleagues, and to use the contents during seminars and lectures. Therefore, I would like to thank the many Afghan doctors, medical students and health workers, whom I met during my five years working in their country. They helped me to gain an understanding of common disease in Afghanistan and to learn about particular needs and difficulties of those who are treating sick children where resources are limited. I would like to mention especially Al Haj Dr M Nader Alemi, Dr M Ibrahim Muheby, Dr Zakia Jabari, Dr Farida Poyan and the staff of the IAM-MCH programme as well as my co-workers at the LEPCO clinic in Mazar-e-Sharif.

Helpful input was received from several IAM colleagues, namely from Ms Judy Thoren, Physiotherapy School Kabul, on all aspects related to rehabilitation, and from Mrs Kathy Griffith and Mrs Susan Obenschain, both working in the Mother and Child Health programme Mazar-e-Sharif, on the chapter about malnutrition. I also thank the whole team of the IAM for their support and encouragement throughout the publication progress

I wish to thank those doctors who translated the Paediatric Guide from English into Dari: Dr M Ibrahim Muheby, Dr Rabbani Shafi and Dr M Masomi Mahsoodi. Al Haj Dr M Nader Alemi helped enormously by proof-reading the Dari edition.

Special thanks go to Dr M. Farid Bazger, ORA publication manager and director of KOR, who gave helpful input to the English edition and without whose commitment the production of the book in Dari would not have been possible. I also appreciated the support of the ORA team, especially Dr Toni Grosshauser. It was a pleasure to work together.

Dr Adrian Howe spent many hours proof-reading the English version of the book. I am also thankful to Mrs Leigh Campell, Mr. Harvey and Mrs Janelle Springer and Mrs Marie Lee who all helped with assuring a use of simple English.

Dr Emmanuel Hakeem, Chest physician in Peshawar kindly provided the x-ray of miliary tuberculosis for figure 6–4.

Of course, I am very thankful to my family for their support during the long process of completing this book.

I am grateful to the following organisations or publishers to permit the use and adaptation of their illustrations or materials:

- African Medical Research Foundation, Kenya for table in figure 15–5 and figures 11–6, 14–4 and 17–1 taken from Stanfield, Child Health, 2nd edition 1997.
- AHRTAG for figure 7–6 taken from ARI news 1993: 25; figure 8–2, from ARI news; figure 8–4 from ARI news 1994: 29 and "How to drain a pleural effusion" on page 58, taken from ARI News 1995; 31. The paragraph on persistent pneumonia, page 58–59, is based on ARI news 1991: 20.
- Churchill Livingstone, Edinburgh, for figure 11–7, taken from Hull, Essential Paediatrics, 2nd edition, 1985 and figures 10–12 and 11–8 taken from Hull, 3rd, edition 1993.
- Hesperian Foundation for figures 6–3, 13–2, 13–3, 13–4, 13–6 to 13–10, 13–13, 15–2, 15–7 to 15–19 and 21–7 taken from Werner, Disabled Village Children, 2nd edition 1996 and 7–11, 9–2, 10–2, 15–3, 17–5 to 17–7, 17–10 to 17–12, 17–15, 22–1, A–3 and "Dental hygiene" (on page 50) taken from Werner, Where there is no doctor, 1993.
- World Health Organisation (WHO) 3–2, 6–2, 6–4, 9–2, 10–5, 10–6, 10–8, 10–9, 11–3, 13–12, 13–13, 15–2, 15–4, 15–5, 16–11, 16–12, 16–14, 16–16, 21–6, 21–7, 21–9, A–1, and A–4 taken from King, Primary Child Care, 1985.

Last not least I thank EFG Windhagen and other private donors from Germany whose generous support enables the sale of this book at a subsidised and affordable price.

Dr Malte L von Blumröder October 1999

Foreword

For many years, doctors, medical students and health workers in countries around the world have only had access to medical textbooks and information intended for developed countries. This information is not always relevant to a doctor in Afghanistan - the common diseases differ, cultural practices are different, and resources are not the same. Giving health professionals information that is country and culture specific is a step towards equipping them to provide best and up-to-date medical care even under difficult circumstances.

In a situation where there is a limit on available resources, then priorities need to be made. Which patients need urgent treatment, which antibiotics should be kept in stock, which children should be referred elsewhere for surgery.

Dr. Malte von Blumröder tackles these difficult issues in his Practical Paediatric Guide as well as producing a comprehensive book on how to manage illnesses in children. Throughout the book are sections on how to promote health in children. He recognises that the modern doctor in Afghanistan has a duty to cure as well as to prevent illness.

The mother of the child is the key to that child's health. By including a chapter on maternal health in a paediatric book and frequently referring to educating mothers and other family members on health matters, families as well as health professionals will be enabled to make appropriate decisions about the child's health.

This is a practical guide, and will be used on a daily basis. It contains all the information that a health professional will need, from the mundane daily fluid requirements of a 10 kg-child to the management of neonatal tetanus. There is a wealth of figures and diagrams on practical procedures. I am particularly pleased to see diagrams on positioning in cerebral palsy. No child is excluded from this book.

To write a textbook is a lonely task. Dr. Malte von Blumröder has produced an excellent piece of work that will benefit the next generation of Afghan children. A second edition in a few years, or its use in neighbouring countries would be a testament to its value.

Dr Paul D Eunson August 1999

MBChB, MSc (Tropical Medicine London)
Fellow of the Royal College of Paediatrics and Child Health
Fellow of the Royal College of Physicians of Edinburgh
Consultant Paediatric Neurologist, Royal Hospital for Sick Children, Edinburgh
Honorary Senior Lecturer, University of Edinburgh

Preface

Despite increasing understanding of the main causes for childhood illness and mortality, up to 30% of live born infants will die before they reach the age of 5 years. Many of these deaths are avoidable. Health promotion and disease prevention programmes including vaccinations and micronutrient supplements, such as Vitamin A, can have a profound impact on child survival. Early recognition of disease is also crucial.

This Practical Paediatric Guide provides simple, clear guidance on how to recognise disease processes and gives clear treatment regimes for a range of important childhood illnesses. The book takes a syndromic approach taking the reader through differential diagnosis of common clinical conditions, enabling a diagnosis to be made using very basic clinical signs and laboratory investigations. If more doctors and other health professionals could use this book to increase their clinical skills and more communities could be encouraged to establish preventative health programmes, then infant and young child mortality would decrease enormously. The combination of text and figures is an attractive way of learning and relates information to what clinicians see with their own eyes. The improvement in clinical management of severely ill children is crucial if death is to be prevented and disability avoided. Many doctors are trained quite comprehensively in adult medicine and few realise the different ways that children present when they have clinical disease.

This important text provides information, which takes the reader straight to the heart of the diagnosis and if this knowledge is applied, child survival and quality of life will improve enormously.

Professor Andrew Tomkins September 1999

Professor of International Child Health
Institute of Child Health, London
University College, London

Introduction

During my five years working in Afghanistan, I was again and again impressed by doctors who tried to provide good health care for sick children under very difficult circumstances. I was encouraged by medical students who tried to learn good medical care despite many obstacles.

Sadly, there is no paediatric book available that would help those who provide health care to children with very limited resources. Such book would need to communicate clearly and simply how to put latest research into practice. It would need to concentrate on clinical findings and how to make the best use of basic tests to reach a correct diagnosis and to provide logical treatment. Such a book should also be able to teach and guide those who had only little paediatric training and lastly, it would need to affordable.

With the Practical Paediatric Guide I have tried to meet these criteria and hope that it will be a help for all those concerned for the health and well-being of children and therefore in the end for the children themselves.

I am thankful for any comments and suggestions from readers.

Dr Malte L von Blumröder October 1999

IAM – Medical Consultant for the
Mother and Child Health Programme

1. The background to childhood illness in Afghanistan

Afghanistan carries a high burden of disease. This is seen especially in the most vulnerable group, the children and their mothers. In Afghanistan, about 25-40% of all life-born babies will die before the age of 5 years, the majority of these die within their first year of life. This places Afghanistan amongst the 5 countries with the highest childhood mortality rate (under-5 mortality rate).

Causes of high childhood morbidity and mortality

When we study which diseases kill children in developing countries, we make an interesting observation: 70-80% of all deaths are caused by less than 10 conditions. The main killers in Afghanistan are:

- Acute respiratory infections (ARI) - about 30% of all deaths
- Diarrhoeal diseases - about 30% of all deaths
- Malnutrition
- Measles
- Tuberculosis

In about 30-60% of all deaths, malnutrition is a main contributing factor. Malnutrition and infection is a deadly combination because malnourished children suffer more often from infections and the course of the disease is more severe.

However, it is not simply disease that determines the health of children and is reflected in the high death rate. Other important factors contribute to the frequency and severity of infections and to the health and survival of children:

- **Overcrowded housing** increases transmission of acute respiratory diseases, measles and tuberculosis.
- **Poor sanitation** and **poor hygiene** increases the frequency of diarrhoeal diseases, worm infestation, anaemia, typhoid fever and hepatitis.
- **Poor nutrition** makes children more susceptible to infections and causes anaemia and vitamin deficiencies (for example vitamin A deficiency).
- **Harmful traditional beliefs**, for example that mothers should not breastfeed their children immediately after birth, or certain special diets during illnesses endanger children.
- **Poor education** prevents mothers and families to provide good health for their children.
- **Poverty** is one of the main factors causing poor nutrition, poor housing and poor hygiene and sanitation.
- **War** and displacement pose health risks to children.
- **Availability of health services**. Mortality rates are significantly higher in remote areas than in larger cities.

It is not enough to think about those children who die. When so many children are dying, it means that many more children are suffering from poor health with all the bad effects on their future development. A doctor who cares for children and wants to improve their health must not only be concerned about the children who are brought to him but also about those who never reach him or another health facility.

How to improve the health of children

The situation of child health in Afghanistan sounds quite grim. However, there is hope and future because simple and cheap principles could have a dramatic impact on childhood mortality and morbidity. The principles are outlined below and explained in detail throughout the chapters of this paediatric guide.

The answer to the situation is not to build better-equipped hospitals, as necessary they are for referral of difficult and severe cases. Hospitals are expensive to maintain and are usually only able to reach a limited population.

Everyone working with sick children will have had the following experience: a child is brought with a certain condition, for example dysentery and malnutrition. The child improves and goes home. However, the child comes back with the same condition a few weeks later or you hear that he has died of the same problem at home. The reason is that the factors that made the child ill in the first place have remained the same (for example, poor food hygiene or bottle-feeding).

Often a child who is brought to you with one health problem will suffer from several conditions that have to be treated at the same time. Missing such an additional condition could mean that the child may die from it in the upcoming months, although you could have easily prevented this death.

Child health can only improve if a doctor who examines a sick child always considers - beside providing best treatment for the actual condition - the following three questions:

1. **Why has the child fallen ill**?
2. **Has the child any signs of dangerous health problems** (for example, malnutrition or anaemia)? Is he protected against the main killer diseases, this means, is he **up-to-date with his immunisations**?
3. **What is the future of the child's health and life**? Are there any simple measures, any advice you can give the family to improve the health of the child? This can include discussing home-made rehydration solution, explaining good and cheap nutrition. It also includes advice on the rehabilitation of a child who has had poliomyelitis or discussing how to support a child with a mental handicap.

The following principles have been shown to have a significant effect on the health of children. All these principles can be implemented everywhere in Afghanistan by everyone who is working with sick children. They are simple and cheap and do not require special equipment:

- **"Integrated Management of Childhood Illness"** (IMCI) is a new WHO/UNICEF strategy to reduce the number of children under 5 years who die every year. IMCI promotes a holistic approach to examining and treating children so that a child being treated for one illness is also checked and treated for the other major childhood killers.
- **Antenatal care**. Only healthy mothers will have healthy babies. Each pregnant woman should be assessed at least three times during her pregnancy. The aims are to ensure safe pregnancy and delivery, and to identify risk factors and danger signs during pregnancy and delivery.
- **Improved nutrition**:
  - **Promotion of breastfeeding**. Breastmilk is the best food for children. Breastfed children are healthier than bottle fed children. Breastfeeding should start immediately after birth, be exclusively given to a baby for the first 5-6 months and then be continued at least until he is 2 years old.
  - **Weaning** is the introduction of good nutritious foods in addition to breastmilk at the age of 5-6 months. Good and cheap weaning foods are available in Afghanistan.
  - **Feeding during an illness**. Key messages are that feeding must be continued during illnesses (including during diarrhoea) and that a child should receive one additional meal per day for 2 weeks after any illness. This prevents malnutrition and helps recovery.
- **Clean environment**. This includes food hygiene, clean water and safe disposal of stools.
- **Immunisations**. About 16% of deaths are caused by diseases that could be prevented by immunisations.
- **Prompt treatment of illnesses** according to approved guidelines and using drugs from the essential drug list.
- **Health education** of families including teaching about good nutrition and hygiene, use of ORS for diarrhoea and also the recognition of danger signs so that children at risk are brought to the health facility early. Knowledge will spread through communities and will be passed on from one family to another.

It is helpful to look at the history of other nations to understand the effect of simple measures. For example, childhood mortality in England and Wales dropped rapidly with improved hygiene. This was long before the development of antibiotics.

In different parts of Afghanistan, some of the outlined principles are successfully put into practice. This Practical Paediatric Guide always incorporates these principles when assessment and treatment of the different conditions are explained.

References

1. ACBAR. *Afghanistan Health Profile - Statistics on health and disease in Afghanistan.* Peshawar: ACBAR 1997.
2. Ebrahim GJ. *Paediatric Practice in Developing Countries*. 2nd edition. London: Macmillan Education Ltd., 1993.
3. IAM. Data from community surveys in Mazar-e-Sharif and Herat (personal communication) 1995/96.
4. *Indicators of Child Morbidity and Mortality in Three Afghan Provinces*. A survey conducted by The Research and Advisory Counccil of Afghanistan (RACA) in collaboration with UNICEF-Afghanisatn Program Office. November 1996.
5. LEPCO. Data from a community survey and clinics in Hazarajat and Mazar-e-Sharif 1996 (personal communication).
6. MSF Belgium. Data from clinics and surveys, Northern Afghanistan (personal communication) 1995/96.
7. OXFAM. *MCH-Survey in Panjao District* 1996 (personal communication).
8. UNICEF. *The State of the World's Children 1993.*
9. UNICEF-Afghanistan - CIETinternational. *The 1997 Afghanistan Multiple Indicator Baseline.*
10. UNICEF. *The Progress of Nations 1998.* New York: unicef, 1998.
11. World Health Organisation. Reducing Mortality from Major Childhood Killer Diseases. *Fact Sheet No 178.* Geneva: WHO, 1997.

2. How to assess sick children

Systematic assessment - the basis of good care for sick children

Whenever you assess a child, it is important to do it in a systematic way. Following the steps below will enable you to collect all information necessary for reaching a correct diagnosis and identifying important health problems. The described steps will help you to start good, logical treatment and to guide you how to improve the child's health for the future. They are an outline of how to assess sick children. Details that are important for specific problems are explained in the relevant chapters of the book.

Often children who come to you with one complaint, suffer from more than one problem. For example, a child presenting with acute earache, may also be anaemic, or has not completed his immunisations. Therefore, while you examine and treat the child for his presenting illness, you must always check and treat him for the major childhood killer. The conditions you must check in each child, irrespective of his presenting problem, are printed in this chapter in CAPITAL LETTERS.

How to assess sick children systematically

Always go through the following steps:

1. **Define the child's presenting problem** (chief complaint), this means finding out why the child has been brought to you.
2. **Take a good history** and find out details in relation to the presenting complaint or complaints.

   For example, ask for details about duration (is it an acute or chronic problem?) and presenting features. Find out how severely the problem affects the child (for example, is the child able to eat?).
3. Independent of the presenting complaint, **always ask:**
   - Is the child up-to-date with IMMUNISATIONS?
   - How is the child fed? If he is under 2 years: is he BREASTFED? If he is not breastfed, why not?
4. **Do a thorough physical examination**: pay special attention to the problem area.
5. **Define the child's problem** and **decide the most likely diagnosis.**
6. Take a moment to **consider why the child has fallen ill**, and how to improve his health in the future. This helps you to decide which areas you should discuss with the family.

Basic equipment for assessing children

- **Watch** (for example, to count the respiratory rate)
- **Torch** (for example, to examine the throat)
- **Stethoscope**
- **Measuring tape** (for example, to measure the mid-upper arm circumference)
- **Spoon** (to use as tongue depressor)
- **Cotton wool** (to test sensation)
- **Otoscope**
- **Soap**, **water** and a **clean towel** because you should always wash your hands after you have examined a child with an infectious disease, and always before you examine a newborn.

Having followed the above steps 1-6 you will have gained the following information:

- You will know the child's main problem and you will have thought about the most likely diagnosis and probably several differential diagnoses.
- You will know the severity of the illness.
- You will have found out whether the child suffers from any other condition that requires treatment.
- You will have identified problems and areas that you should discuss with the family (for example, missing immunisations, food hygiene, how to support a child with a disability).

7. If you are uncertain whether your diagnosis is correct, you may order further investigations to either confirm or change your diagnosis.

How to start rational (logical) management

Again, follow certain easy and logical steps:

1. **Define your management aim**.

   For example, in diarrhoea with dehydration: rehydration; in acute otitis media: cure of the infection and prevention of deafness; in a child with epilepsy: long-term control of convulsions; in a child with cerebral palsy: prevention of complications (contractures) and supporting the child's development.
2. **Consider what you should explain to the family**. Common topics are good nutrition, use of ORS (oral rehydration solution) or WSS (wheat salt solution), immunisations or recognition of danger signs. Do not try to explain everything but concentrate on one or two important points.
3. **Choose a drug from the essential drug list** for the child's treatment. Use the drug that is likely to be the most effective and suitable, that is, safe to give, easy to administer and cheap. If possible, the oral

route should always be preferred to injections. Take a moment to consider whether the drug may interact with other medicines and whether there is a contra-indication to its use.

4. **Write a prescription using the generic name** (brand names should not be used). State preparation, dosage and duration of treatment. There must be a rational (logical) reason for each drug you prescribe. It is good medical practice to prescribe as few medicines as possible. Usually one or two drugs are sufficient for the majority of conditions.
5. **Inform the family**. Explain to them what each drug is for, how much to take and for how long. In order to make sure the child takes the medicines correctly, it is often advisable to ask the family to buy the drugs and show them to you. Then you eplain again how to give the drugs to the child.
6. **Monitor the treatment by following up the child**. If the treatment is not effective, make sure he has taken the medicines correctly. If he has done so, reconsider your diagnosis. Set an appropriate time in which to complete the treatment, because completing it is as important as starting it. Do not change drugs too soon, give each one enough time to work. Do change a drug if it is ineffective, or adverse reactions occur.

Summary - basic physical examination of children

Detailed examination of each body system and specific points of importance for different complaints are explained in detail in the relevant chapter.

Postpone the examination of throat and ears until the end of your examination because it is likely to upset the child.

Do not examine children forcefully but win their trust and cooperation.

General inspection

Your first impression is very important. Many information (including respiratory rate) can be gained by just watching the child.

- Does the child appear well or ill?

Look for

- ANAEMIA?
- Signs of SEVERE MALNUTRITION (oedema or severe wasting)

Examine all the body systems (basic list)

- **Eyes**: redness, abnormal whiteness?
- **Ears, nose and throat** (ENT): ear discharge, throat inflammation?
- **Neck**: enlarged cervical lymph nodes?
- **Respiratory system**: respiratory rate, percussion, auscultation. Chest indrawing, audible breathing sound?
- **Cardio-vascular system**: heart murmur? Feel position of apex beat.
- **Abdomen**: soft or hard, tenderness (with or without guarding or rebound?), enlarged organs or masses?
- **Nervous system**: level of consciousness. Signs of meningitis? Weakness of arm or leg?
- **Musculo-skeletal system**: tenderness or swelling over joint or bone or spine? Deformities?
- **Skin**: any lesions?

3. Malnutrition

Malnutrition has catastrophic effects on children

When a child does not get enough food, he fails to grow and may become malnourished. Malnutrition means that he suffers from serious effects of poor nutrition. His food may lack nutrients needed for his body to grow (proteins), needed to give energy to play and to learn (carbohydrates and fats) or to protect from infections (vitamins and minerals). If he is not eating enough bodybuilding or energy containing foods, he will develop protein-energy malnutrition (PEM). The lack of protecting foods results in specific vitamin deficiencies or anaemia.

Many children you see with complaints such as diarrhoea, measles or fever suffer from malnutrition as well. Malnutrition has catastrophic consequences for them. It does not only affect their health but also their development and future (figure 3–1):

- **Malnutrition slows the growth of children.** When a child does not get enough food, he becomes thin and underweight. When poor nutrition continues, he stops growing. Chronically malnourished children are shorter than healthy children (stunting). Later, as adults, they may be less able to perform heavy physical work.
- **Malnutrition disturbs children's brain development**. The main period of brain growth is from 12 weeks foetal life until age 2 years. If malnutrition occurs during that time, a child's brain growth may be affected and his development delayed, for example he may start to walk late or perform poorly at school.
- **Malnutrition weakens the immune system**. A malnourished child will suffer poorer health and will get more infections than a well-nourished child. When he gets an infection, it is often severe.
- **Malnutrition kills**. Malnourished children not only get more infections, they are also more likely to die from them, compared with well-nourished children. Malnutrition kills many children. It is a contributing factor in more than 1/3 of all deaths in children who die under the age of five years.

Only 2% of malnourished children present with clinical signs of severe malnutrition like kwashiorkor or marasmus. The other 98% of malnourished children may appear clinically normal on the first look. It is very important to understand that all malnourished children suffer the catastrophic effects of malnutrition, not only the severely malnourished ones. It is your great challenge to recognise and help children at risk from malnutrition even if they come to you with another health complaint. The poor nutritional status of moderately malnourished children may escape your attention unless you start looking for it.

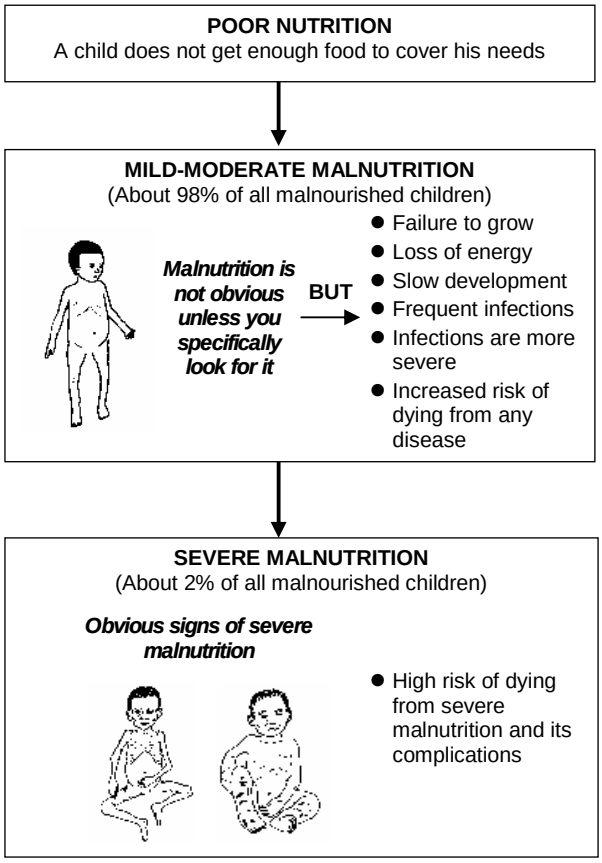


Figure 3–1 ***The consequences of malnutrition***.

How to assess a child for malnutrition

Do a rapid assessment of the nutritional condition of any child who comes to you:

Take a history

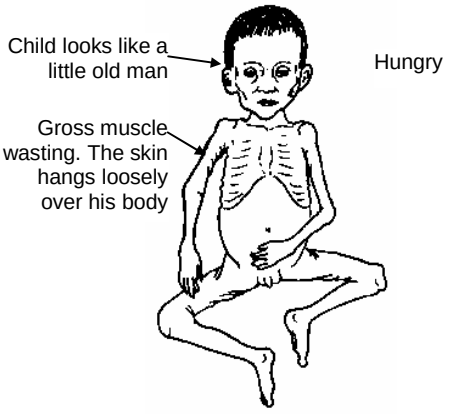
- ○ How old is the child?
- ○ What is the child eating? Is he breastfed? If you want to find out details, ask the mother: "What did your child eat yesterday?"
- ○ Has the child suffered from measles or diarrhoea recently?

Examine the child (figures 3–2, 3–3 and 3–4)

- ○ Signs of severe malnutrition (**severe wasting** - severe thinness of the body, or **oedema**)?
- ○ **Anaemia**?
- ○ Signs of **vitamin A** or other **vitamin deficiencies**?
- ○ In children between 1-5 years, in whom you suspect malnutrition, measure the mid-upper arm circumference (**MUAC**) (figure 3–5).

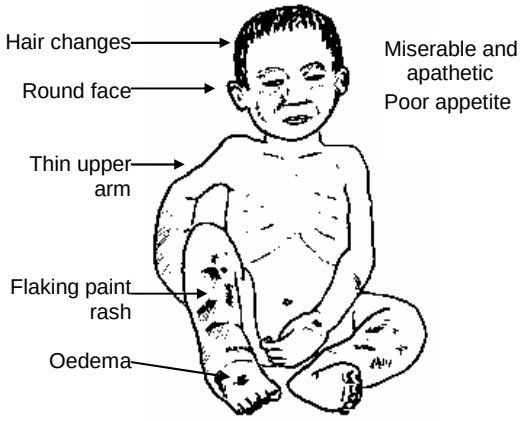
MARASMUS:

- Commonest age: 6–12 months
- Develops gradually



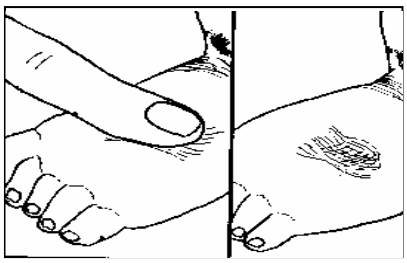
KWASHIORKOR:

- Commonest age: 1–3 years
- Comes on acutely, often triggered by an infection, especially measles or diarrhoea



There are different theories why some children develop marasmus, some kwashiorkor and some marasmic kwashiorkor, which is a combination of both. The latest theory is that it depends on the ability of the individual child to cope with nutritional stress. These theories are not important for our practical management, which is the same for both groups of children. The main clinical difference is the presence of oedema in children with kwashiorkor, caused by different factors, and their poor appetite that makes feeding them more difficult at first.

Figure 3–2 ***The clinical signs of severe malnutrition***.



Press with your finger over the bone above the child's foot for 1-2 seconds.

Then take your finger away. If it leaves a mark, the child has oedema.

Figure 3–3 ***How to test for oedema***.

Causes of oedema

- Kwashiorkor
- Nephrotic syndrome
- Severe anaemia
- Heart failure

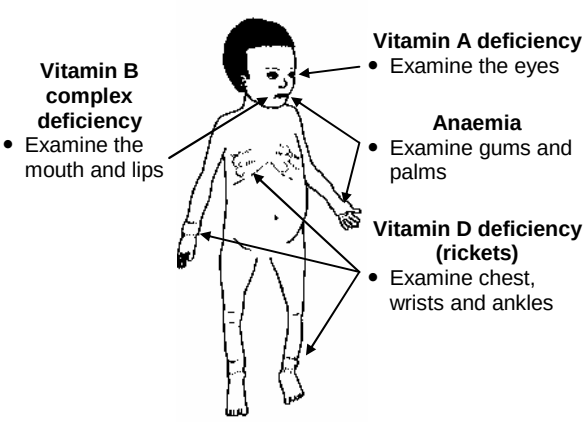


Figure 3–4 ***Assessment for common vitamin deficiencies***.

The mid-upper arm circumference (MUAC)

An easy method to determine the nutritional condition of a child is the measurement of the mid-upper arm circumference (MUAC). It is based on the knowledge that the upper arm circumference of children remains almost the same between the age of 1–5 years. The MUAC only provides information about the present nutritional condition.

The best way to know the degree and duration of malnutrition would be to take a child's weight and height. By using reference tables that put weight and height in relation to each other, the degree of acute and chronic malnutrition could be determined. However, special weighing and measuring equipment is necessary and this method is usually only used in special nutrition rehabilitation centres.

Interpretation of the MUAC

Over 13.5 cm = good nutritional status

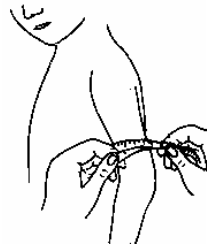
12.5-13.5 cm = moderate malnutrition
(AT RISK of developing severe malnutrition)

Under 12.5 cm = severe malnutrition
(VERY DANGEROUS)

All children with **oedema** are classified as severe malnutrition whatever their MUAC.

HOW TO MEASURE THE MUAC:

- Measure at the left arm while it is hanging down.
- Measure the circumference of the middle of the upper arm.
- Do not pull the tape so tight that folds appear in the child's skin.



ARM-CIRCUMFERENCE-FOR-AGE-CHART:

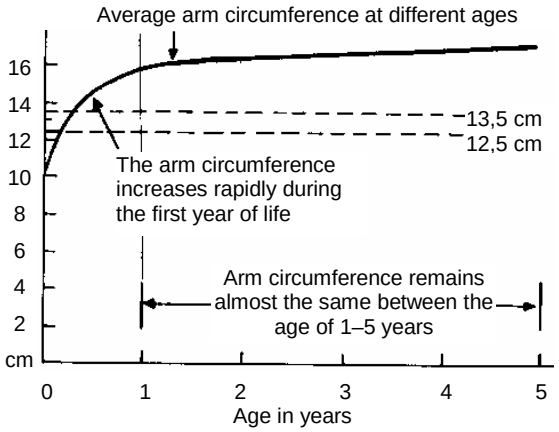


Figure 3–5 ***The mid-upper arm circumference (MUAC)***.

How to manage children with malnutrition

Often children present with consequences of malnutrition such as infections rather then with obvious malnutrition. Doctors sometimes entirely concentrate on treating the consequences but neglect the cause of the presenting problem, which is the underlying malnutrition. If the problem of malnutrition is not solved, the child's general health will remain poor and he remains at risk of dying. You can help malnourished children permanently, even when they come from very poor families, when your management includes the following three points:

1. **Find out exactly why a child has become malnourished**. Malnutrition starts with poor nutrition. The specific causes depend on the age of the child (see figure 3–6). Usually you can solve the original problem.
2. **Treat the malnutrition according to the severity** as described below. Nutrition is more important than medicines because the origin of the problem is poor nutrition that can only be treated by good nutrition.
3. **Treat any complications**.

Management of moderate malnutrition

1. Treat any acute medical problem.
2. Discuss with the family how to solve the problem of why the child has become malnourished. Advise them on good nutrition, for example, super-flour (details are explained on page 15). Good nutrition is more important than any medicines. Do not prescribe unnecessary drugs. Otherwise all the credit for improvement goes to the medicines and not to the food, which means, the mother is likely to stop giving good food and will ask for more medicines.
3. Give routinely only the following medicines:
   - ***Vitamin A*** one single dose. Give a full treatment course if there are signs of vitamin A deficiency (see page 163).

Under 6 months	50,000 Units
7–12 months	100,000 Units
Over 1 year	200,000 Units

   - Worm medicine to all children over 6 months
     Pyrantel

7–12 months	62.5 mg	once daily for 3 days
1–5 years	125 mg	once daily for 3 days
Over 5 years	250 mg	once daily for 3 days

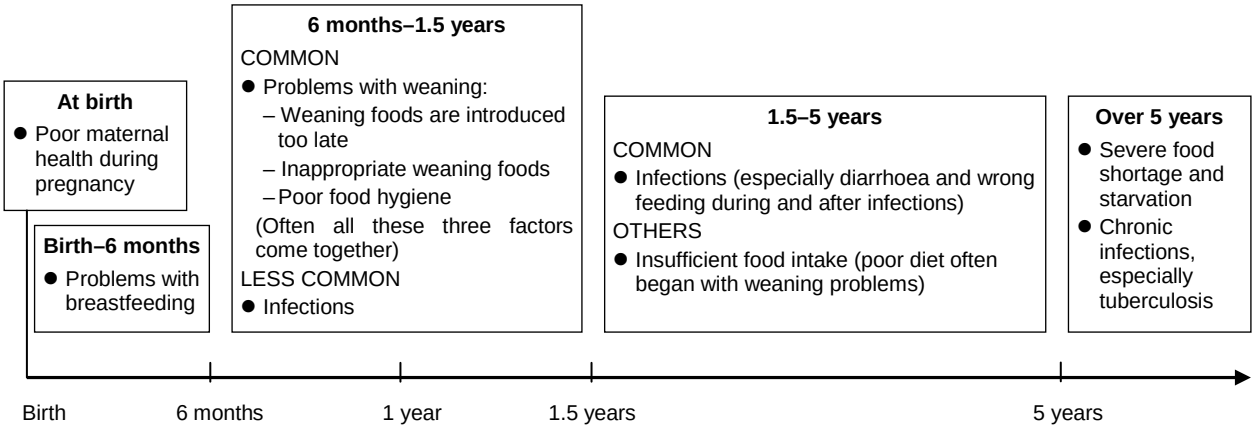


Figure 3–6 ***Common causes of malnutrition according to the child's age***.

Alternative: mebendazole

Over 2 years	500 mg	one single dose
OR	100 mg	2 times daily for 3 days

4. Refer the child for missing immunisations, especially for measles vaccine.
5. Review the child after 2 weeks. Write down his present MUAC on paper and give to the mother to bring back to the next visit.

Management of severe malnutrition - it consists of two phases

Severe malnutrition is a medical emergency. It affects the functions of many organs. Severely malnourished children need special attention and care. Sadly, some hospitals do not accept severely malnourished children whose lives could be saved by simple, readily available treatment. There is no difference in the management of marasmus, kwashiorkor or marasmic kwashiorkor.

The management consists of two phases:

1. **Stabilisation phase**. The aim of this short phase is to stabilise the child's condition. It consists of treating acute medical problems and giving nutrition in a way that the disturbed metabolic body will start functioning again.
2. **Rehabilitation phase**. This phase is longer. The aim is to help the child regaining his normal weight quickly.

NOTE: Although, acute medical problems are treated during the stabilisation phase, do not give unnecessary medicines. The great majority of children will improve with good nutrition even if no medicines are given. To give unnecessary medicines is dangerous because all the credit for improvement goes to the medicines and not to the food, which means, the mother is likely to stop giving good food and will ask for more medicines.

1. STABILISATION PHASE

Management of acute medical problems

NOTE: Try to give as few medicines as possible. Medicines have the disadvantage that families will often think that all credit for improvement goes to the medicine not to the food. This means the mother is likely to stop giving good food and will ask for more medicine - this is not what we are aiming for in the treatment of malnutrition.

Causes of collapse in severely malnourished children

- Severe infection (sepsis)
- Severe dehydration
- Hypoglycaemia
- Heart failure, often due to severe anaemia

- **INFECTIONS**. Almost all severely malnourished children suffer from infections. The usual signs of infection, such as fever, are often absent because of the weakness of the immune system. Give routinely an antibiotic to all severely malnourished children. The choice of antibiotics depends on the condition of the child. Lethargy, hypothermia and hypoglycaemia may be signs of a severe infection.
  - *If no complications* and no signs of a specific infection:
    Oral ***co-trimoxazole*** for 5 days

Child under 8 kg	120 mg	2 times daily
8–15 kg	240 mg	2 times daily

  - *If a child is lethargic, hypothermic or hypoglycaemic* (this means he is severely ill):
    Gentamicin 7.5 mg/kg IM or IV once daily for 7 days (calculate carefully, the daily dosage is usually between 15–60 mg)
    AND
    Ampicillin 50–100 mg/kg/day IM or IV divided into 3 doses for 2 days, then change to oral amoxicillin or ampicillin for 5 days

Under 8 kg	250 (–500 mg)	3 times daily
8–15 kg	500 mg	3 times daily

  - *If a child does not improve after 48 hours*:
    Reassess and add ***chloramphenicol*** 50(–100) mg/kg IM or IV divided into 3-4 doses for 4 days. In severely malnourished children, chloramphenicol given by mouth is possibly not well absorbed and better given by injection.

Under 8 kg:	62.5–125 mg	3 times daily
8–15 kg:	125–250 mg	3 times daily

  - *If the child does not improve after 1 week*:
    Reassess and consider tuberculosis.

- **DEHYDRATION AND DIARRHOEA**. Severe malnutrition is usually accompanied by diarrhoea. The commonest cause is poor food digestion and malabsorption due to atrophy of the gut mucosa. This results in chronic diarrhoea. The only treatment for this condition is providing good nutrition for rebuilding the damaged gut mucosa. Other causes are bacterial overgrowth of the gut or intestinal parasites. Metronidazole is effective for both conditions. If the diarrhoea is severe or not improving with nutritional treatment, give metronidazole 40 mg/kg 3 times daily for 7 days.

Under 8 kg	50–100 mg	3 times daily
8–15 kg	100–200 mg	3 times daily

  Some children suffer from lactose intolerance. This explains why diarrhoea sometimes starts with the introduction of increased milk feeds (for details see page 76 "Lactose intolerance"). Infectious causes that would need treatment with antibiotics are rare.

How to recognise dehydration in severe malnutrition

Dehydration is difficult to assess in malnourished children. The signs of sunken eyes and reduced skin elasticity that are described in the chapter 9. “Diarrhoea” are not reliable in severely malnourished children because the loss of subcutaneous fat also produces sunken eyes and reduced skin elasticity.

Best indicators of dehydration in severely malnourished children are:

- Dry mucous membranes
- Sunken fontanelle
- Reduced or absent urine output
- Disturbed consciousness, collapse or fast pulse. These may also be signs of sepsis or other serious conditions (see box "Causes of collapse in severely malnourished children")

Treatment of dehydration

It is dangerous to treat the dehydration of severely malnourished children with intravenous (IV) fluids. You may easily give too much fluids with the risk of heart failure and death.

The rules of rehydration in severely malnourished children are:

1. **Give rehydration fluids orally**. Give it by cup and spoon, not by bottle. If you know how to do it, you can also use a nasogastric tube for rehydration if a child is very weak, refuses to drink, or is vomiting repeatedly.
2. **Use a special ½ strength oral rehydration solution (ORS)**. The electrolytes of dehydrated children with severe malnutrition are disturbed. Their total body sodium is high and the body potassium is low. Therefore, do not use standard ORS as its sodium content is too high.

   How to prepare ½ strength ORS solution
   - Take one package ORS. Mix it with 2 litres clean water (8 cups) instead of 1 litre.
   - Add 2 large tablespoons sugar (50 g).
   - If possible, add 4 g potassium chloride.

   If you do not have access to ORS solution, use WSS (wheat salt solution) and prepare it with one pinch of salt instead of two (see page 67).
3. **Give the fluids more slowly than usual**. A total of 70–100 ml/kg of this special ORS is usually sufficient to restore a normal hydration state. Give the total amount over 12 hours. Start with about 5 ml/kg every 30 minutes for the first two hours.
4. **Give IV fluids only if the child is shocked**:
   - Use ringer-lactate solution and add one 10 ml ampoule of glucose 50% (or 2 ampoules glucose 25%) to the bottle.
   - Give 15 ml/kg over the first hour.
   - As soon as the radial pulse becomes strong again, stop IV fluids and continue with oral rehydration. Watch for signs of over-hydration. The earliest sign is an increase in the respiration rate.

     If the child has not improved after 1 hour, repeat 15 ml/kg for another hour.

- **HYPOGLYCAEMIA (low blood sugar) and HYPOTHERMIA (low body temperature)** usually occur together. They are often signs of infection. Either can cause death in a severely malnourished child.

  *Prevention and treatment of **hypoglycaemia***

  To prevent hypoglycaemia, feed a severely malnourished child every 2 hours. The feeding should continue during the night. If you suspect hypoglycaemia (blood sugar below 3 mmol/l), mix 3.5 tablespoons clean water with 1 rounded tablespoon sugar and give this sugar water to the child. Start feeding immediately afterwards.

  If a child is collapsed or his consciousness disturbed, give glucose IV in addition to treating for infection and possibly dehydration. Take 1 ml/kg of a 50 % glucose solution (or 2 ml/kg of a 25 % glucose solution). Prepare with it a glucose 10% solution (see box) and give this IV over 15 minutes.

  If the child does not improve, repeat it.

How to prepare a 10% glucose solution

With 50% glucose solution

Take 1 ml/kg of the 50% solution and mix it with 4 times the amount of sodium chloride 0.9% or water for injection.

For example, take 4 ml 50% solution and mix with 4 times 4 ml (= 16 ml) water for injection = 20 ml glucose 10% solution.

With 25% glucose solution

Take 2 ml/kg of the 25% solution and mix it with 1.5 times the amount of sodium chloride 0.9% or water for injection.

  *Prevention and treatment of **hypothermia***

  The ability to regulate the body temperature is limited in a severely malnourished child. Hypothermia is a rectal temperature below 35.5 C. If you do not have thermometer, feel the calves or in the armpit of a child. If these are cold, the child is hypothermic.

  Prevent hypothermia by keeping the child warm and close to the mother. Do not bath him.

  Treat hypothermia by keeping the child close to his mother’s skin as described for the newborn (see page 180). Do not forget to consider and treat hypoglycaemia and infection.

- **HEART FAILURE**. Severe anaemia is a common cause of heart failure. Sometimes heart failure is caused by poor management. A common mistake is a fluid over-load from too much IV fluids.

Treatment is generally supportive with diuretics and digoxin. For treatment of severe anaemia, see below.

Causes of heart failure in severe malnutrition

- Fluid overload due to over-rehydration
- Sodium overload
  This may be caused by rehydration therapy using full strength ORS or wrong nutritional treatment with which the body's weakened metabolic functions could not cope.
- Sepsis

- **ANAEMIA, VITAMIN AND MINERAL DEFICIENCIES**. All severely malnourished children are anaemic due to iron and/or folate deficiency. They also suffer from vitamin and mineral deficiencies. It is controversial whether you should, beside giving vitamin A, treat routinely all severely malnourished children with folate, vitamin and mineral supplements because most of these deficiencies will resolve soon with good nutritional treatment. Especially when the child is treated at home, the family may pay less attention to good nutrition if you prescribe the child many medicines. Therefore, it may be best, to concentrate on nutrition and later treat for anaemia and vitamin and mineral deficiencies if still necessary. Exception is severe anaemia (see below).

  Management of anaemia

  1. Oral ***folic acid*** 5 mg once daily for 1 month
  2. Do not give iron (ferrous sulphate) for the first two weeks of treatment. Iron increases the risk of infection in severely malnourished children.
     Start after the second week of treatment ***ferrous sulphate*** 10–25 mg/kg/day for 3 months

Child under 8 kg	50 mg	1(-2) times daily
8–15 kg	100 mg	2 times daily

  3. **Blood transfusion**. Do not give a blood transfusion because of the risk of heart failure. The only indication is heart failure with shock due to anaemia. Then, give 10 ml/kg whole blood very slowly (over several hours). You can control heart failure without shock with frusemide and digoxin until the anaemia treatment shows its effect (see page 122).

  Management of specific vitamin and mineral deficiencies

  1. Give ***vitamin A*** to all children even if there are no clinical signs of deficiency.
     Give a first dose the day you see the child, then one the next day, and one after one week. Repeat one dose after 4 months.

Under 6 months	50,000 Units
7–12 months	100,000 Units
Over 1 year	200,000 Units

  2. If you are sure that the family has understood that food is more important than medicines, you may give multivitamins for 1 month. Try to find a preparation that contains also minerals. Particularly ***zinc*** and ***copper*** are important. The daily zinc dosage should be 2 mg/kg, the copper dosage 0.2 mg/kg.
  3. If there are **signs of rickets**, the child should be exposed to sunlight for 10 minutes every day. If rickets is severe, give ***vitamin D*** 600,000 Units IM as a single dose and repeat after 1 week.

- **UNDERLYING WORM INFESTATION**. Many malnourished children older than 6 months have intestinal parasites that worsen the malnutrition and delay recovery. Therefore, treat all malnourished children over 6 months for worms.

  Pyrantel

7–12 months	62.5 mg	once daily for 3 days
1–5 years	125 mg	once daily for 3 days
Over 5 years	250 mg	once daily for 3 days

  Alternative: mebendazole

Over 2 years	500 mg	one single dose
OR	100 mg	2 times daily for 3 days

Nutritional management

How to feed a child during the stabilisation phase

In severe malnutrition, all body functions have slowed down. Metabolic mechanisms need time to readjust to food intake and food processing. If too much protein and energy food is given too early a child's system will not be able to process it and he may develop heart failure.

Children under 6 months

If the child is breastfed, offer the breast first, then a high energy milk mix. Make every effort to keep up the breastmilk supply. Breastmilk is better than any artificial milk.

Mix a high energy milk as described in the box on page 11. Pay special attention that it is prepared under clean conditions. Give the milk by spoon or cup, not by bottle. A child needs 100 kcal/kg of a high energy milk. Divide this into 2-3 hourly feeds.

The individual needs can be calculated easily:

For example:
A severely malnourished child weighs 3 kg.
He needs 100 kcal/kg = 3 x 100 kcal = 300 kcal.
1 ml of the mix equals 1 kcal, the child therefore needs 300 ml of the mix in 24 hours.
Divide the 300 ml of high energy milk into 10 feeds, this means the child should be given 30 ml 10 times in 24 hours (= every 2-3 hours, including night-time).

Children over 6 months

If the child is breastfed, offer the breast first, then any other food. In children over 6 months, try not to use the high energy milk because it can become easily contaminated if hygiene conditions are poor. Give the child small portions of super-flour every 2 hours, see below. Feeding has to continue during the night to prevent hypoglycaemia.

What to do if the mother says, "my child will not eat the food".

- **Play and stimulation - a way to successful feeding**. There is a strong connection between stimulation and appetite. Whatever causes the child to think will help the return of appetite even in a very apathetic child: rolling stones, counting fingers, talking to the child and cuddling.
- **Finger feeding - a possible life-saver**. If a child is not eating super-flour, it may be a problem with feeding technique. Explain to the family how to give the food with the finger:
  1. Lightly touch the upper lip. This usually causes the child to open the mouth to receive food.
  2. Place the food on top of the infant's tongue, without touching the tip of the tongue.
  3. If the child pushes the food our of the mouth, the food should be gently slipped back into his mouth.
- **Check for oral thrush or mouth ulcers** and treat appropriately.

When to start the rehabilitation phase

It usually takes about one week to stabilise the condition of a child before you can move to the rehabilitation phase. Never wait longer than 2 weeks.

Signs of stability are:

- The medical problems are under control.
- The mood of the child has improved and the child smiles again.
- The appetite has returned.

It is not necessary to wait until oedema has disappeared.

2. REHABILITATION PHASE

Nutritional management

How to feed a child during the rehabilitation phase

In the rehabilitation phase very high intakes of energy and nutrients are needed. These help to promote rapid growth and to rebuild the body tissues that were affected by the malnutrition.

Children under 6 months

At first, feed the same special milk mix that you started in the stabilisation phase. Increase its amount gradually to 150–200 kcal/kg/24 hours. The child's appetite is a good guide and you can give more if the child wants it. Give the food every 3-4 hours. If the child is already 4 months or older, start weaning by introducing super-flour, see page 15.

How to prepare a high energy milk if no special milk formula is available

Use powdered milk

Mix:

- 4 tablespoons milk powder (full or skimmed) = 80 g
- 4.5 tablespoons cooking oil = 60 g
- 2 tablespoons sugar = 50 g

This dry mix can be stored. If you mix 4.5 tablespoons of this mix in 500 ml (2 cups) of boiled water, each ml milk equals 1 kcal.

Children over 6 months

Increase the amount of food, especially its energy content. Add, for example, one teaspoon cooking oil to each feed. Continue giving many small feeds because the child's stomach capacity is small. After one week, start introducing appropriate family foods but continue super-flour feedings. Gradually move from 2 hourly to 3-4 hourly feeds, which means the child gets 6-8 feeds per day. Cook the super-flour with vegetables (protective food) at least two times daily.

Give missing immunisations

Malnutrition is not a contra-indication but an absolute indication for immunisations. The measles vaccine is the most important.

How to protect the child from malnutrition in the future

Talk repeatedly with the family how to provide good food for their child. Focus on those areas that you have identified as causative factors of the malnutrition.

FOLLOW-UP

Follow up the child. If possible weigh him weekly and later every month and plot his weight on a growth chart, see page 16. If you cannot do that, measure his MUAC instead. It will take longer to see changes of the MUAC as a response to treatment than with the body weight. Write down all measurements with a date. Give this record to the family to keep and to bring back at each follow-up visit.

If a malnourished child does not improve:

1. Make sure his food is prepared correctly.
2. Make sure he is offered enough food day and night.
3. Make sure he is eating the food. If he refuses his feeds, try the finger feeding technique, discuss the need of stimulation and examine his throat for oral thrush or mouth ulcers.

If the child has not improved after 4 weeks despite correct nutritional management:

4. Consider an underlying infection, especially tuberculosis or urinary tract infection.
5. Look for any other underlying problem (for example, heart disease or leukaemia).

Summary - management of severe malnutrition

ALWAYS REMEMBER: proper feeding is the main treatment. Do not give unnecessary medicines, otherwise the family will stop giving good foods because they will rely on the medicines!

STABILISATION PHASE

Duration: usually 4-10 days, maximum 14 days. The aim is to control acute medical problems and to restore the deranged metabolic body functions.

- **Management of medical conditions**

Infections: uncomplicated cases: cotrimoxazole
Very ill children: ampicillin and gentamicin; if no response after 48 hours chloramphenicol

Dehydration and diarrhoea: Use special ½ strength ORS to correct dehydration. IV fluids only if the child is shocked.

Treat and prevent **hypoglycaemia** and **hypothermia**.

Give **vitamin A**, three doses.

Treat **anaemia** and **specific vitamin deficiencies**. Do not start ferrous sulphate immediately but after 2 weeks. Give it for 3 months.

If the child is over 6 months, treat for **worms**.

- **Nutritional management**

If under 6 months, continue breastfeeding. Give high energy milk 100 kcal/kg/24 hours divided in 2-3 hourly feeds, also during the night.

If over 6 months, continue breastfeeding. Give super-flour every 2 hours.

- **Start health education**

REHABILITATION PHASE

Start as soon as the child's condition is stable and not later than 14 days.

The aim is that the child gains his normal weight quickly.

- **Nutrition rehabilitation**

If under 6 months, continue breastfeeding. Increase the special milk feeds to 150–200 kcal/24 hours divided in 3-4 hourly feeds. If over 4 months, consider introducing weaning foods (super-flour).

If over 6 months, continue breastfeeding. After one week, gradually introduce appropriate family foods. Continue super-flour. Give foods every 3-4 hours.

- **Give missing immunisations**, especially measles.
- **Continue medical treatment,** start **ferrous sulphate.**
- **Continue teaching the family about good nutrition.**

FOLLOW-UP

See the child at first weekly, then monthly. At each visit weigh the child or take the MUAC and write it down in the child's record.

What everyone should know about good nutrition

A body needs the following three kinds of nutrients:

1. **Body-building foods**: proteins. They are essential for growth, tissue repair and body defence.
2. **Energy-giving foods**: fat and carbohydrates. They provide energy or fuel the body needs for warmth and work.
3. **Protective foods**: vitamins and minerals. They protect the body from infections and help the body to function well.

Summary - six rules for good nutrition

Rule 1: start breastfeeding within 1 hour after delivery and continue until the child is 2-3 years old.

Rule 2: start additional porridge at the age of 5-6 months and mix it with protein-rich food.

Rule 3: give protective food at least two times daily.

Rule 4: give children at least four meals daily.

Rule 5: give sick children six meals per day for 2 weeks.

Rule 6: prepare children's food fresh and clean.

Breastfeeding

Breastmilk is the best food for babies. Its nutritional contents fit exactly into the needs and functions of the baby's body. It also contains factors that protect the child from infections. Breastfed babies are healthier and have a lower mortality rate than non-breastfed babies. Breastmilk is cheap, sterile and easily digested.

How breastmilk production is regulated

The mother's body regulates how much breastmilk is produced. When the baby suckles at the breast, the mother's pituitary gland secretes two hormones called prolactin and oxytocin. Prolactin makes the breast produce more milk. Oxytocin causes the ejaculation of breastmilk.

If you understand the following mechanism, you will be able help mothers to breastfeed:

- If the baby suckles almost immediately and in the first few days after birth, it helps the milk "come in".
- If the baby suckles more, the breasts will make more milk.
- If the baby suckles less, the breasts will make less milk.

When to start breastfeeding and how to breastfeed

Breastfeeding should start within 1 hour of delivery. The first milk the mother produces is specially made for newborn babies and is particularly rich in protective factors. This milk is called colostrum. Early breastfeeding encourages the relationship between mother and child, called bonding. It helps the milk to "come in" sooner. It also helps the uterus to contract and reduces the risk of postpartum bleeding and infection. Breastmilk should be given whenever the baby wants it (demand feeding).

Only breastmilk should be given during the first 5-6 months and no other additional drinks or foods must be given unless for clear medical indications. At 5-6 months, start additional foods because a child's nutritional needs can no longer be met by breastmilk alone. However, breastmilk remains an important nutritional source and should be continued until the child reaches the age of 2-3 years.

Problems and mistakes with breastfeeding

Problem 1: Breastfeeding is not started immediately after birth. It is a very dangerous custom to wait for one or more days before breastfeeding is started. Breastfeeding must start within the first hour after birth. It is a wrong belief that colostrum could be harmful to the baby. Exactly the opposite is true; it is the best food for newborn babies.

Problem 2: Giving additional drinks. The offering of additional drinks of glucose or other fluids to the newborn is another dangerous practice. It is unnecessary and in fact harmful. These drinks do not contain helpful nutrients. They fill the baby's stomach causing it to suckle less at the breast. They therefore decrease the production of breast milk. They are often given by bottle, which puts the baby at risk of diarrhoea. Babies do not need additional foods until they are 5-6 months old.

Sometimes a mother thinks that her breasts feel soft and empty for the first 2 or 3 days after delivery. You can assure her that this is normal. If she lets her baby suckle her breast, he will get everything he needs.

Problem 3: The mother says: "I don t have enough milk". First, find out whether this statement is true and the baby is not getting enough milk. In most situations you will not be able to weigh the baby on several occasions to see whether he gains weight. A healthy baby gains around 125 g each week or 500 g a month.

Another way to find out whether a baby gets enough breastmilk is the wetness test. If a breastfed baby who has not been given other fluids, urinates at least six times in 24 hours, then he is almost certainly taking enough breastmilk.

How to help a child who is truly not getting enough milk

If you suspect a baby is truly not getting enough milk, you have to think why this might be:

- ○ Is the baby not suckling effectively?
- ○ Is the mother not feeding her baby often enough?
- ○ Is the mother not feeding her baby long enough?
- ○ Is the mother giving unnecessary additional fluids?

Give a mother who rightly complains about not having enough milk the following advice:

1. She should make sure the baby takes enough of the breast into his mouth, not just the nipple, but also some breast tissue.
2. She should let the baby suckle on her breast every 3 hours. The baby needs to breastfeed at least 5-6 times daily to keep the milk production going.
3. The baby should suckle for longer than usual. Advise the mother to let her baby continue breastfeeding until he stops suckling. If the baby goes to sleep after a few minutes she should stroke his cheek gently to wake him up.
4. She should stop giving any additional drinks to the baby.
5. She should drink plenty herself. Some families traditionally give "chAI chawA" or "jwAni-bad" which is an excellent custom. It should be given to the mother 4-5 times daily. About 10 minutes after the mother has drunk the tea or soup, she should put the baby to her breast.

   How to prepare jwAni-bad
   1. Take 1 heaped teaspoon crushed jwAni.
   2. Saute in one teaspoon oil or fat.
   3. According to taste, you may add salt.
   4. Boil it with one cup water.

NOTE: It is important to inform the mother that it may take 2-4 days before the amount of breastmilk increases. Frequent and prolonged suckling can restart the production of breastmilk even when the breast had been "dry" for several days.

Problem 4: Painful cracked nipples are usually caused by a poor suckling position. Check that the baby is sucking correctly (see advice under "Problem 3"). The mother should improve the suckling position and continue breastfeeding. Ask her to also express some milk after each feed and massage it into the cracked nipples.

Problem 5: Mastitis and abscess. The milk should be expressed gently from the infected breast every 3-4 hours. Continue giving the baby the other breast. Give the mother oral cloxacillin 500 mg 3 times daily for 5 days. If an abscess has formed, drain it.

Breastfeeding in special situations

The mother with tuberculosis

Continue breastfeeding in any case because the risk for the baby of dying because of not being breastfed is far greater than the risk of acquiring tuberculosis from his mother.

If the mother has active open pulmonary tuberculosis at the baby's birth, shown by positive sputum test, give the child isoniazid for 6 months (5 mg/kg once daily = about 15 mg. Give about ¼ tablet isoniazid 100 mg). Do not give him BCG vaccine at birth but after completing the course of isoniazid.

If the mother has been sputum negative at birth give the baby BCG vaccine and follow him up, if possible, by monthly weight checks.

The child with cleft lip or palate or physical inability to suckle

Children with cleft lip or cleft palate often have problems with suckling. Feeding these children can be difficult and direct breastfeeding may not be possible. In cleft lip, teach the mother to cover the defect with her finger. If this does not help, she should express breastmilk and give it to the child by spoon. The best time for surgical repair for cleft lip is at 4 months, for cleft palate at 8 months.

Spoonfeeding is also the method of choice for other handicapped children who have difficulties suckling. Never use a bottle.

The baby without mother

First, try to find another lactating woman in the family who could breastfeed the child. If no one can be found, give powdered milk or cow's milk (see below) with spoon and cup. Do not use skimmed milk unless oil or fat is added.

Fresh cow's milk and powdered milk

In the rare occasion that providing breastmilk for a baby is impossible, other milk sources can be used. A baby's milk requirements are about 150 ml/kg/24 hours.

Fresh cow's milk

The main difference between breastmilk and cow's milk is the higher protein and sodium content of cow's milk. For this reason, nutritionist in Western countries recommend to dilute cow's milk for babies under 3 months: 2 parts boiled milk and 1 part boiled water are mixed and 1 level teaspoon sugar is added per feed (for example, one cup is filled to 2/3 with milk and to 1/3 with water. This mixtures is boiled and 1 level teaspoon sugar added).

However, in a situation where poor hygiene is a major problem, diluting cow's milk may put a child at a high risk of infection or malnutrition when the milk is overdiluted. It is therefore better advice, to give cow's milk undiluted, boiled and cooled down before feeds. Between the feeds, give clean boiled water to compensate the higher protein and sodium content of the cow's milk.

Amount and frequency of milk feeds

Generally, follow the baby's demand. Give more milk more frequently, if he demands it.

Age	Amount per feed	Frequency of feed per day
Birth–1 month	50–75 ml	6-7
1–2 months	75–100 ml	6-7
2–4 months	100–125 ml	5-6
4–6 months	150–175 ml	5
Over 6 months	175–200 ml	4-5

Powdered milk

Powdered milk is cow's milk from which the water has been removed. If fat is left, it is called full-cream dried milk or dried whole milk. If the fat is also taken away, it is called dried skimmed milk. Do not use skimmed milk to feed babies.

Powdered milk should be the "last choice" because commonly, mistakes in its preparation put children at high risk of infection and malnutrition.

- Very often, not enough milk powder is added. For each 30 ml of boiled water, one level teaspoon of full cream milk powder must be added. That means, for one cup boiled water, about 5-7 teaspoons milk powder are required, never less. One level teaspoon of sugar should be added to each cup of feed.
- Only boiled water must be used for the preparation.
- Each feed must be prepared fresh.
- The milk should be given by spoon or cup, never by feeding bottle.

Weaning

Weaning is the process of introducing new foods in addition to breastmilk. The number of meals is gradually increased until finally a child gets all necessary nutrients through family food. Weaning foods should be started when a child is 5-6 months old. At that time breastmilk is no longer able to meet the increasing nutritional needs of the growing infant, especially if the mother herself is undernourished. There is no

Energy foods (carbohydrates)	Body-building foods (protein-rich)	Protective foods (vitamins and minerals)
● They provide energy but little protein. ● They form the base of a meal. ● They contain some vitamins and minerals in their coarse layer.	● Beside proteins, they also provide energy and some vitamins. ● Vegetable protein is as good as animal protein if vegetables are roasted, grinded and mixed with rice or wheat.	● Add one protective food to at least two meals a day.
Cereals • Rice • Wheat • Maize • Suji **Starchy vegetables** • Potato	**Protein from vegetables** • Beans • "Dal" • Chick peas • Ground-nuts • Green "mung" beans and others **Protein from animals** • Eggs (most suitable protein) • Milk (also contains vitamin A+B) • Milk products (yoghurt, chaka) • Meat, fish (they also contain iron but are expensive and not essential if good vegetable protein is used)	**Vegetables** (Rich in vitamin A+C; also in iron, but that is poorly absorbed) • Green vegetables: Spinach, "gaznich" (Afghan parsley), "gandana" (leek), mint, lady's finger, green part of spring onions and others • Other vegetables: Carrots, tomatoes, pumpkins **Fruits** • Mangoes, oranges, pomegranates, bananas, melons, grapes, mulberries, apples and others

● Add one teaspoon **oil** or **fat** to a meal. It softens the mix and increases its energy content without increasing its bulk.

● **Sugar**: avoid, especially in between meals. Never use it in large quantities. Sugar reduces a child's appetite and harms his teeth.

single food that can provide all the necessary nutrients for body growth, energy and protection. Only a mixture from all three food groups can supply everything necessary (see table above).

If the protein or energy content of the weaning food is insufficient, the child will become malnourished. If weaning food has not been prepared in a clean way, he will become ill. These are common causes of malnutrition. Weaning is an important, but also a dangerous time in the life of children.

When weaning foods are introduced, tell the mother that changes in the baby's stool are quite normal. The colour or consistency may change. If a child develops diarrhoea it was probably not because of the food but because of poor hygiene.

There are many traditional good weaning foods in Afghanistan that cannot be discussed in detail. Some good examples are "mAsh-berenj" (a mix of rice, mung beans and vegetables), "shulwar tarkArI (a vegetable soup of chickpeas, rice and mung beanes), "mung-rice" and "shIr-e-berenj".

Super-flour ("arde qwAt")

Super-flour ("arde-qwAt") is an excellent alternative to traditional weaning foods. It has the advantages of being cheap and being prepared from food that is readily available locally. It can be prepared at home and stored away like any other flour.

How to prepare super-flour

Take equal amounts of:

- Wheat or another whole cereal grain
- Rice
- Chick peas or other small pulse/legume

1. Clean and dry the ingredients.
2. Roast, without using oil, each of them separately.
3. Allow them to cool and grind each of them separately to flour.
4. Take an equal amount of each flour and mix them together. This mixture is called super-flour.

How to prepare food from the super-flour: take one glass of water and add 3-4 tablespoons of the flour mixture. Boil it and add some oil. Stir it until it has the consistency like pudding ("firnI").

How to use super-flour-porridge as weaning food: Start by giving it 1-2 times daily in addition to breast-milk. Give the porridge first and then offer the breast. Add fruit or vegetables to at least 2 meals a day to provide protective nutrients. Its taste can be varied according to the like of the individual child. Some of the super-flour can be added when baking bread.

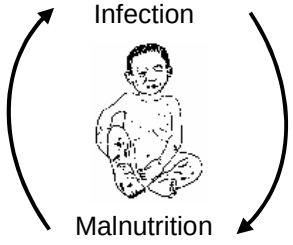


Figure 3–7 ***The vicious cycle of infection and malnutrition***.

Feeding during infections

Why infections are dangerous for a child's nutrition

Children's appetite is poor during infections and their food intake reduced. Infections increase the demand for nutrients and use up reserves. Nutrients get lost during diarrhoea. Some families give their ill children an insufficient diet because of traditional beliefs. All these factors increase the risk of malnutrition. Once a child has become malnourished, he will suffer more infections, which in turn will make his nutritional situation worse (see figure 3–7).

How to prevent a child from becoming malnourished during infections

1. Give him one extra meal daily for two weeks after the infection.
2. Offer him extra food during each meal.
3. Give him extra good food. To give super-flour is excellent. Add one teaspoon oil or fat to each feed to improve its energy content.
4. Do not prescribe multivitamins or tonics to improve recovery from infections! It is a wrong belief that multivitamins are needed to strengthen a child or to improve his appetite. It is a waste of money for the family.

Read also "Feeding during diarrhoea", page 70.

Food hygiene

Unhygienic food preparation puts many young children at risk of diarrhoea and other infections. The following are rules of safe food preparation:

1. **Cook food thoroughly**.
2. **Avoid storing cooked food**. It is best to give infants and young children food that has been freshly prepared. If it is necessary to store food, it should be kept in a cool place and be well protected from flies and other animals. Stored food must be reheated thoroughly until it is too hot to touch.
3. **Wash fruits and vegetables with clean water**. Those that cannot be peeled should be cooked before eaten.
4. **Use safe water**. The deeper the source of water (deep well), the cleaner the water will be. However, even deep well water may still be polluted with bacteria, especially if it is located near a place where people pass faeces. Water that has been boiled for 5 minutes is free of pathogens. However, boiling water is expensive. There is another simple and cheap way to get clean water that is not widely known: fill a clear plastic bottle with water and leave it in the full sunshine during one whole day. The sunlight will kill off the pathogens. Reassure the family that it is not true that sunlight is harmful to water.
5. **Wash hands with soap before preparing food** and wash the hands of children before they eat.
6. **Never use a feeding bottle**. Use a spoon and cup instead.
7. **Keep the cooking area and the dishes clean**. Avoid contact between raw and cooked food.

Growth monitoring

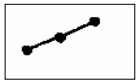
The best way to monitor the health of children and to detect problems early is to watch how a child grows. The best tool for that is the growth monitoring chart, also called "Road to Health Chart". Only healthy children grow well, sick children do not. You can often recognise problems before they have become clinically obvious by simply looking at the growth of children (for example, the growth of a child is already abnormal for several months before he develops kwashiorkor). Early interventions become possible by using the growth chart. A growth chart will also demonstrate the effect of treatment because a child who recovers from an illness will gain weight.

Growth charts are in use at several places in Afghanistan and it is good for everyone working in child health to be familiar with the basics of a "Road to Health Chart". A paediatric hanging scale and a supply of growth charts are necessary equipment. Studying the following charts (figures 3–8 to 3–11) carefully will also help you to get a deeper understanding of the effects of nutrition and illness on the health and growth of children.

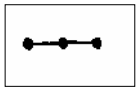
How to read the growth chart

When you look at the chart, a single weight measurement and its position on the chart is not so important. You cannot tell from a single measurement whether a child is putting weight on or losing it (figure 3–10). You want to know the direction of the growth curve:

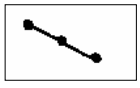
- If a child's growth curve is rising and following the direction of the thick lines it indicates good health.



- If the weight curve is rising less steeply than the thick lines or is not rising at all (flat line) a child is not gaining weight well. He is therefore not growing well or not growing at all. This indicates danger. A flat curve is usually a sign of poor nutrition.



- If the growth curve is falling, this is a sign of great danger. A fall in the growth curve means the child is losing weight. This usually indicates infection.



How to understand the growth chart and how to fill it in:

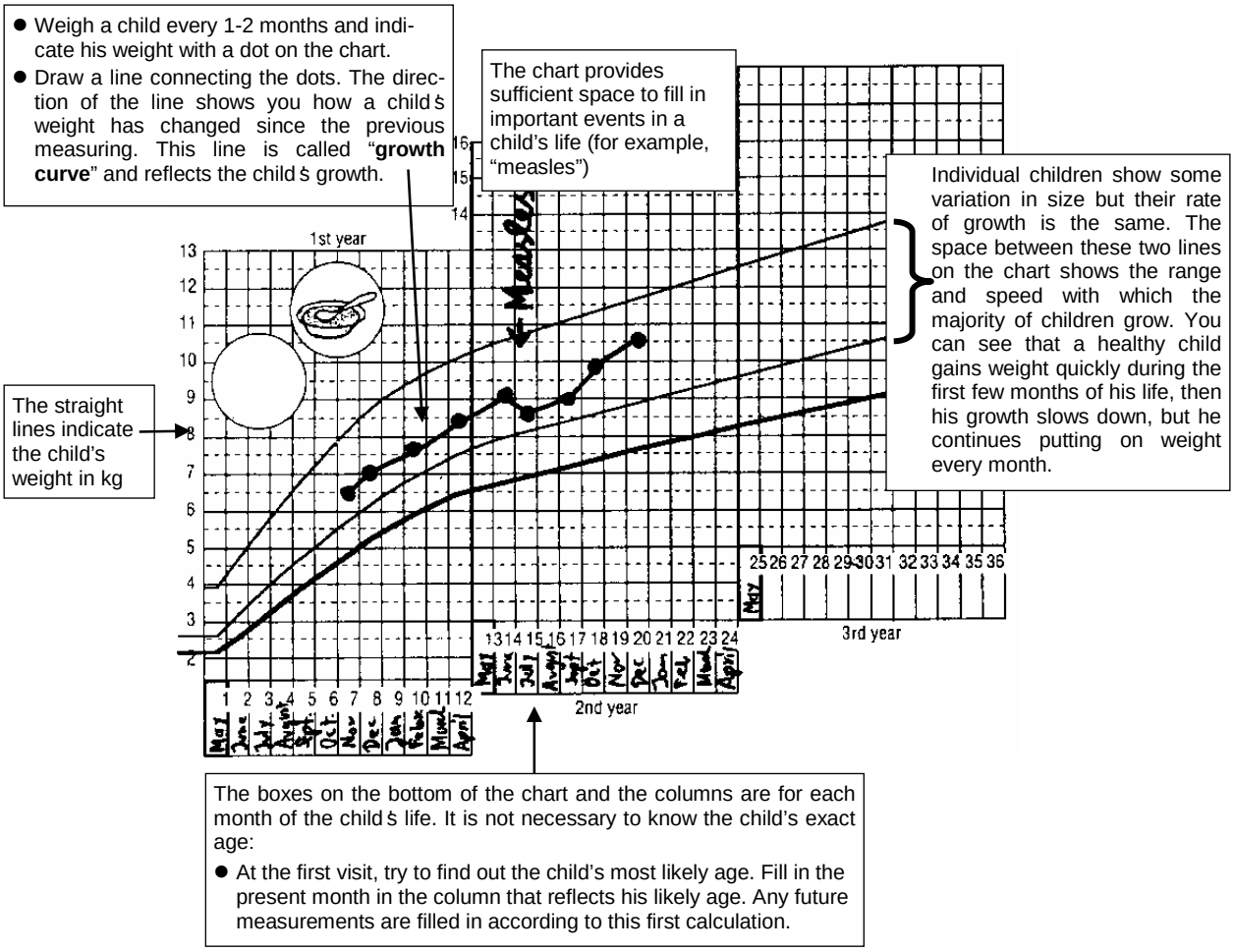
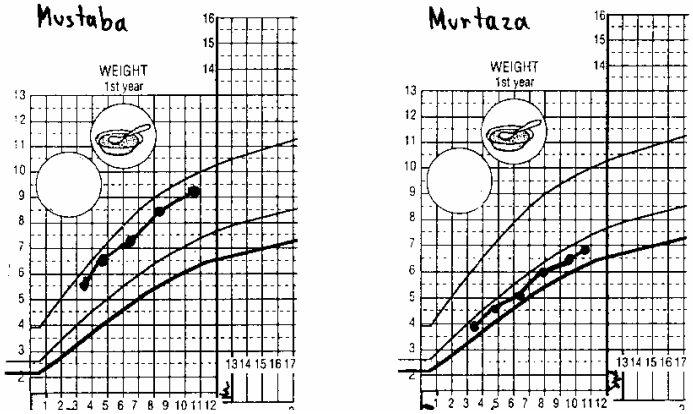


Figure 3–8 *Growth curve*.

Examples of growth curves:

EXAMPLE 1: THE DIRECTION OF THE GROWTH CURVE IS IMPORTANT



The direction of the growth curve is important. Both children are growing well because their growth curves are raising. Only the size of the children is different: Murtaza is smaller than Mustaba.

Figure 3–9 *Good growth.*

EXAMPLE 2: A SINGLE WEIGHT MEASUREMENT DOES NOT GIVE YOU A LOT OF INFORMATION

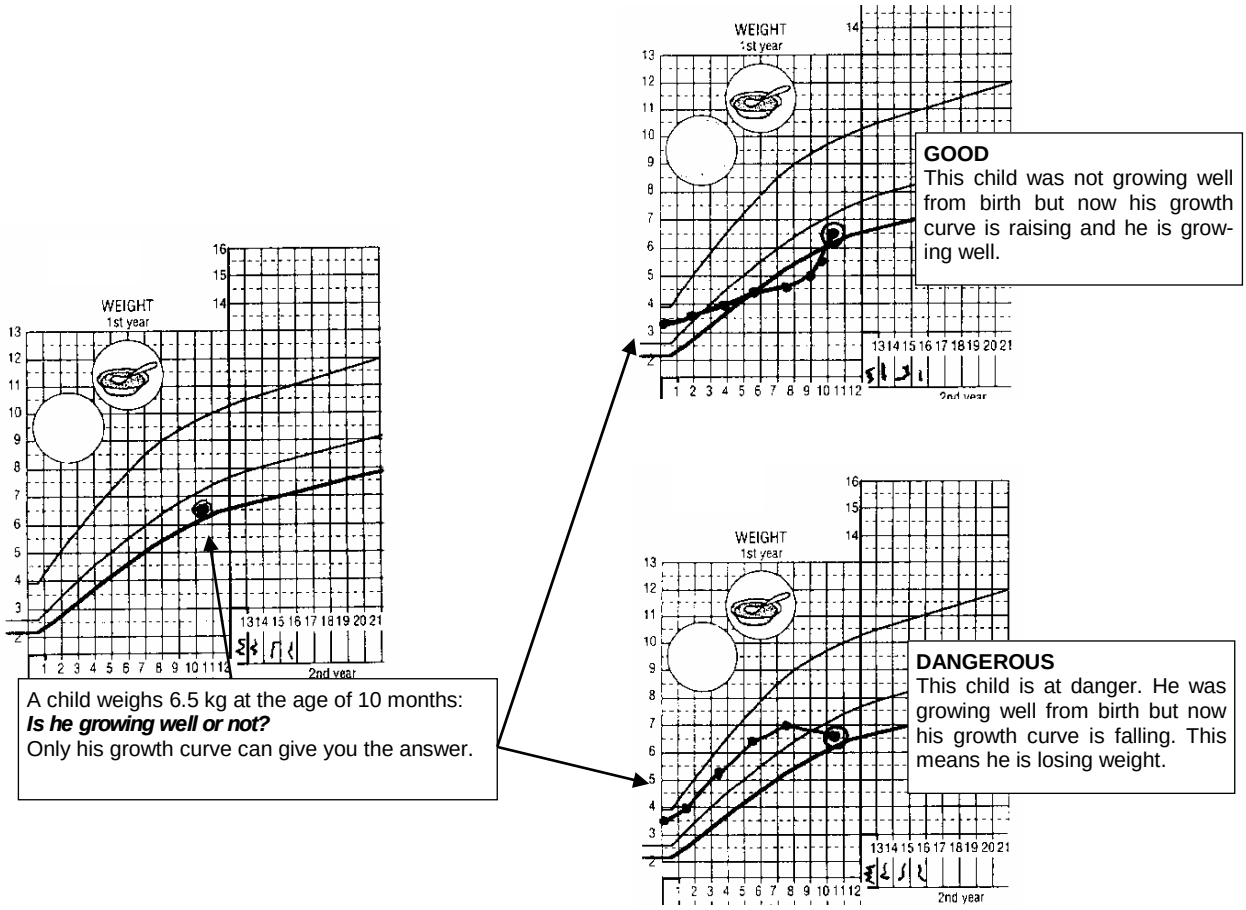


Figure 3–10 ***A single measurement does not give a lot of information.***

EXAMPLE 3: WHAT THIS GROWTH CHART TELLS US ABOUT YUSUF'S HEALTH

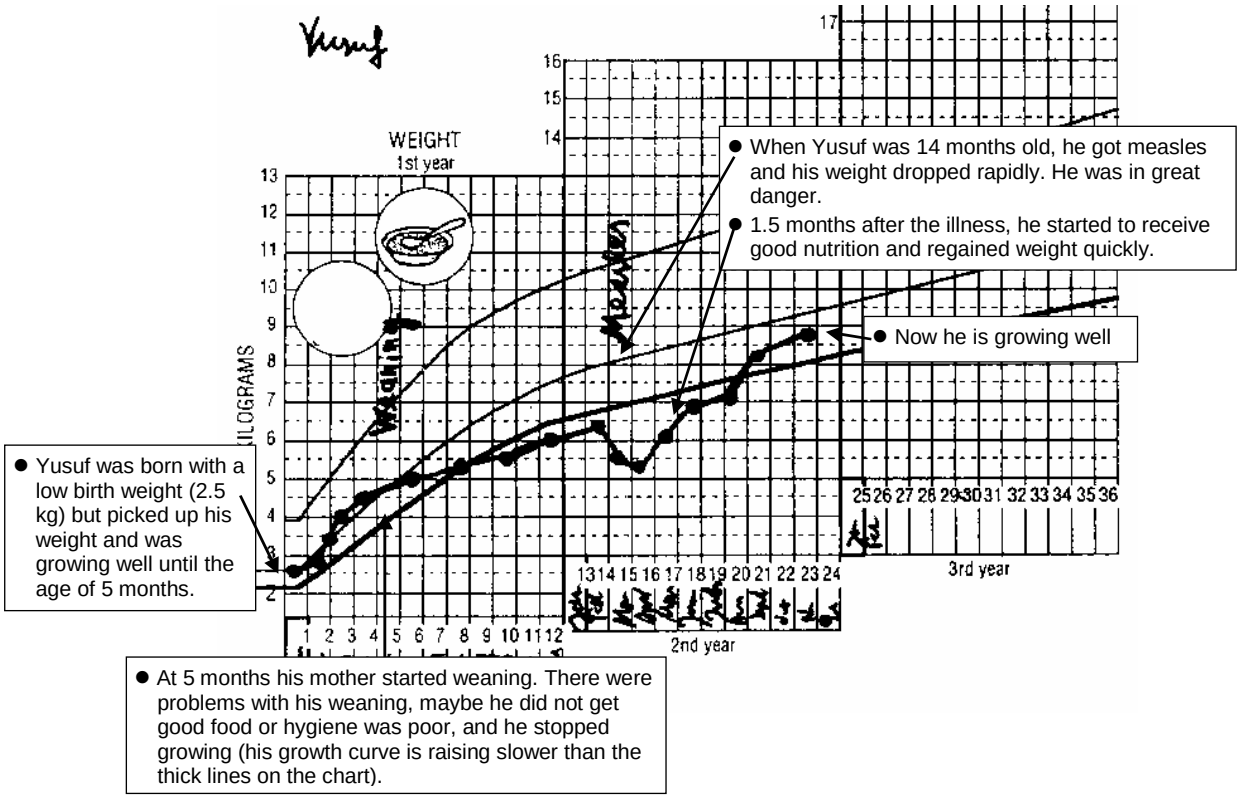


Figure 3–11 ***What a growth chart can tell us***.

References

1. Adhikari RK, Krantz ME. *Child Nutrition and Health*. 2nd edition. Kathmandu: Health Learning Material Centre, 1997.
2. Arbelot A (ed.), *Nutrition Guidelines*, Paris: Medicins Sans Frontieres, 1995.
3. Ashworth A, Jackson A, Khanum S, Schofield C. Ten steps to recovery. *Child Health Dialogue* 1996:3-4; 10-12.
4. Ebrahim GJ. *Paediatric Practice in Developing Countries*. 2nd edition. London: Macmillan Education Ltd., 1993.
5. Savage F. "I do not have enough milk". *Dialogue on Diarrhoea* 1993; 53: 5.
6. Savage King F, Burgess A. *Nutrition for Developing Countries*. 2nd edition. Oxford: Oxford University Press, 1992.
7. *Solar Disinfection of Drinking Water and Oral Rehydration Solution. Guidelines for Household Application in Developing Countries.* Department of Environmental Health. Faculty of Health Sciences. American University of Beirut.
8. Sommer A. *Vitamin A deficiency and its consequences*. 3rd edition. Geneva: WHO, 1995.
9. Stanfield P, Brueton M, Chan M, Parkin M, Waterston T. *Diseases of Children in the Subtropics and Tropics*. 4th edition. Kent: Edward Arnold. 1991.
10. Stanfield P. *Child Health*. 2nd edition. Nairobi: African Medical and Research Foundation, 1997.

4. Fever

Fever is not an indication to routinely prescribe antibiotics

Fever, raised body temperature, is a very common complaint. Fever itself is not a sign of a bacterial disease, many viral diseases also present with a high temperature. It is not even an indicator of infection. Many non-infectious causes can present with fever. There is therefore no logical reason to prescribe an antibiotic for a child simply because he has fever. Instead, you should try to find the cause of the fever and recognise those children who may suffer from a dangerous illness.

How to recognise fever

If you have a thermometer, take the temperature either for 1-2 minutes in the rectum, or for 3-5 minutes in the armpit. Alternatively place the thermometer under the child's tongue for 3-5 minutes.

If you do not have a thermometer, place your hand on the child's chest or abdomen to see whether his body is abnormally hot.

When it is important to reduce fever

There is no evidence that fever in itself is harmful. It is the cause of the fever, not the fever, that causes ill health. There is increasing evidence that the body's defences against infection work better at above normal temperatures.

The few indications to reduce fever are:

- The fever is high (39°C or more)
- Severe pneumonia because fever increases a body's oxygen demands
- A child is very uncomfortable with the fever

How to reduce fever

1. Give oral ***paracetamol*** 40 mg/kg/day divided into 3-4 doses.

2–12 months	50–125 mg	up to 4 times daily
1–5 years	125–250 mg	up to 4 times daily
6–12 years	250–500 mg	up to 4 times daily

Only if paracetamol is not available, give oral aspirin (acetylsalicylic acid) 50 mg/kg divided into 3 doses.

1–5 years	150 mg	up to 4 times daily
6–12 years	250–500 mg	up to 4 times daily

2. **Do not overwrap** the child.

NOTE: Do not give metamizol (Analgin, Dipyrone, Noramidopyrine, Novalgin). It has dangerous side-effects and is banned in many countries.

Causes of fever

- Infection (bacterial, viral or parasitic)
- Inflammation (for example, juvenile chronic arthritis)
- Dehydration
- Overheating
- Tumours
- Drug-induced fever
- Response to injury or surgery
- Poisoning

How to assess a child with fever

The most important point to learn is how to recognise the well child from the one who may be seriously ill. This skill is learnt by experience only. Make it a routine habit to ask yourself whenever you see a child: "Does this child look well or very ill?" (Figure 4–1)

Take a history

- ○ What is the child's main problem (presenting complaint)? When did it start? How did it start, suddenly or gradually?
- ○ Is the child suffering from any of the following: cough, diarrhoea, vomiting, pain in the ears, throat or bones, convulsions, abdominal pain, headache or skin rash?
- ○ Is the child able to eat?
- ○ Are there any other household members with a similar illness?
- ○ Which treatment has he already received?

Examine the child

General inspection

- ○ Very ill or not?
- ○ What is his consciousness level?
- ○ Dehydration? Anaemia? Jaundice?
- ○ Red eyes?
- ○ Nasal discharge?
- ○ Signs of malnutrition (muscle wasting or oedema)?

Examination of the different body systems

- ○ Respiratory system:
  - Fast breathing (count the respiratory rate)?
  - Chest indrawing?

- ○ Abdomen:
  - Tenderness?
  - Enlarged spleen or liver?
  - Masses?
- ○ Nervous system:
  - Neck stiffness or other meningeal signs?
  - Paralysis?
- ○ Heart:
  - Heart murmur?
  - Count the pulse rate.
- ○ Bones and joints (examine all joints and bones):
  - Swelling?
  - Tenderness?
  - Limited or painful joint movements?
- ○ Enlarged lymph nodes?
- ○ Skin: rash or lesion?
- ○ Ears and throat: signs of infection (do not forget to look for Koplik's spots of early measles)?

THE WELL CHILD:

- Interested in his surroundings
- Active, moving about
- Smiling
- Taking food

THE ILL CHILD:

- Lethargic, not interested in his surroundings
- Not moving about
- Floppy (his arms hang from him as if there were no muscles)
- Not taking food
- Pale

Especially infants (children under 1 year):

- Irritable
- Abnormal cry

Figure 4–1 ***The ill and the well child***.

How to approach children with fever - divide them into three different groups

A child with fever can present a diagnostic challenge when facilities are limited to the basics. For practical reasons, divide children with fever into three different groups:

1. Children with **fever and focal symptoms** (for example, earache or difficult breathing).
2. Children with **acute fever** for a few days but **without a focus** of infection. Of these, most children appear well but some very ill.
3. Children with **fever for longer than 1 week**.

Children with fever and focal symptoms

Children with fever may complain about specific symptoms, such as cough or sore throat. These symptoms guide you to the focus of infection. Even if the only complaint is fever, you will often find the source of fever by taking a good history and examining the child carefully. If you find a focus, diagnosis is easy and you treat the child accordingly.

Children with acute fever for a few days but without a focus of infection

Children who appear well

Many children present with a few days of fever. Most of them are well and you cannot find any focus of infection.

There are two main reasons why you may not be able to detect a cause of the fever:

1. Many of these children suffer from an unspecific, self-limiting viral illness.
2. It may take several days after the onset of fever before typical signs and symptoms reveal a site of infection. Therefore, re-examine the child after 2 days if he still has a fever.

Management

1. Advise about good nutrition.
2. Advise the family to bring the child back after 2 days if he still has a fever, or earlier if his condition worsens.

3. If the fever is high, reduce it with paracetamol.

NOTE: Do not give antibiotics. Do not order any investigations.

Children who appear very ill

Some children with acute fever are very ill and you must treat them urgently for the most likely cause or causes, even if you cannot find a source of infection.

Important causes of the very ill child with acute fever

See also "Causes of altered consciousness or coma", page 135.

- Septicaemia
- Malaria
- Meningitis (children under 18 months may not have neck stiffness)
- Appendicitis (young children)
- Urinary tract infection

Helpful investigations

Do not wait for the results of these investigations. Start treatment immediately for the problem you think is most likely.

- Malaria blood film
- Total and differential White blood cell count (for how to interpret the WBC results see at the end of this chapter)
- Urine microscopy
- Blood culture if available
- Chest x-ray
- Lumbar puncture and examination of cerebrospinal fluid (CSF), especially in children under 18 months (see page 133)

Management

Treat the child for the most likely cause or causes and monitor his progress. If good hospital facilities are available, give him a first dose of an appropriate antibiotic and refer immediately.

1. Treat for the following conditions:
   - Septicaemia (sepsis)
   - Malaria, if from a malarious area
2. Treat any additional problems, for example:
   - Dehydration
   - Shock
   - Anaemia
3. Give vitamin A, one single high dose.
4. Review the child latest after 24 hours. *If the child has not improved:*
   1. Examine him again thoroughly.
   2. Check that he received the prescribed antibiotics and check the doses.
   3. Get a chest x-ray if you did not do one already.

SEPTICAEMIA (SEPSIS)

In septicaemia, bacteria have entered the blood stream and are causing a severe, life-threatening infection.

Clinical features

- Very ill child
- Fever or hypothermia
- Hypoglycaemia
- Hepatomegaly or splenomegaly
- Shock
- WBC under 5000 or over 15,000/ml with an ESR over 30 mm/h_1 in a child with high fever supports the diagnosis of septicaemia. However, a normal WBC does not exclude sepsis.

How to recognise septic shock

Septic shock is caused by certain bacterial toxins that cause dilatation of blood vessels. It is important to recognise and treat it early.

Clinical signs of septic shock are:

- ◆ The child looks very pale.
- ◆ The skin looks mottled, especially in young children.
- ◆ The child's consciousness may be altered.
- ◆ Peripheral pulses are weak or not palpable. At first, the pulse is only slightly raised, later it is very fast (tachycardia).

  Normal pulse rates in children

  Under 1 year 80-160/minute
  Over 1 year 70-120/minute
  (Add 10 more for every degree of fever over 37°C.)
- ◆ Blood pressure is normal at first, later low.
- ◆ Hands, feet and nose that are typically cold in children with hypovolaemic shock from blood loss are warm in the early stage of septic shock.

Assess the circulatory situation by measuring the capillary refill time: press with your finger on a fingernail of the child so that the blood bleaches. Then take your finger away and measure the time it takes until the capillaries of the nailbed have been filled with blood again. A prolonged refill time of more than 2 seconds indicates impaired circulation and septic shock.

Management

1. Give ***ampicillin*** + ***gentamicin*** (+ ***metronidazole***) IV/IM. Treat for 10 days. Once the child's condition is stable, change ampicillin from IV/IM to oral.

   Alternative is chloramphenicol that could even be given orally if injections are not possible, see box.
2. Give one single dose ***vitamin A***.
3. **Maintain circulation** with sodium chloride 0.9% and treat septic shock early with polygeline (haemacel) or saline 0.9% 15 ml/kg over 15-30

minutes. Repeat if necessary until you can feel strong peripheral pulses.

4. **Give oxygen**.
5. **Treat other complications**:
   - Hypoglycaemia (see page 9)
   - Dehydration (see page 67)
   - Anaemia (see page 107)
   - Heart failure (see page 122)
   - Acute renal failure (see page 97)

NOTE: Corticosteroids are not effective in sepsis or septic shock. Instead, they may increase mortality.

Antibiotics for sepsis of unknown origin:

Ampicillin *AND* gentamicin (*AND* metronidazole)

The combination of ***ampicillin*** and ***gentamicin*** will cover the most likely bacteria responsible for a sepsis. If sepsis from the abdomen is possible, add ***metronidazole.***

- ***Ampicillin*** IV or IM 100 mg/kg divided into 3 doses

2–12 months	250–500 mg	3 times daily
1–5 years	500 mg	3 times daily
6–12 years	1 g	3 times daily

- ***Gentamicin*** IV or IM 7.5 mg/kg as one single daily dose

  It is important to calculate the gentamicin dose carefully because of serious side-effects if the dose is too high.

  To give one single daily dose is as effective as dividing the dose and may have fewer side-effects.

2–12 months	20–60 mg	one single daily dose
1–5 years	60–100 mg	one single daily dose
6–12 years	100–200 mg	one single daily dose

- ***Metronidazole*** 22.5 mg/kg/day divided into 3 doses.

  For dosage see "List of essential drugs ".

***Alternative:* chloramphenicol** IV, IM or ORAL

- ***Chloramphenicol*** has the advantage that it is well absorbed orally and penetrates well into the cerebrospinal fluid.

  Start with 75–100 mg/kg/day divided into 3 doses, reduce to 50 mg/kg after 48 hours if the child's condition is stable

2–12 months	62.5–125 mg	3 times daily
1–15 years	125–250 mg	3 times daily
6–12 years	500 mg	3 times daily

MALARIA

Malaria is caused by a parasite (Plasmodium) that is transmitted by a bite of certain mosquitoes (Anopheles mosquitoes). Because the parasites spend part of their life cycle inside those mosquitoes, certain climatic conditions are necessary for their development, and malaria is only found in some parts of Afghanistan. The parasites invade the red blood cells where they multiply and mature. Once the parasites have reached maturity the invaded red blood cells rupture and the clinical symptoms occur.

In Afghanistan, you can find two of the four types of malaria:

1. **Plasmodium vivax malaria**. This is the commonest type of malaria in Afghanistan (about 85% of all cases). It produces mild malaria without severe complications and without drug resistance.
2. **Plasmodium falciparum malaria**. It is rare compared with Pl. vivax but can sometimes produce severe life-threatening disease. Another problem with this type is drug resistance. In Afghanistan, about 40% of plasmodium falciparum malaria cases show some resistance to chloroquine and about 10% to sulfadoxine + pyrimethamine (Fansidar). However, chloroquine resistance is usually so-called R I, meaning that chloroquine clears the parasites from the blood and the symptoms at first improve but recur after about 14 days.

Clinical features

Consider malaria in any child who comes from a malarious area and who has one or more of the following symptoms:

- Fever. The onset of fever may be sudden with rigors. However, it may take several weeks before a child develops the classical fever pattern of malaria. Do not wait for it! (figure 4–2)
- Child appears very ill. Malaria can cause sudden severe illness in children
- Diarrhoea and vomiting, especially in young children
- Enlarged spleen
- Anaemia and jaundice (haemolytic jaundice)
- Convulsions
- Disturbed consciousness, coma

Of these, signs of **severe malaria** are:

- ◆ Child is very ill
- ◆ Severe anaemia
- ◆ Convulsions
- ◆ Disturbed consciousness, coma

Be aware, it may take several weeks before the typical malaria fever pattern has developed!

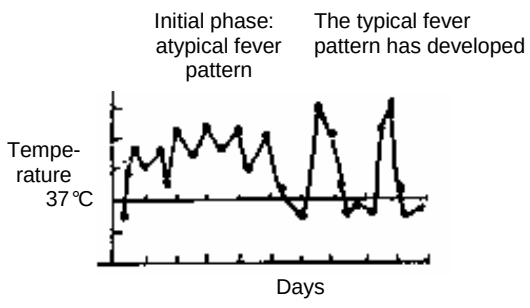


Figure 4–2 *Malaria fever pattern*.

Helpful investigations

- **Malaria blood film**. The parasites can be detected by examining a specially stained thick drop of blood or blood film with a microscope. The blood film is most likely to be positive if it has been taken during the rise of the fever. A negative blood film result does not exclude malaria. Only 3 negative blood films, examined by an experienced laboratory technician, exclude malaria with great likelihood. Do not wait with treatment for the results of the blood film if you strongly suspect malaria.

In severe malaria check also:

- Haemoglobin
- Blood sugar

Management of mild malaria

1. ***Chloroquine*** base orally, never IM.
2. Reduce fever.
3. Follow up the child after 2-3 days.

   If the fever persists after 2-3 days treatment consider the following possibilities:

   1. The child has not taken the medicines or has vomited them back.
   2. The parasites are resistant to chloroquine. Give sulfadoxine + pyrimethamine (Fansidar).
   3. The fever is not caused by malaria. Consider an alternative diagnosis.

Chloroquine treatment for malaria

Treatment is oral only. Do not give chloroquine IM injections in children. They can cause sudden death.

There are several treatment regimens, the following is the simplest:

Give one daily dose for three days. On the first two days, give 10 mg/kg, on the third day 5 mg/kg, which in practice is half the dose of the initial doses.

Give on day 1 + 2

2–12 months	50–75 mg
1–5 years	150 mg
5–12 years	300 mg

Give on day 3

2-12 months	37.5–50 mg
1–5 years	75–100 mg
5–12 years	150 mg

If a child vomits within 30 minutes after taking chloroquine, repeat the full dose, if he vomits 30 minutes–1 hour later, repeat half the dose.

Management of severe malaria

1. Give ***quinine***, if possible orally, otherwise IV or IM.
2. Give ***sulfadoxine + pyrimethamine*** (Fansidar).
3. Treat complications, especially:
   - **Hypoglycaemia** (low blood sugar). It is a complication of malaria but also a frequent side effect of quinine. If you cannot measure blood glucose, treat all children with disturbed consciousness for hypoglycaemia (see page 9).
   - **Convulsions** (see page 128).
4. If you are not sure whether a child suffers from severe malaria or meningitis, treat for both (for meningitis, see page 132).
5. Monitor urine output, blood sugar and consciousness level.

Drugs used to treat severe malaria

Quinine 30 mg/kg/day divided into 3 doses

Give orally for 7 days. If oral is not possible, give IV or IM and change to oral as soon as the child can swallow again. The course should then be 10 days.

Oral

2–12 months	50 mg	3 times daily
1–5 years	100–150 mg	3 times daily
6–12 years	150–300 mg	3 times daily

IM: dose is similar to oral dose. ***Always dilute IM quinine to a concentration of 60 mg/ml solution.***

Dilute 2 ml ampoules containing 150 mg per ml with 3 ml water for injection
Dilute 2 ml ampoules containing 300 mg per ml with 8 ml water for injection

IV: ***Never inject directly but always give as infusion over 4 hours three times daily. Give diluted in 5% glucose (dextrose) and continue a glucose infusion in between the dosages.***

Give a loading dose of 20 mg/kg over 4 hours and then 10 mg/kg 8 hours after the start of the previous dose. Repeat every 8 hours until the child can take quinine orally.

Risks of IV:
- Hypoglycaemia
- Severe low blood pressure if infused too rapidly

Sulfadoxine + pyrimethamine (Fansidar)

Under 4 years	½ tablet	one single dose
5–6 years	1 tablet	one single dose
7–9 years	1.5 tablets	one single dose
10–14 years	2 tablets	one single dose

Children with fever for more than 1 week

A child with prolonged fever for more than 1 week, in whom the source of fever is unknown, needs further investigations. Many of these children will still recover without treatment and you will not be able to find out which disease had caused the fever. Perhaps it was a virus or primary tuberculosis?

Treat complications such as dehydration, anaemia, malnutrition while you are trying to establish a diagnosis.

How to assess children with prolonged fever

○ Take a careful history and examine the child repeatedly.

○ Note the fever pattern.

○ Do the following investigations as a baseline:
   - White blood cell count (WBC), total and differential

- Erythrocyte sedimentation rate (ESR)
- Malaria blood film
- Urine examination (protein, microscopy)
- Chest x-ray

NOTE: The Widal test is frequently requested but it is both unreliable and unhelpful. Its many problems are discussed below under "Typhoid fever".

○ Depending on your suspicion, the results of your base-line tests, and facilities, consider further investigations, for example:

- Cerebrospinal fluid, microscopy and culture
- Liver function tests (GPT)
- Blood, urine culture or stool culture
- Rheumatoid factor
- Ultrasound scan (for example to detect a liver abscess)
- X-rays
- Specific serology
- Biopsies and histology

Important causes of prolonged fever

INFECTIONS

- Typhoid fever
- Tuberculosis
- Urinary tract infection
- Hidden abscesses (for example, abdominal, liver or dental abscess)
- Brucellosis
- Endocarditis

OTHERS

- Rheumatic fever and other auto-immune diseases
- Drug-induced fever
- Tumours
- Leukaemia, Lymphoma

TYPHOID FEVER (ENTERIC FEVER)

Typhoid fever is an important cause of septicaemia and mortality in children. Its case fatality is untreated about 10% but can be reduced to 1% with correct treatment. It is caused by salmonella bacteria that are transmitted by the so-called faecal-oral route. This means someone gets typhoid fever by drinking water or eating food that has become contaminated by infected stools. The bacteria are not only excreted in the stools of patients for several weeks after the illness, some people are chronic carriers and always excrete the bacteria. Improvement of water supplies and the safe disposal of stools are necessary to reduce the incidence of typhoid fever in a community.

Clinical features

The onset of typhoid fever is gradual. Think about typhoid fever in any child who appears ill with fever for several days. Older children show more commonly the typical adult signs, while young children in whom the disease is often milder, may present with fever, diarrhoea and vomiting, or convulsions.

Typical and common signs in typhoid fever are (fig. 4–3):

- Child appearing very ill, drowsy and apathetic, sometimes acute confusion
- Continuos fever that increases stepwise every day during the first week
- Headache
- Cough and chest signs
- Diffuse abdominal tenderness and discomfort
- Hepatosplenomegaly

How to diagnose typhoid fever

Suspect typhoid fever in any ill child with fever for more than 5 days. In typhoid fever, the fever will not persist beyond 4 weeks - a fever persisting for more than 4 weeks is not likely to be typhoid fever. Think about tuberculosis.

Diagnosis is usually based on clinical findings. A low or normal total WBC with neutropenia and lymphocytosis supports your clinical diagnosis. There is no help from ordering the Widal test.

If available, a blood culture taken during the first week of the illness, or a urine or stool culture taken during the second or third week of the illness will often, but not always be positive. However, start treatment immediately in any very ill child with suspected typhoid fever, do not wait for results of investigations.

About the Widal test

The widespread use of the Widal test is not justified. The O-antigen that rises first is also high with previous or present infection with types of salmonella that do not cause typhoid fever. The H-antigen is naturally high in a population like in Afghanistan where typhoid fever is endemic. The H-antigen remains high for several months following contact with the salmonella bacteria. For these two reasons, you get a false positive Widal test in some patients, meaning the test is positive although the patient is not suffering from typhoid fever.

It has been shown that some patients do not show an antibody response to typhoid infection. They have a falsely negative Widal test, this means, the test is negative although the patient suffers from typhoid fever.

These facts throw doubt on the usefulness of the Widal test and therefore, it is no longer recommended.

Management

1. Give oral ***chloramphenicol*** (see box).
2. Reduce a high fever or pain with paracetamol.
3. Treat dehydration (see pages 67–69).
4. Treat anaemia.
5. Advise about good nutrition.

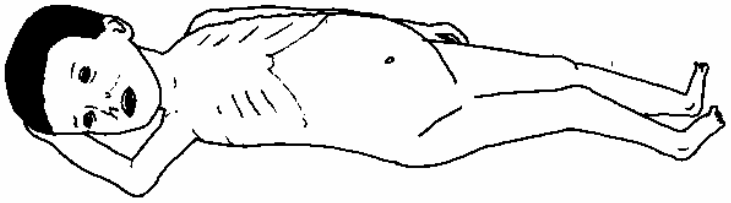
6. Give one single dose vitamin A.
7. Follow up the child. If he does not show any response to treatment after 3–5 days, add a second antibiotic to chloramphenicol. Use amoxicillin, ampicillin or co-trimoxazole (about the use of ciprofloxacin in children, see box).

NOTE: There is no indication for the routine use of corticosteroids. Give them only to children who are very ill, in shock or confused. Corticosteroids do not increase the rate of complications if antibiotic treatment is appropriate.

TYPICAL CLINICAL FEATURES OF TYPHOID FEVER:

Severity varies from child to child. Typhoid fever is often less severe in young children.

- Very lethargic
- Severe loss of appetite
- Often dehydrated
- Headache



- Mild abdominal distension
- Diffuse abdominal tenderness (discomfort when you palpate the abdomen)
- Splenomegaly
- Cough and signs of bronchitis or pneumonia

COMPLICATIONS

Surgical:

- Gastro-intestinal perforation
  Signs: abdominal distension and tenderness followed by severe pain and vomiting
- Gastro-intestinal bleeding
  S***igns***: diarrhoea with blood, sudden shock

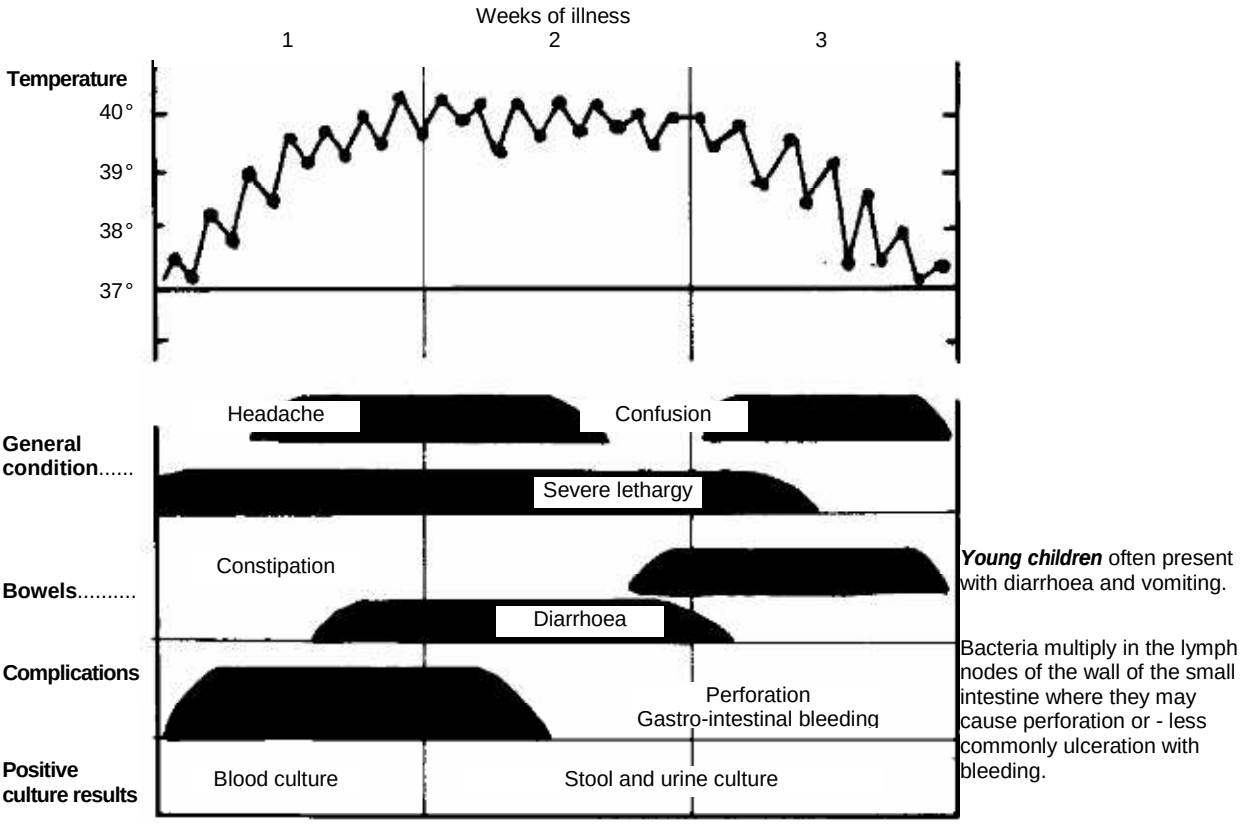
Medical:

- Typhoid pneumonia
- Myocarditis
- Confusion
- Typhoid meningitis (children under 5 years)
- Peripheral neuropathy

CLINICAL COURSE OF TYPHOID FEVER:

Incubation period: 10-14 days. During this time, the bacteria that have reached liver and spleen multiply. The illness starts when bacteria enter the bloodstream.

The **fever** increases stepwise during the first week, it is continuing during the second week and then goes down stepwise during the third week.



Young children often present with diarrhoea and vomiting.

Bacteria multiply in the lymph nodes of the wall of the small intestine where they may cause perforation or - less commonly ulceration with bleeding.

Figure 4–3 ***Typhoid fever***.

Dexamethasone 1 mg/kg/day divided into 3-4 doses IM or IV for 2 days

2–12 months	4–8 mg	3 times daily
1–5 years	8–12 mg	3 times daily
6–12 years	16–20 mg	3 times daily

Alternative: oral prednisolone 2 mg/kg/day oral in one single daily dose for 4 days (maximum 40 mg/day)

Complications and their management

- **Gastro-intestinal perforation** or **gastro-intestinal bleeding** with shock. These are the most important complications that occur during the second or third week of the illness. The child needs urgent surgery. Add metronidazole to chloramphenicol. For treatment of shock (see page 169).
- **Confusion**. Give a short course of high dose corticosteroids (for example, dexamethasone or prednisolone - dosages see above).

For further complications, see figure 4–3.

Antibiotic treatment of typhoid fever

Bacterial resistance

Bacterial resistance to antibiotics has become a problem in typhoid fever. This has been caused by irrational prescribing. To prevent further development of resistance, treatment should usually be with one antibiotic only.

Chloramphenicol

Give it orally. It is more effective by mouth than by injection.

Calculate the doses carefully according to the child's weight: 75–100 mg/kg/day divided into 3–4 doses, reduce after 3 days to 50–75 mg/kg/day.

First 3 days

2–12 months	125–250 mg	3 times daily
1–5 years	250–500 mg	3 times daily
6–12 years	500–750 mg	3 times daily

After 3 days, reduce the dose

2–12 months	62.5–125 mg	3 times daily
1–5 years	125–250 mg	3 times daily
6–12 years	500 mg	3 times daily

The fever will go down after 5-7 days but treatment should be continued for 10 days after the patient has become afebrile (without fever). This is believed to reduce the relapse rate.

Amoxicillin orally 100 mg/kg divided into 3 doses

2–12 months	250 mg	3 times daily
1–5 years	500 mg	3 times daily
6–12 years	1000 mg	3 times daily

Ampicillin IM 200 mg/kg divided into 3 doses

Co-trimoxazole orally

6 weeks–12 months	240 mg	2 times daily
1–5 years	480 mg	2 times daily
6–12 years	960 mg	2 times daily

About the use of Ciprofloxacin

Ciprofloxacin is contra-indicated children under the age of 12 years because of its possibly harmful side-effects on bone growth. However, its use can be justified in desperately sick children with typhoid fever who do not respond to other antibiotics and in whom multi-drug-resistance must be suspected. Ciprofloxacin dosage is 7.5–15 mg/kg/day divided into 2 doses.

Management of a relapse

10-20% of all children with typhoid fever will relapse even after correct treatment. A relapse is usually milder and shorter than the initial illness and occurs about 1-2 weeks after stopping the antibiotic. Treat with the same antibiotic as the first acute attack. A relapse is not a sign of drug resistance.

BRUCELLOSIS

Brucellosis is rare, compared with typhoid fever or tuberculosis, but it can sometimes be the cause of prolonged fever. The brucella bacteria infect cows and can be transmitted to children who are in close contact with the infected cattle, or who drink unboiled infected milk.

Clinical features

- Recurrent bouts of fever, tiredness and weakness.
- Musculo-skeletal symptoms. Arthritis often affects the hip, sacro-iliac or intervertebral joints, causing hip or back pain.
- A large spleen can be found in those children in whom the disease has gone on for several weeks.

How to diagnose brucellosis

Diagnosis is mainly based on clinical findings and the duration of illness. Sometimes brucellosis serology is available. The following findings support the diagnosis:

- Haemoglobin: moderate anaemia
- Low or normal WBC with low percentage of neutrophiles

Management

Children under 8 years co-trimoxazole + rifampicin for 6-12 weeks.

Alternative: co-trimoxazole + streptomycin for 6-12 weeks.

Children over 8 years: doxycycline daily for 6-12 weeks + for the first 14-21 days streptomycin daily.

DRUG-INDUCED FEVER

Drug-induced fever is usually not associated with specific symptoms. The fever is continuous. Several drugs, including antibiotics, especially sulphonamides (co-trimoxazole) can cause persistent fever. If the child's fever does not disappear with treatment and there is no suggestion to the cause of fever, stop all drugs and observe the child. The fever will come down after 2-3 days if it has been caused by a drug.

How to interpret fever patterns, ESR and White blood cell count (WBC)

Fever patterns

Sudden onset of fever	• Malaria • Bacterial infection • Viral infection
Gradual onset of fever	• Typhoid fever • Tuberculosis • Brucellosis
Biphasic fever The initial fever is followed by 1-2 days without fever, then the fever returns. The initial fever is caused by viruses multiplying in the child's body, the return of fever is caused by anti-bodies destroying the viruses.	• Viral infections
Relapsing fever Attacks of fever return in regular or irregular intervals.	• Malaria • Brucellosis
Constant fever	• Septicaemia (including typhoid fever)
Fever swings There are wide swings in the temperature during the same day. Phases with high fever are followed by phases without fever. Often there are focal signs.	• Severe pyogenic disease (disease with pus, for example, an abscess)

Interpretation of erythrocytes sedimentation rate (ESR)

The erythrocyte sedimentation rate (ESR) measures the rate of sedimentation of red blood cells in 1 hour (mm/h_1). It is an unspecific indicator of the presence of inflammation. Although often done, it is not very helpful in finding a specific diagnosis because it is positive in a wide variety of conditions associated with inflammation (for example, infections, rheumatic diseases, tissue trauma, necrosis). An ESR may even be normal despite the presence of inflammation. The ESR is also affected by many external factors such as the freshness of the chemical solution. It rises with high room temperatures and anaemia.

The following table gives some guidance but remember that the ESR is a screening test and not a specific diagnostic test (for example, in a child with a very high ESR, beside other possibilities, you need to consider a tumour. However, a normal ESR does not exclude a tumour).

Normal (Under 10 mm/h_1)	• Viral illness • Bacterial illness (early or not severe) • Tuberculosis
High (Over 30 mm/h_1)	• Bacterial illness (including sepsis) • Anaemia • Rheumatic fever • Tuberculosis • Chronic childhood arthritis • Nephrotic syndrome • Leukaemia
Very high (Over 80 mm/h_1)	• Rheumatic fever • Leukaemia • Tuberculosis • Nephrotic syndrome • Malignant tumour

Interpretation of White blood cells (WBC)

White blood cells (WBC) may be abnormal in number or in morphology. Therefore, the examination of the WBC consists of two parts that need to be seen together:

1. The total WBC count that gives the number of WBC in 1000 per ml (mm^3) blood.
2. Differential WBC count that gives the percentage of the different types of WBC in the blood.

THE TOTAL WBC COUNT

The normal values of the total WBC count of children are different from that of adults:

2 weeks–5 years	5,000–12,000/ml
5–12 years	5,000–10,000/ml

Interpretation of the total WBC in fever

This table provides guidance to interpret WBC in the light of the whole clinical picture. It does not mean that, for example, a low WBC would exclude leukaemia. On the other hand, if it is beyond 20,000 leukaemia is one of the likely causes.

Low (less than 5,000/ml)	• Typhoid fever • Malaria • Severe septicaemia • Brucellosis
Within **normal** values	• Viral infections • Chronic infections (for example, tuberculosis) • Typhoid fever

Raised, but less than 20,000/ml	• Bacterial infections (including sepsis) • Viral infections • Inflammation • Reaction following injuries, burns or surgery • Prolonged therapy with corticosteroids
Very high (over 20,000/ml)	• Leukaemia • Severe bacterial infection (for example, liver abscess)

THE DIFFERENTIAL WBC

The differential WBC count provides additional information to the total count. The percentage of the different types of white blood cells in the blood stream is estimated by counting 100 white blood cells in a thin blood film.

The normal values for children are different from adults. The most important difference is that the number of neutrophiles and lymphocytes is similar in children up to about the age of 5 years.

Normal values of neutrophiles and lymphocytes:

2 weeks–5 years	Neutrophiles (N)	40–60%
	Lymphocytes (L)	40–60%
5–12 years	Neutrophiles (N)	45–65%
	Lymphocytes (L)	30–50%

Normal values of eosinophiles, monocytes and basophiles:

2 weeks–12 years	Eosinophiles (E)	1–5%
	Monocytes (M)	3–7%
	Basophiles (B)	0–1%

Interpretation of differential WBC in *acute fever*

In acute fever the most important information is whether a child has got more neutrophiles than normal or not.

Neutrophiles normal or low	• Viral infection (high lymphocyte count) • Typhoid fever • Malaria
Neutrophiles high (neutrophilia, polymorph leukocytosis, granulocytosis)	• Bacterial infection • Collection of pus (abscess)

Interpretation of differential WBC in *prolonged fever*

Neutrophiles normal or low (neutropenia)	• Typhoid fever • Disseminated tuberculosis • Malaria • Severe septicaemia
	• Auto-immune diseases (for example, rheumatoid arthritis) • Brucellosis • Tumours
Neutrophiles high (neutrophilia)	• Bacterial infection • Collection of pus (abscess)
Lymphocytes high (lymphocytosis)	• Viral infection (often reactive changes of the lymphocytes are found) • Typhoid fever (especially if the total number of WBC is low) • Brucellosis
Eosinophiles high (eosinophilia)	• Parasitic infections but only when the parasites have invaded tissues: – Strongyloides – Hydatid disease (not always) – Hookworm • Allergic reaction (some cases of asthma and eczema) • Rare: Lymphoma
Abnormal white cells	• Leukaemia

References

1. Balldin B. *KCMC Management schedules of some children's diseases at hospital level.* 5th edition. Moshi, Tanzania: KCMC Educational Committee 1994.
2. Behrmann RE, Kliegman RM, Nelson WE. *Textbook of Paediatrics.* 15th edition. Philadelphia: WB Saunders Company 1996.
3. Cattaneo A. Managing fever in a child with cough or difficult breathing. *ARI news* 1993; 25: 2-3.
4. Ebrahim GJ. *Paediatric Practice in Developing Countries.* 2nd edition. London: Macmillan Education Ltd. 1993.
5. HealthNet International. *Malaria Control Program for repatriating refugees in Eastern Afghanistan. 6-month report III: 1 September 1995 to 29 February 1996*. Peshawar 1996.
6. Illingworth RS. *Common Symptoms of Disease in Children.* 9th edition. London: Blackwell Scientific Publications 1988.
7. Luxemburger C. Managing Malaria. *Child Health Dialogue* 1997; 6: 7-8.
8. Paxton LA, Redd SC, Stekee RW, Otieno JO, Nahlen B. An evaluation of clinical indicators for severe paediatric illness. *Bulletin of the World Health Organization* 1996; 74: 613-618.
9. Stanfield P. *Child Health*. 2nd edition. Nairobi: African Medical and Research Foundation 1997.
10. Stanfield P, Brueton M, Chan M, Parkin M, Waterston T. *Diseases of Children in the Subtropics and Tropics*. 4th edition. Kent: Edward Arnold 1991.
11. Weatherhall DJ, Ledingham JGG, Warrell DA (editors). *Oxford Textbook of Medicine*, Volume 2. 3rd edition. Oxford: Oxford University Press 1996.
12. World Health Organisation. Charts for Integrated Management of Childhood Illness. Geneva: WHO ca. 1996.

5. Measles

Measles is a major killer of children

Measles is a viral illness. It is one of the five main killers of children and about 10% of children with measles will die. Children do not just die during the acute illness because of complications. They also have a significantly higher risk of dying in the months following the illness because the measles virus weakens a child's immunity for several months, making him more vulnerable to infections during that time. In many children, measles is followed by malnutrition.

How to diagnose and classify measles

It is easy to recognise measles once the typical rash appears. Suspect measles in any child with fever, cough, nasal discharge or red eyes.

The typical clinical presentation of measles, pointing out areas of special clinical importance, is explained in figure 5–1.

The first step after diagnosing measles is to classify the illness according to its severity:

1. **Mild measles** = **uncomplicated** infection
2. **Severe measles** = the child has **complications**

The clinical course of measles

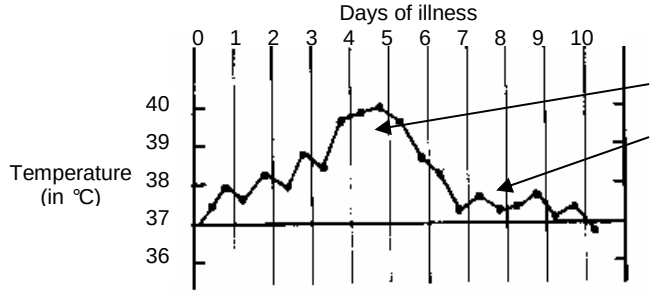
Commonest age: 9 months–4 years

How children become infected: they inhale fine, invisible droplets that contain the virus from another infected child (= droplet infection). The disease spreads very rapidly.

Incubation period (time between acquiring infection until the begin of clinical illness): 10-14 days

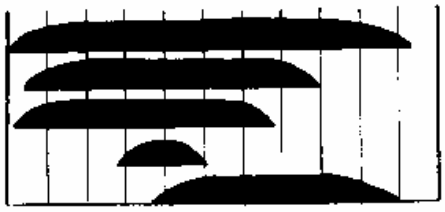
Duration when infectious: the highest risk to infect other children is from the 8th day of the incubation period until 1 week after the appearance of the rash.

Immunity: life-long. Children who have had measles are unlikely to get the disease again.



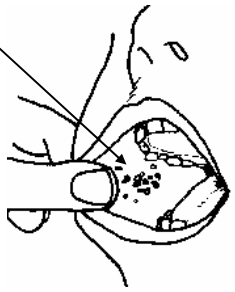
Fever:
- When the rash appears, the fever rises rapidly and the child becomes ill.
- The fever resolves 3-4 days after the onset of the rash.
- ***If the fever continues for more than 4 days after the appearance of the rash, or if it returns*** after an afebrile period, suspect a secondary bacterial infection.

CLINICAL SIGNS:
- Cough.....
- Nasal discharge...
- Red eyes.....
- Koplik's spots.....
- Rash.....



Cough, nasal discharge, red eyes and red throat are the first clinical signs (prodromal signs) of measles.

Koplik's spots: on day 3 or 4 the measles rash appears inside the cheeks before it starts on the outer skin. The rash consists of raised white spots and looks like "sprinkled salt"; it is called Koplik's spots.



Measles rash: The typical rash appears on day 4 or 5. It starts behind the ears and then spreads down over the face to the trunk and all limbs. The rash is macula-papular, red and slightly raised and irregular. There are no blisters or pustules.
After 7 days, the rash darkens and peels (desquamation). It leaves behind a brownish discoloration that can be seen for about 2 weeks after the illness.

Figure 5–1 ***The clinical course of measles***.

How to manage a child with uncomplicated measles

There is no specific treatment available. Management is supportive.

1. Advise about **good nutrition**:
   - Breastfeeding should be continued.
   - Extra food should be provided. Advise about protein and energy-rich food (for example, super-flour, see page 15). The child needs two additional feeds during the two weeks following the illness.
   - Discourage harmful beliefs. Measles is a unique disease that is recognised by most Afghans. As there is no effective treatment available, measles has given rise to various beliefs and practices, some of which are harmful. Ask the family what they are doing with their child and discourage harmful practices.
2. Give ***vitamin A***: it reduces the risk of complications, shortens the duration of the illness, and reduces mortality from measles. Give the first dose on the day you see the child and a second dose the next day. In children under 2 years, give a third dose after one week.

Under 6 months	50,000 IU
7–12 months	100,000 IU
Over 1 year	200,000 IU

3. Explain **eye and mouth care**:
   - Eyes and mouth should be cleaned at least four times daily.
   - Show the parents how to clean the eyes with warm clean water or tea.
   - Traditional eye medicine should not be applied. Never give steroid eye drops.
   - The mouth should be wiped with a clean cloth soaked in clean water with a pinch of salt.
4. **Reduce high fever** (over 39°C) with paracetamol.
5. **Assess for complications** and treat accordingly.
6. **Follow up a child** for several months after the illness to detect and treat malnutrition and complications early. Ideally, monitor how the child is growing (see page 16). In uncomplicated measles, ask the parents to bring the child back in two weeks or earlier if his condition worsens. Particular danger signs the family should know are:
   - Newly started cough
   - Difficult breathing
   - Recurrence of fever
   - Blood in stools
   - Inability to drink

NOTE: Do not routinely use antibiotics. There is no proof that they prevent complications. Never routinely give phenobarbital.

Summary - basic principles of measles management

1. Continue breastfeeding.
2. Provide extra food.
3. Discourage harmful traditional practices.
4. Give vitamin A.
5. Give eye and mouth care.
6. Reduce high fever.
7. Look for complications, especially in high risk groups, and treat accordingly.
8. Follow up the child.

NOTE: Do not routinely use antibiotics or phenobarbital.

Complications in measles

Complications in measles are common. They are more frequent and severe in certain children. Expect complications especially in the following children:

- Severely malnourished children
- Children who have contracted measles from someone in the same household, because they have probably been exposed to a large infecting dose of the virus
- Children who live under crowded conditions (for example, in refugee camps)

If good hospital care exists, refer the following children to a hospital for observation:

- Severely malnourished children
- Young children under 1 year of age
- Children with severe pneumonia
- Children with croup
- Children with severe dehydration
- Children with diarrhoea more than 5 times daily
- Children with deep mouth ulcers

Summary - the key points of the assessment for complications

- Is the child malnourished?
- Has the child fast breathing, chest indrawing or difficult breathing? (Pneumonia)
- Can you hear a stridor, this is a harsh breathing sound while the child is breathing in? (Croup)
- Are the child's eyes dry and cloudy? (Vitamin A deficiency)
- Is there pus at the corners of the eye? (Secondary bacterial infection)
- Is the child suffering from diarrhoea?
- Is the child dehydrated?
- Has the child mouth ulcers?
- Has the child ear pain, acute ear discharge or a red eardrum? (Otitis media)
- Has the child fever for more than 4 days after the rash appeared? (Secondary bacterial infection)

PNEUMONIA

Secondary pneumonia is a common complication of measles with a high mortality.

Look for fast breathing, chest indrawing or difficult breathing (dyspnoea).

Treatment is according to the standard treatment guidelines for pneumonia, see page 55.

CROUP (Laryngotracheobronchitis)

This is a very dangerous condition.

Look for stridor, a harsh noise when the child is breathing in. The child's voice is hoarse.

Treat with chloramphenicol.

DIARRHOEA AND DEHYDRATION

Diarrhoea increases the risk of malnutrition through protein loss. It may be severe enough to cause dehydration. Treat it according to the standard treatment for diarrhoea (see page 67). An antibiotic is not indicated unless there is blood in the stools.

EYE INFECTION

The measles virus itself invades the conjunctiva, causing viral conjunctivitis. A corneal ulcer may develop rapidly, especially in a child with vitamin A deficiency. This can result in blindness.

The usual eye discharge in measles is watery. Look for pus in the corners of the eye that indicates secondary bacterial infection. Look also for signs of vitamin A deficiency.

Treat with tetracycline eye ointment 4 times daily for 1 week.

MOUTH ULCERS

Soreness and ulceration of the lips and the throat make eating for the child painful and contribute to the development of malnutrition. Secondary herpes virus infection can occur; manage as described on page 48.

MALNUTRITION

Children with measles often become malnourished because of their poor appetite, sore mouth, diarrhoea and infections. Therefore, good nutrition is one of the priorities of measles management.

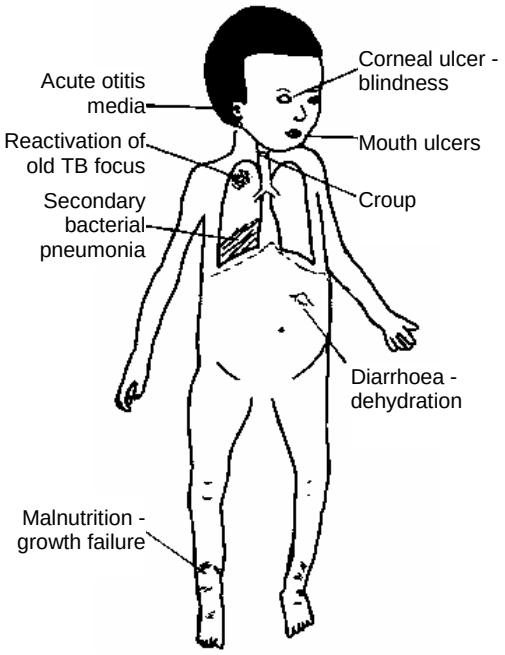


Figure 5–2 ***Complications of measles***.

TUBERCULOSIS (TB)

The measles virus weakens particularly that part of the immune system (cell mediated immunity) that controls tuberculosis infection. Often an old TB focus is re-activated and a child develops TB disease.

Suspect tuberculosis if a pneumonia does not respond to standard antibiotics or if a child does not recover from measles despite good nutrition. A tuberculin skin test is negative after measles (for details of how to diagnose tuberculosis in children, see chapter 6. "Tuberculosis").

OTITIS MEDIA

Look for acute ear discharge or a red, bulging eardrum (details are described on page 42).

FEBRILE CONVULSIONS

They occur usually within the first days of the disease (for management see page 128).

RARE: ENCEPHALITIS

Viral encephalitis is a rare but often fatal complication of measles. It occurs in 1 out of 1000 cases. About 2-3 weeks after the initial illness, a child presents with irritability (exclude dehydration), vomiting, confusion or convulsions. 50% of these children will recover, but often with residual brain damage (for management see page 134).

How to prevent measles - do not miss an opportunity to immunise

Measles and all of its disastrous consequences could easily be prevented through immunisation. The measles vaccine should be given to all children when they are 9 months old. Under 9 months, the young baby is usually well protected from measles by antibodies from his mother.

When a child comes to you for whatever reason, ask about previous immunisations. Give measles vaccine to all non-immunised children from 9 months up to at least 2 years. If possible, give it on the same day you see the child.

During an outbreak of measles, the age for giving measles vaccine should be lowered to 6 months. These children need a second dose at the age of 9 months. Children with a case of measles in their household should be immunised immediately.

It is important that *children in hospitals* are immunised against measles to prevent measles transmission in hospital. The WHO recommends that on admission, measles vaccine is given to all non-immunised children from the age of 6 months onwards. Children with suspected measles should be isolated from other children in the waiting areas of clinics and private consultation rooms. Malnutrition is not a contraindication to measles vaccine but a very strong indication to immunise as soon as possible.

References

1. Ebrahim GJ. *Paediatric Practice in Developing Countries*. 2nd edition. London: Macmillan Education Ltd. 1993.
2. Hussey G. How to manage measles. *ARI News* 1994; 28: 4-5.
3. Hussey G. Preventing measles deaths. *Child Health Dialogue* 1996; 3+4: 14.
4. Sommer A. *Vitamin A deficiency and its consequences*. 3rd edition. Geneva: WHO 1995.
5. Stanfield P. *Child Health*. 2nd edition. Nairobi: African Medical and Research Foundation 1997.

6. Tuberculosis (TB)

Tuberculosis, a unique infectious disease

Tuberculosis (TB) is caused by Mycobacterium tuberculosis bacilli. These form small nodules (granulomas or tubercles) in whichever body organ they infect. Eventually they can destroy the organ. TB is a unique infection because of its great variety of presentation that can imitate many other conditions. It can be difficult to diagnose in children. If a child is treated correctly, he will be cured. If he is not treated correctly, he may suffer permanent organ damage or die.

TB is very common in Afghanistan. Reasons are poverty with poor nutritional status and weak immunity, crowded living conditions and the often incorrect treatment of adults with TB.

To be able to diagnose and manage children with TB,

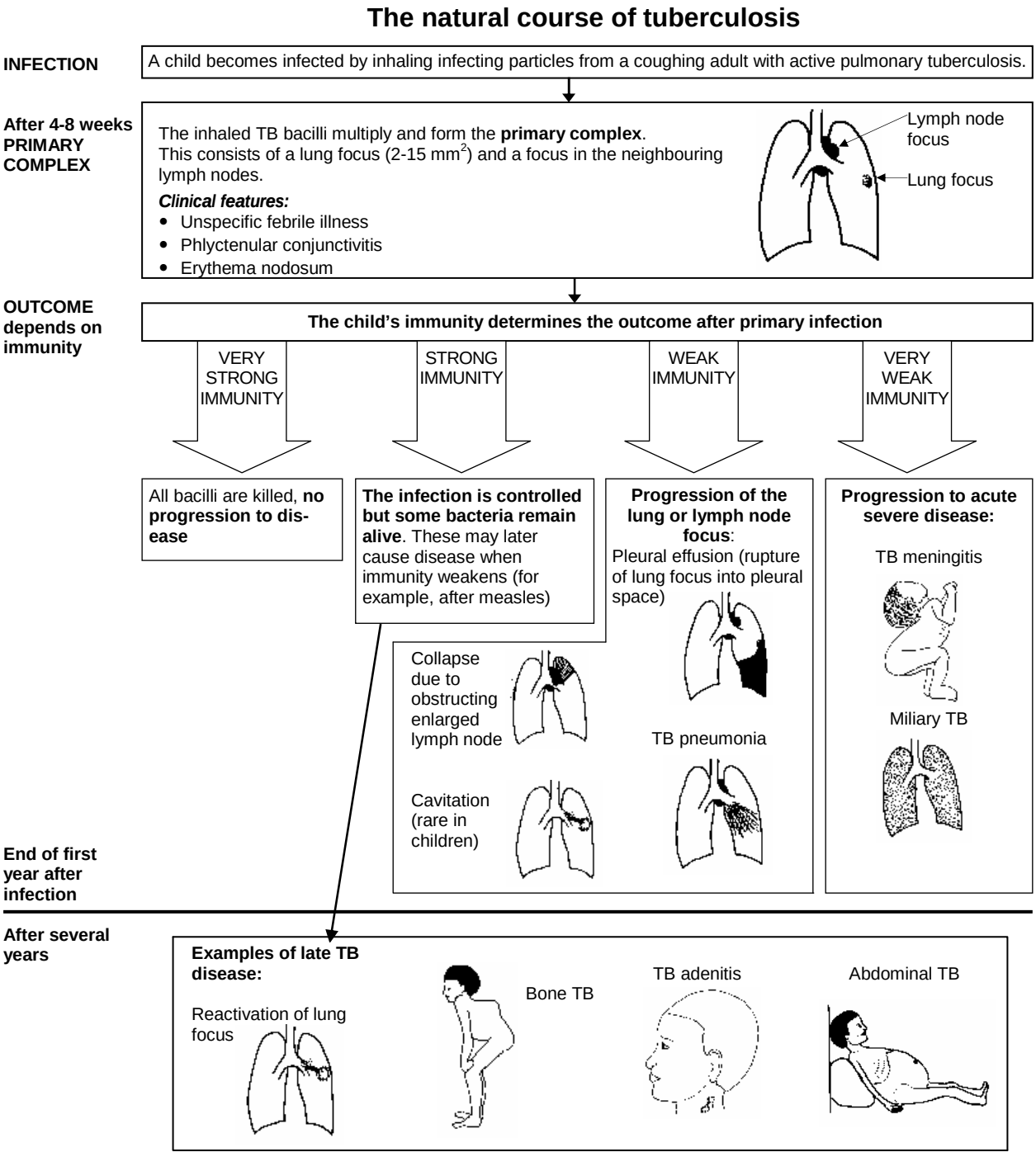


Figure 6–1 ***The natural course of tuberculosis***.

it is important to understand how children become infected and how the disease can progress (figure 6–1).

Adults with active pulmonary TB are the main source of TB infection. In their lungs are cavities (spaces), which are full of TB bacilli. When such a person coughs, a large number of TB bacilli are sprayed into the air in tiny droplets. A child who is in close contact with someone who has active pulmonary TB is at great risk of inhaling these bacilli and becoming infected with TB.

There is a difference between *TB infection* and *TB disease*. A child who has inhaled TB bacilli has TB infection. However, if his body defences are strong, all bacilli are killed. Sometimes the bacilli are controlled and will not further multiply but are still alive. If a child's immunity becomes weak later (for example, during measles) the bacilli may start multiplying again and the child develops TB disease. By the age of 20 years, almost everyone in Afghanistan will have been infected by TB bacilli, but not all have developed disease.

If a child's body defences are not strong, the child will develop TB disease. The lungs can be affected (pulmonary TB) or more commonly, an organ outside the lungs (extra-pulmonary disease). The TB bacilli get to extra-pulmonary organs through the blood stream. If body defences are very weak, a child may develop TB meningitis or disseminated (miliary) TB. This means that TB affects many locations of the body at the same time. The following children have a weak immunity and are at a high risk of developing TB disease:

- Young children
- Malnourished children
- Children with measles
- Children on long-term treatment with steroids

How to diagnose TB in children

The diagnosis of tuberculosis may be obvious in some children while in others it may be very difficult to establish. The diagnosis is based on:

- Suspicious symptoms and signs
- History of contact with someone with active pulmonary TB

The following may be helpful:

- In older children: a sputum test
- A suspicious x-ray
- A highly positive tuberculin skin test
- Measuring the child's progress, ESR and weight during a 3-week trial of anti-TB medicine

Summary - signs and symptoms suspicious of tuberculosis

COMMON

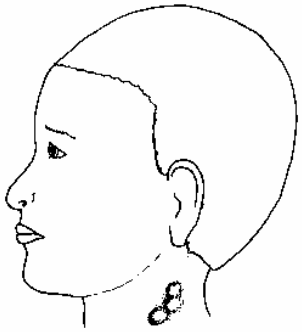
- Weight loss and failure to grow
- Loss of appetite and energy
- Fever of unknown cause for more than 1 week
- Large swollen painless lymph nodes, sometimes with discharge
- Cough or wheeze lasting for more than 1 week

LESS COMMON

- Pleural effusion
- Pneumonia not responding to standard treatment
- Stiff and painful back
- Ascites
- Gradually increasing headache, irritability and drowsiness
- Very ill child with constant fever
- Stiff and swollen joint

Suspicious symptoms and signs

- **Weight loss and failure to grow**. A child with tuberculosis does not grow normally and usually loses weight. TB and malnutrition often go together, but the majority of children with malnutrition do not have TB. In children with TB, the malnutrition does not respond to appropriate nutritional treatment.
- **Loss of appetite and energy**. Another common cause of appetite and energy loss is worm infestation with anaemia. TB and worm infestation may exist at the same time.
- **Fever of unknown cause for more than 1 week**. The fever occurs often in the evening and is usually not very high. It may have been present for several months.
- **Large swollen, painless lymph nodes, sometimes with discharge**. The neck lymph nodes are most commonly affected. Lymph node involvement is usually caused by lymphatic spread from the lungs and not by a TB focus on the tonsils. Sometimes lymph nodes in the axilla enlarge, which suggests more widespread disease. If there is no discharging sinus, give co-trimoxazole for 2 weeks and reassess the child afterwards. Treatment of lymph gland TB (TB adenitis) is by anti-TB drugs, not by operation.



- Chronic
- No pain
- One or more firm enlarged lymph nodes. They may later open and discharge pus. Then typical scarring of the skin (scrufolderma) may be found.

Figure 6–2 *TB adenitis*.

- **Cough or wheeze lasting for more than 2 weeks**. Cough is such a common symptom that you should not consider TB unless a child has been coughing for more than 2 weeks or shows other signs of TB. Suspicious signs of TB are a persistent cough with weight loss, loss of energy and prolonged fever (see also "Chronic cough", page 59).
- **Pleural effusion**. A pleural effusion is likely caused by TB if it has developed gradually over several weeks and is associated with loss of weight and energy. Often a child's breathing is surprisingly little disturbed, even with a large effusion (For other causes of pleural effusion see page 58).
- **Pneumonia**. Suspect TB if a pneumonia has not responded to standard treatment (see page 55).
- **Stiff and painful back** (figure 6–3). These are the earliest signs of spinal TB, which is the commonest site for bone TB. If the diagnosis is delayed, a deformity (gibbus) and later paralysis of the legs may develop.

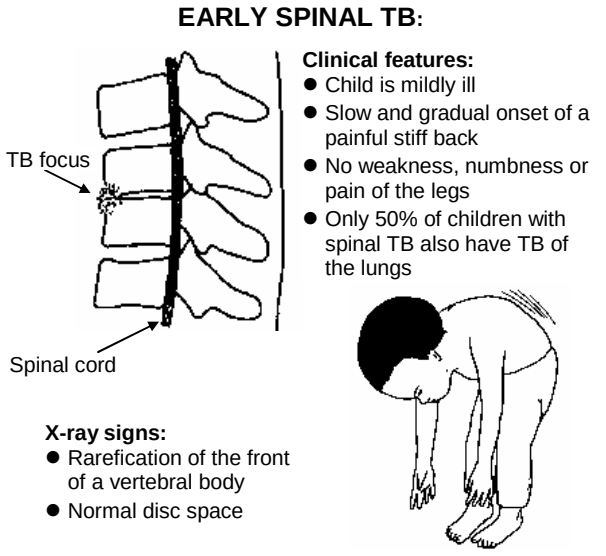


Figure 6–3 ***Spinal tuberculosis***.

On examination, there is marked tenderness over one or more defined areas directly over the spine. Sometimes an abscess that is not hot and red can be found. Weakness of the legs or paralysis may have already developed.

Treatment can be started on the basis of typical clinical findings. A spinal x-ray (lateral is more important than anterior-posterior view) will confirm the diagnosis (for differential diagnosis of back pain or back deformity see page 116).

- **Ascites** (see page 86).
- **Headache, mental changes: TB meningitis**. Gradually increasing headache, irritability, drowsiness, vomiting, mental changes and meningeal signs are typical for TB meningitis.
- **Very ill child, high steady fever, often difficult breathing: miliary TB**. In a very ill child with high, continuous fever and often difficult breathing, suspect miliary TB. This is a septicaemia caused by TB bacilli that have spread to all parts of the body and produced millions of small TB foci. On a chest-x-ray, you can see these typical miliary focuses (figure 6–4).

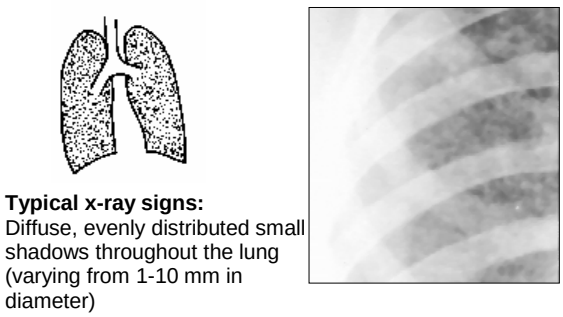


Figure 6–4 ***Miliary tuberculosis***.

- **Stiff and swollen joints, limp**. The joints are not hot like in septic arthritis. Joint tuberculosis is rare in children. The onset is slower than septic arthritis. Hip and knee joints are most commonly involved (see pages 112–114).
- Chronic skin ulcer (see pages 149–150).

History of contact with someone with active pulmonary TB

If a child with any of the above symptoms had close contact with a person with active tuberculosis, TB is very likely.

Sputum microscopy

The first choice test for adults with suspected pulmonary TB is sputum examination. In children, sputum examination is of limited value. Children rarely develop pulmonary cavities and young children swallow their sputum. However, if a child has developed a

productive cough, three sputum samples, one of which should be an early morning sample, should be examined for acid fast bacilli (AFB).

A suspicious x-ray

Doctors who diagnose TB based on a x-ray alone, will label many children as having TB who actually suffer from another condition. Many diseases (for example, pneumonia) show the same x-ray signs as TB. The following x-ray findings are indicators of a TB lung infection if the duration of the illness and clinical symptoms suggest TB:

- The combination of lung infiltration and enlarged mediastinal lymph glands
- Infiltration of the upper lung zones
- The typical miliary shadows of miliary TB

NOTE: Calcification is a sign of old infection

A high positive tuberculin skin test

A tuberculin test only confirms that a child had contact with TB bacilli (TB infection). It does not confirm that a child has developed TB disease. However, if you suspect TB in a child, a strongly positive test may support your suspicion. In the test a certain amount of inactive TB bacilli are injected into the skin and after 48-72 the defence reaction of the body is assessed. Measure the induration; redness is not important.

Be aware that the test may be negative in children with miliary TB, in malnourished children and children with measles even if they suffer from TB disease.

Measuring the child's progress, ESR and weight during a 3-week trial of anti-TB medicine

If the diagnosis of TB is likely but you cannot confirm it, try to measure the child's weight and do an ESR. Start full TB treatment (do not use a single drug) for three weeks and reassess the child afterwards. If his general condition has improved, his appetite has returned, his weight is increasing and the ESR decreasing, the diagnosis of TB is confirmed. The child must continue the full treatment, otherwise he will not be cured. Do not do this therapeutic trial if there is a functioning TB programme in your area. Instead, refer a child there for further management. Be aware that some children with TB disease may have a normal ESR.

In the case of chest symptoms such as chronic cough, a course of a broad-spectrum antibiotic such as co-trimoxazole or amoxicillin should be tried first. Then, only if the child does not improve, the trial of anti-TB medicines may be started. If you give antibiotics and anti-TB drugs at the same time, you will not know which drugs have helped!

How to manage children with tuberculosis

Who should treat children with tuberculosis?

Whenever possible, the management should be done by a national TB control programme. If there is a well-functioning programme that supervises the treatment in your area, refer all suspected and all proven cases there. One of the reasons for the worsening TB crisis is that the disease is treated by many people, and, in the majority of cases, wrongly.

If there is no reliable TB programme you should treat children only according to recommended guidelines. If you follow these guidelines, children will usually be cured.

The different treatment groups of children

- Children with pulmonary or extra-pulmonary disease who are not seriously ill
- Children who are seriously ill with extensive pulmonary disease, miliary TB or TB meningitis
- Children without symptoms but who are known to be at high risk of infection, for example, a newborn whose mother is sputum positive for TB at birth.

Education of the family

Before you start treatment, make sure...

- ...that the family understands the disease and the necessity to complete the prescribed treatment.
  - Try to see several family members, or at least both parents, so that everyone understands about the disease and its treatment.
  - Ask the family to appoint one member who is responsible for ensuring the child takes the medicine every day.
  - Whenever you see the family, stress again the need to continue the treatment until its completion.

  Be sure, the family has understood all of the following:

  1. The child will start feeling better with treatment after a few weeks, but this does not mean that he is cured. It means that the treatment is effective and he will be cured if it is completed. The disease is still there and it will take 8 or 12 months (depending on the regimen) until all TB germs are killed.
  2. The child should take all drugs at the same time once daily. This should be 1 hour before food.

Do not divide the drugs into several doses.

3. Explain common side-effects of drugs. Ask them to bring the child back if any of these occur.
4. The child needs good nutritious food.
5. Reassure the family that the child will not infect others (the exception being sputum positive TB).

- ...that you treat with a correct combination of drugs to prevent resistance
- ...that you give the right dosage
- ...that the drugs are taken every day under supervision
- ...that the drugs are taken for a sufficient time, usually 8 or 12 months

Drug treatment

TB treatment consists of two phases:

1. **The initial (intensive) phase**. In this phase, a combination of 3 or more drugs is used to kill as many TB bacilli as possible and to prevent the development of drug resistance. This initial phase should last for a minimum of 2 months.
2. **The continuation phase**. In this phase fewer drugs, usually 2 are given. Even if the child feels well already, the phase must be continued for long enough to kill all the remaining bacilli. Depending on the regimen, this phase lasts 4 or 6 months; or 10 months according to the old standard treatment.

Drugs used to treat TB

Isoniazid

Pyrazinamide

Rifampicin

Rifampicin is a very effective drug. It is therefore a disaster if bacilli become resistant to it. To prevent this, rifampicin should only be taken under supervision. Do not prescribe it if you cannot be sure that a patient will take it without any interruption!

Streptomycin

When you prescribe streptomycin consider that it can possibly cause hearing damage and that it has to be given by injection. Syringes and needles add to the costs and hepatitis viruses may be spread by the injection. The solution of streptomycin can only be used within 1 hour after its preparation!

Ethambutol

It can affect the vision and young children may be unable to report problems with their eyesight. Therefore, do not give it to children under age 6 years.

Thioacetone

It is always given in combination with isoniazid.

Recommended combinations of anti-TB drugs

Until recently, the standard treatment was 12 months. This was cheap but had the disadvantage that it was often not completed and a child was not fully cured. Short course regimens were introduced about 15 years ago; they are more expensive but have a higher cure rate. Total duration of these short course regimens is 6 or 8 months.

8 months regimen

Initial intensive phase (first 2 months):	Daily: ***Isoniazid + rifampicin + pyrazinamide*** ***In severe forms or if sputum positive***, add ethambutol or streptomycin
Continuation phase (months 3-8):	Daily: ***Isoniazid + thioacetone*** ***Alternative***: Isoniazid + ethambutol

In miliary TB and TB meningitis, give for 3 months intensive phase treatment and for 9 months continuation treatment.

If the treatment cannot be strictly supervised or the family is poor, the old 12 months regimen will be successful if it is not interrupted or stopped too early:

12 months regimen

Initial intensive phase (first 2 months):	Daily ***Isoniazid + thioacetone + ethambutol*** ***Alternative***: Isoniazid + thioacetone + streptomycin
Continuation phase (months 3-12):	Daily: ***Isoniazid + thioacetone*** ***Alternative***: Isoniazid + ethambutol

NOTE: The WHO draft for a TB control programme for Afghanistan recommends a 6 months regimen, using rifampicin and isoniazid during the 4 months continuation phase. The patient takes his drugs daily supervised by clinic staff. However, strict supervision is usually not realistic and for practical purposes, this regimen cannot be recommended for treating patients outside well-organised TB control programmes. Sadly, it is one of the commonest wrongdoings of TB treatment in the private (and hospital) sector, to give patients a one-month prescription including rifampicin. Never do it! We must try to reduce the misuse and insufficient prescribing of rifampicin, otherwise rifampicin resistant bacteria will emerge in the community, making the cure of TB patients very difficult or almost impossible.

Drug doses of anti-Tb drugs

A drug dose is calculated according to the **weight before treatment** (pre-treatment weight) of a child. In severely malnourished children, re-calculate and adjust the dosage at the end of the initial phase.

Drug preparations combining two or more anti-TB drugs can be used if their quality is assured.

	PRE-TREATMENT WEIGHT					
	Under 5 kg	**5–10 kg**	**11–20 kg**	**21–32 kg**	**33–50 kg**	**Over 50 kg**
Isoniazid	5 mg/kg daily	50 mg	100 mg	200 mg	300 mg	300 mg
Rifampicin	10 mg/kg daily	75 mg	150 mg	300 mg	450 mg	600 mg
Pyrazinamide	25 mg/kg daily	250 mg	500 mg	1000 mg	1500 mg	2000 mg
Ethambutol	***Do not use in children under 6 years***			800 mg	800 mg	1200 mg
Streptomycin	15 mg/kg daily	250 mg	500 mg	500 mg	750 mg	1000 mg
Thioacetone	2.5 mg/kg daily	25 mg	50 mg	100 mg	150 mg	150 mg

Additional drugs in TB treatment

- ***Vitamin A***: give one single dose to all children with TB.
- ***Pyridoxine*** (vitamin B_6): do not routinely give it unless the child has signs of isoniazid-induced paraesthesia.
- ***Steroids***:
  - Never give them to patients with suspected TB who are not on treatment.
  - Never use them routinely because of their side-effects.
  - They may be useful for the severely ill child and may help to reduce the outpouring of fluid into the abdomen (ascites), pleural space (pleural effusion) or pericardium (pericardial effusion).
  - They may be used in TB meningitis.

NOTE: Do not prescribe multivitamins, they are useless. Good nutrition with protein- and energy-rich food is important.

Management of common side-effects of TB drugs

Joint pains (pyrazinamide): give aspirin or ibuprofen.

Numbness and **"pins and needles"** in the feet (isoniazid): give pyridoxine (vitamin B_6).

Jaundice (isoniazid, rifampicin, pyrazinamide, rare: thioacetone): stop all drugs until the jaundice improves, which usually takes 3-7 days, then restart them all.

If jaundice recurs, stop the drugs again and restart them systematically: start with isoniazid and add another drug every 4 days. If the child turns jaundiced after introducing a drug, discontinue this drug.

Ringing of ears, giddiness (streptomycin): reduce the streptomycin dose by one quarter.

If symptoms persist:
- If the patient is above 6 years, change to ethambutol.
- If the patient is under 6 years, stop streptomycin.

Nausea (rifampicin, pyrazinamide): give the drugs with food.

Mild itching (any drug): add an anti-histamine.

Loss of vision (ethambutol): stop ethambutol and never give it again.

Follow-up

It is very important to keep a written record to give to the family. Otherwise you or others who see the child later may not know at which stage of the treatment he is. It is not enough to give a prescription of drugs to a family.

The written record should contain:

1. The child's presenting symptoms and how you confirmed the diagnosis of TB. On each follow-up visit write down the child's condition
2. The date when you started treatment and the date treatment should be completed
3. Which treatment course you want the child to take and for how long he should take each drug
4. The estimated pre-treatment weight and the drug dosages
5. Details about how long you supplied the patient with drugs and on which date the child should return. If it is not possible to see him daily, see him at least weekly during the intensive phase and every two weeks during the continuation phase.

What to do if a child is not improving

Drug resistance is very rare in children. The commonest causes are that the drug dosage was wrong or the family did not give the drugs regularly. Check also your diagnosis and examine for complications (for example a missed pleural effusion).

Can TB relapse after several months or years?

If a child has completed correct treatment without interruption recurrence of TB is very unlikely. Look first at other possible causes (for example bronchiectasis is often missed, see page 60).

Look for the person who has infected the child

Look amongst the household and the child's close contacts for an adult who has a chronic cough, often also some weight loss, poor appetite and fever. Examine and treat the adult appropriately. Tell the family that it is possible that the person has also infected other children and that they should send you any child who becomes ill.

Prophylaxis for a newborn whose mother has active TB

A newborn whose mother has active open pulmonary tuberculosis should receive prophylaxis with isoniazid. She must continue breastfeeding in any case because the risk of the baby dying because of not being breastfed is far greater than the risk of acquiring tuberculosis from his mother. Give the child ***isoniazid*** for 6 months (5 mg/kg once daily = about 15 mg. This is about ¼ tablet isoniazid 100 mg). Do not give him BCG at birth but after finishing the isoniazid.

If the mother has been sputum negative at birth, give the baby BCG and follow him up, if possible, by monthly weight checks.

How to prevent TB

1. Give BCG vaccine within the first week after birth. It does not prevent a child from becoming infected with TB but it strengthens a child's body defences against TB so that he is protected from miliary TB and TB meningitis.
2. Find adults with active lung disease who spread the disease through the community. Treat them according to standard guidelines. After 2 or 3 weeks of treatment they will no longer be infectious. Patients with extra-pulmonary TB do not spread the disease.
3. Tell people who cough, to cover their mouth and nose when they are coughing. Discourage spitting inside rooms.
4. Encourage people to ventilate their houses and to let sunshine in. Ventilation blows TB bacilli out of rooms and reduces transmission rate. Sunlight kills TB bacilli. TB is not transmitted by sharing food with TB patients.
5. Encourage good nutrition and measles vaccination.

References

1. Crofton J, Horne N, Miller F. *Clinical Tuberculosis.* London: Macmillan 1992.
2. Ebrahim GJ. *Paediatric Practice in Developing Countries.* 2nd edition. London: Macmillan Education Ltd. 1993.
3. International Union Against Tuberculosis and Lung Disease. *Tuberculosis Guide for Low Income Countries.* 4th edition. Paris: IUATLD 1996.
4. King M, King F, Martodipoero S. *Primary Child Care.* Book One. Oxford: Oxford University Press 1978.
5. LEPCO. *Manual TB Control Programme.* Afghanistan 1998 (unpublished).
6. Tuberculosis and children: the missing diagnosis. *Child Health Dialogue* (special supplement) 1996.
7. World Health Organisation Support Office for Afghanistan. *Guidelines for Tuberculosis Control in Afghanistan.* Islamabad: WHO 1998 (unpublished First Draft).

7. Ear, nose and throat problems and neck swellings

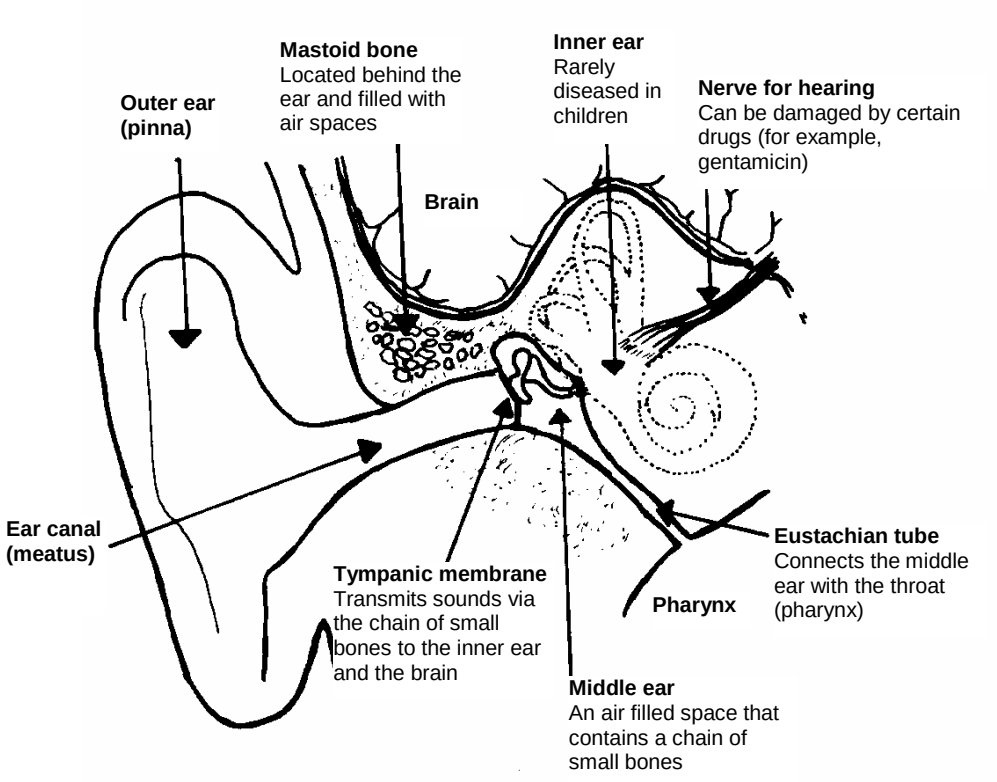


Figure 7 –1 ***Basic anatomy of the ear***.

EAR PROBLEMS

The two most common ear problems are pain and discharge. The different causes are listed below.

How to assess a child with an ear problem

Take a history

- Does the child have ear pain or ear discharge?
  - If he has ear discharge, for how long?
    - If less than two weeks = acute illness
    - If more than two weeks = chronic problem

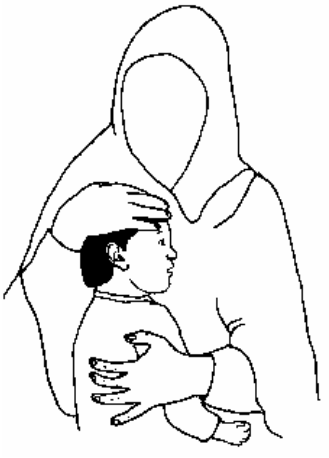
Examine the child

Always examine the ears at the end of your examination because children will often cry when you do it. (See figure 7–2)

- Tenderness and swelling behind or above the child's ear?
- Pain when you move his outer ear?
- Examine the eardrum with an otoscope.

EAR EXAMINATION:

- Sit the child sideways on his mother's knees. The mother holds his head with one hand against her body. She puts her other hand around the child's arm and body.



- When you examine with an otoscope: pull the ear up and back to straighten the ear canal to get a good view of the tympanic membrane.

In babies, pull the ear downwards

VIEW OF A NORMAL TYMPANIC MEMBRANE (right ear):

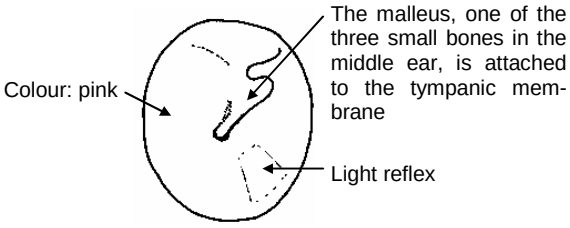


Figure 7–2 ***Ear examination in children***.

Ear pain or ear discharge

ACUTE OTITIS MEDIA

Otitis media is an infection in the middle ear. The middle ear is connected to the throat by the Eustachian tube. It usually becomes infected through this tube when the child suffers a nose or throat infection. Ear infections rarely cause death but they are the main cause of preventable deafness in children.

When a child suffers from middle ear infection, pus collects behind the eardrum. This causes pain and often fever. Young children may have unspecific symptoms like fever, irritability, vomiting or diarrhoea. This is the reason why an ear examination is essential in any child with a fever. If the ear infection is not treated, the eardrum may burst. When this occurs, the pus discharges into the ear canal. The fever and pain and other symptoms then usually disappear but the child has difficulty hearing, because his eardrum has a hole (perforation). Sometimes the eardrum heals by itself. Sometimes the discharge continues for several weeks, the eardrum does not heal and the child remains deaf in that ear. Then the child has developed chronic suppurative otitis media. (figure 7–3)

Causes of ear discharge

COMMON

- Chronic suppurative otitis media
- Acute otitis media with perforation of the eardrum

LESS COMMON

- Otitis externa
- Injury - bloody discharge
- Cerebrospinal fluid - clear discharge after head injury
- Foreign body in the ear canal

NOTE: ear wax is normal but it concerns many mothers and may be mistaken for pus

Causes of ear pain

COMMON

- Acute otitis media

LESS COMMON

- Otitis externa
- Injury
- Boils
- Herpes infection
- Pain referred from the teeth, throat, parotid gland (for example, mumps), spine or jaw joint (temporomandibular joint)

Management

The immediate use of antibiotics for all children with otitis media is increasingly questioned as many ear infections heal by themselves without complications. There is concern that the frequent use of antibiotics for otitis media may increase bacterial resistance within a community. However, in a situation like in Afghanistan, it is usually not realistic to expect follow-up visits of children for ear problems, and the WHO recommends antibiotics for all children with acute otitis media.

1. Give oral ***co-trimoxazole*** for 5 days.
   Alternative: oral amoxicillin
2. **Dry any ear discharge** using a wick (see below).
3. Treat pain or high fever with paracetamol.
4. Reassess after 5 days. If there is still pain or discharge, continue the antibiotic for 5 more days.

Complications

Sometimes an infection can spread from the middle ear to the mastoid bone, causing mastoiditis, or to the brain, causing meningitis or brain abscess.

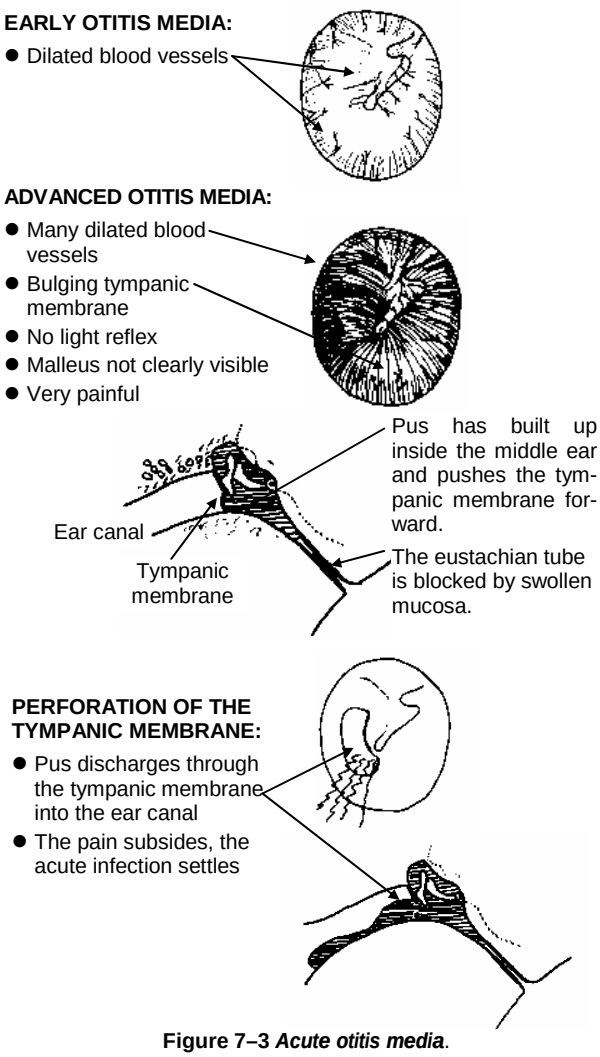


Figure 7–3 ***Acute otitis media***.

MASTOIDITIS

Clinical features

- Tender swelling behind or above the ear over the mastoid bone
- The ear is pushed forward and outwards

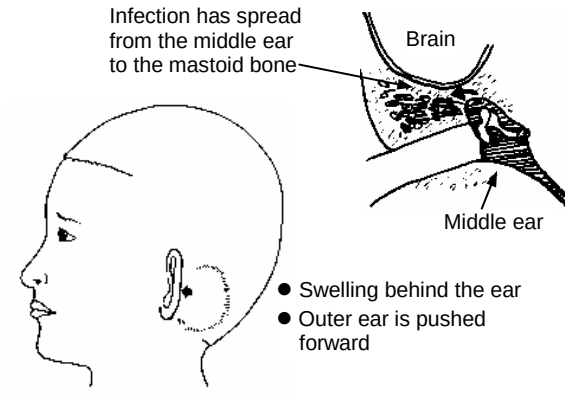


Figure 7–4 ***Mastoiditis***.

Management

1. Drain any abscess.
2. Give ***procaine penicillin*** IM for 7-14 days

   Alternative: ampicillin IM or IV for 2 days, then continue with oral amoxicillin or ampicillin for 14 days.

CHRONIC SUPPURATIVE OTITIS MEDIA

Chronic suppurative otitis media follows poorly treated acute otitis media and is a common cause of hearing loss.

Clinical features

- Ear discharge persisting for more than 2 weeks
- After cleaning the ear canal, you find a hole (perforation) in the eardrum

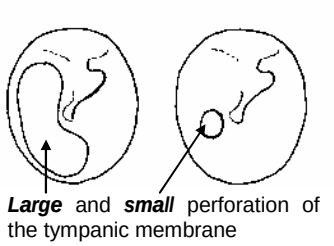


Figure 7–5 ***Chronic perforation of the tympanic membrane***.

Management

1. Teach the family how to dry the ear regularly. A chronically draining ear can only heal when it is dry. Therefore, the main treatment is drying the ear using an ear wick. You can clean the ear with a wick as described below. You can also gently syringe a draining ear with 10 ml of boiled water. Make sure the water is at body temperature, otherwise you induce reflex vomiting. There is no risk of inducing infection if your solution is sterile.
2. Apply antibiotics locally (for example, gentamicin ear drops 3 times daily) for 7 days. After the drops have been put into the ear, the child should lie on the opposite side for 5 minutes so that the drops can reach the middle ear.

   NOTE: Although it is an infection, systemic antibiotics do not usually help. Try one course of antibiotics as for acute otitis media if the child has not had any before. Otherwise, systemic antibiotics are only indicated when there is a fever or increased earache as signs of an acute secondary infection.

How to dry a discharging ear

Explain and demonstrate the following procedure to the family. First, show them how to dry an ear. Then ask them to demonstrate it to you. In that way, you can be sure that they understand what to do. Tell the family that it usually takes 1-2 weeks for the

ear to stop draining and stay dry. Warn them that their child will become deaf if they do not dry the ear regularly and properly.

1. Roll a soft, absorbent cotton cloth into a wick. Never use a stick or paper.
2. Place the wick in the child's ear until the wick is wet.
3. Remove the wick.
4. Take a new, clean wick and repeat these steps until the ear is dry.
5. Dry the ear this way at least 3 times daily until it stays dry. Apply antibiotic ear drops each time after cleaning the ear. Use them for 7 days.

Figure 7–6 *Ear wick*.

OTITIS EXTERNA

Otitis externa is an infection of the ear canal. It is an important differential diagnosis to acute otitis media with perforation. You can distinguish the two conditions easily by physical examination:

Otitis externa	Otitis media
● Swelling of the ear canal	● No swelling of the ear canal
● Pain on pulling the ear	● No pain on pulling the ear
● Swollen lymph nodes in front of the ear	● No swollen regional lymph nodes

Management

1. **Clean the ear with a wick** (see above).
2. Insert ***gentamicin ear drops*** (eye drops can be used) every 6 hours. If possible, soak a wick with the drops and insert it into the ear canal. Change the wick every 6 hours.
3. Only if the otitis externa is severe, give oral co-trimoxazole for 5 days.

   Alternative: oral erythromycin for 5 days.

FOREIGN BODY IN THE EAR CANAL

A foreign body in the ear canal is a rare cause of discharge or pain. Try to remove it by syringing the ear. If it does not come out, refer to an ENT specialist.

Deafness - How you can help a child who cannot hear well

How to prevent deafness

Deafness and hearing impairment in children are often preventable.

The main causes of deafness and preventative measures are:

Common cause of deafness	How you can prevent deafness
Chronic suppurative otitis media	Treat acute otitis media early and correctly.
Drugs that cause damage to the ear (for example, gentamicin or streptomycin)	Never give these drugs in pregnancy. Always give them to children in the correct dosage.
Birth asphyxia	Give good care during pregnancy and delivery.
Neonatal jaundice	Detect and treat neonatal jaundice early.
Meningitis	Detect and treat meningitis early.
Repeated exposure to loud noise	Avoid exposure to loud noise.

How to recognise a child who cannot hear well

Hearing impairment is often missed. Young children can be severely deaf without this being recognised. Sometimes people think a deaf child is mentally handicapped because he cannot speak well.

Signs of deafness in a child are:

- He does not learn to speak or he speaks rather loudly but not clearly.
- He seems to be disobedient and naughty because he does not understand.
- He is shy, withdrawn or anxious.
- He may not do well at school.

How to help a child who cannot hear well

1. Examine the ears to make sure there is no infection that needs treatment.
2. Explain to the family:
   - "Do not believe that a deaf child is stupid, especially when his speech is unclear. His thinking is usually normal. He needs your special support."

- "Talk to the child as much as possible in a good clear voice. Use simple, short sentences. Children are often not completely deaf".
- "Look at the child when you speak to him, he will learn to read from your lips".
- "Be patient with the child".

NOSE PROBLEMS

Nosebleeds (Epistaxis)

Nosebleeds are common in children. The bleeding is usually from the anterior part of the septum. For causes of nosebleeds, see box.

Causes of nosebleeds

COMMON

- Nose picking
- Hyperaemia of the nasal mucosa from common cold or allergic rhinitis

LESS COMMON

- High blood pressure
- Typhoid fever
- Rheumatic fever

RARE

- Blood disorders

Management

1. Compress the soft part of the nose from both sides for 10 minutes while the child is sitting. He should not lie on his back.
2. *If simple compression does not stop the bleeding*, add 1 ml adrenaline (epinephrine) to 9 ml clean water or saline. Soak a piece of cotton wool with 1 ml of this solution and put it in the anterior part of the nose. Apply compression again for 10 minutes. Then remove the cotton wool.
3. *If a child has repeated nosebleeds*, put vaseline inside the nose on the nasal septum every night.
4. Do not forget to check for signs of shock or anaemia, because a nosebleed can cause a significant blood loss.

NOTE: Do not give vitamin K; it is not indicated.

Nasal discharge

ALLERGIC RHINITIS

Allergic rhinitis is a common cause of nasal discharge. It is commonly caused by pollen. The discharge is watery and seasonal, this means it is worse at certain times of the year. It is accompanied by sneezing attacks and often allergic conjunctivitis.

Causes of nasal discharge

COMMON

- Common cold
- Allergic rhinitis

LESS COMMON

- Foreign body

RARE

- Diphtheria

Management

1. Try to reduce exposure to the allergen.
2. Give an antihistamine (for example, chlorphenamine or promethazine).

NOTE: Do not use nose drops that cause constriction of the nasal blood vessels for longer than 5 days (for example, ephedrine nose drops). If used for longer periods, they themselves will cause hyperaemia of the nasal mucosa, chronic nasal blockage and discharge.

FOREIGN BODY IN THE NOSE

A nasal foreign body may present with purulent discharge that typically comes only out of the affected nostril.

Management

Close the unaffected nostril and ask the child to blow through the other. If the foreign body does not come out this way, refer to an ENT specialist.

THROAT PROBLEMS

How to assess a child with a throat problem

Take a history

○ Is the child able to drink?

Examine the child

Always examine the throat at the end of your examination because it is unpleasant for a child (figure 7–7).

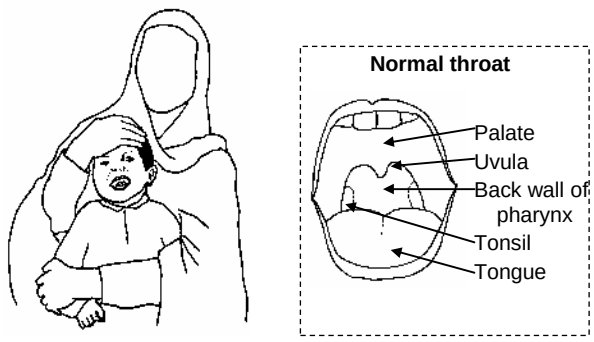
○ Feel for enlarged neck glands (lymph nodes). In sore throat, the tonsillar nodes are of greatest importance.

○ Examine the throat with a light:

- Look at the tonsils for an exudate (white patches) or membranes.
- Carefully examine the whole throat. Systematically look at the pharynx, the tongue, the mucosa inside the cheeks (buccal mucosa), as well as at the teeth, gums and lips for signs of inflammation, mouth ulcers, white plaques, dental decay, and bleeding and swelling of gums.

HOW TO EXAMINE THE THROAT:

- Sit the child on his mother's knees with his back to her body. His mother holds his forehead with one hand and puts the other arm around the child's arms and body.



- The examination of the neck for enlarged lymph nodes is part of the assessment of throat problems. Feel both neck sides simultaneously and compare them (for details see figure 7–13)

Figure 7–7 ***Throat examination***.

Sore throat

Causes of sore throat

COMMON

- Viral pharyngitis
- Streptococcal tonsillitis
- Mouth ulcers
- Oral thrush

RARE

- Diphtheria

VIRAL PHARYNGITIS

This is the most common cause of a sore throat. It can be caused by a variety of viruses. Important differential diagnosis is streptococcal tonsillitis (see below).

Management

Viral pharyngitis will get better by itself after a few days.

Give paracetamol for pain or high fever.

NOTE: Do not give antibiotics; they are not effective and not able to prevent secondary bacterial infection. It has been shown that vitamin C or multivitamins are of no help.

How to differentiate between viral pharyngitis and streptococcal tonsillitis:

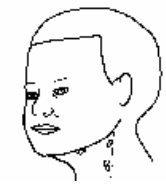
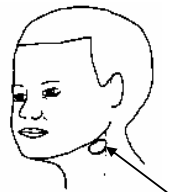
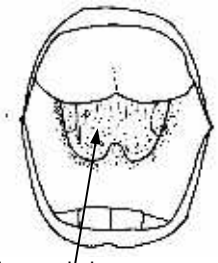
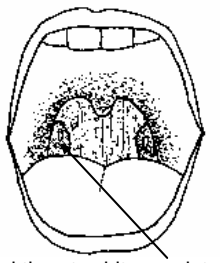
VIRAL PHARYNGITIS	STREPTOCOCCAL TONSILLITIS
● Gradual onset	● Sudden onset
● Often associated with: – Mild fever – Nasal discharge – Mildly red tympanic membranes – Mild conjunctivitis	● Often high fever; no signs suggesting viral illness: – No nasal discharge – No red tympanic membranes – No conjunctivitis
● Mild pain on swallowing	● Pain on swallowing
	
● Mild, diffuse lymph node enlargement	● Enlarged, tender tonsillar nodes
	
● Diffuse red pharynx	● Red throat, white exudate that has not spread beyond the tonsils

Figure 7–8 ***How to differentiate between viral pharyngitis and streptococcal tonsillitis***.

STREPTOCOCCAL TONSILLITIS

Streptococcal tonsillitis is caused by streptococcus bacteria. It is self-limiting but antibiotics are indicated to prevent rheumatic fever or glomerulonephritis.

Management

- ***Penicillin V*** orally for a total of 10 days. This length is necessary to kill all streptococcus bacteria in order to prevent late complications.

  Alternatives:

  If you think the 10 days is unlikely to be completed, give benzathine penicillin IM as one single dose.

  If penicillin allergy: oral erythromycin for 10 days.

NOTE: Co-trimoxazole is not effective. Avoid amoxicillin or ampicillin, which may cause a rash in glandular fever (this is tonsillitis caused by Ebstein-Barr virus).

Complications

Acute complications:

- Peritonsillar abscess (quinsy)

Late complications (after 2-4 weeks):

- Rheumatic fever
- Glomerulonephritis

PERITONSILLAR ABSCESS (QUINSY)

The development of an abscess is rare but needs immediate treatment.

Clinical features

- Increasing pain on the affected side
- Inability to open the mouth (trismus)
- Painful swallowing (dysphagia) with drooling of saliva
- On examination, swelling lateral of the affected tonsil that pushes it towards the midline.

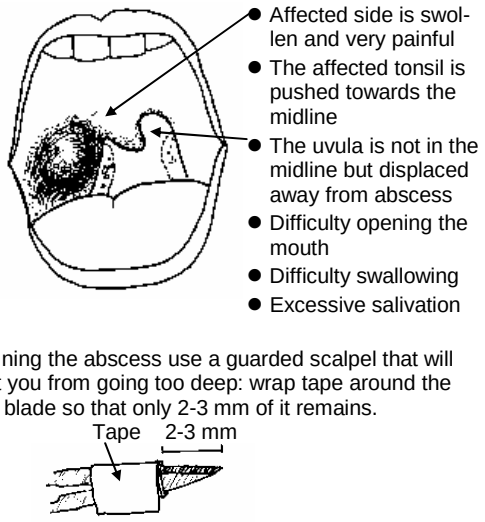


Figure 7–9 *Peritonsillar abscess (quinsy).*

Management

In the early stages before pus has formed, antibiotics may be effective.

If pus has formed, drain the abscess with a guarded scalpel, see figure 7–9. Drainage is unpleasant but gives immediate relief. Give procaine penicillin for 10 days. If possible, a tonsillectomy should be performed a few weeks later because of the risk of recurrence.

DIPHTHERIA

Diphtheria is a rare but serious acute infection of the upper respiratory tract. The diphtheria bacteria (Corynebacteria diphtheria) produce characteristic membranous lesions. They release toxins that are responsible for severe general symptoms and can cause death by damaging the heart (myocarditis), or paralysis of peripheral nerves. Commonest is paralysis of the nerves innervating the palatal muscles causing swallowing difficulty (dysphagia) and of the muscles moving the eyes. Diphtheria is preventable by immunisation.

Clinical features

- The child is very ill.
- On examination, you find the typical grey membranes that have spread outside the tonsils. They start bleeding when you try to remove them.
- In severe cases, the neck is swollen due to oedema of the soft tissues and enlarged lymph nodes.
- When the lesions spread down the respiratory tract they may cause laryngitis (clinical symptoms: hoarseness, stridor, respiratory distress), tracheitis or pneumonia.
- Sometimes, if the nose is affected, you find blood-stained purulent nasal discharge.

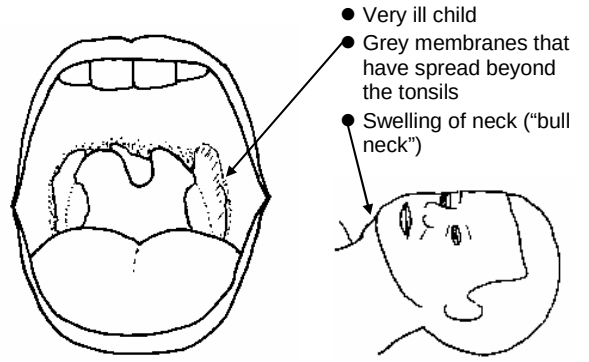


Figure 7–10 *Diphtheria*.

Management

1. Give ***procaine benzylpenicillin*** IM for 7 days. For dosage see " List of essential drugs " at the end of this book. For mild cases, oral penicillin V or erythromycin are also effective.
2. Give diphtheria antitoxin 20.000–60.000 Units IM or IV to neutralise the circulating toxins because the antibiotic will kill the bacteria but cannot stop the effects of the toxin that has already been released.
3. Refer to hospital urgently.
4. Strict bedrest.
5. If a child develops stridor, add a corticosteroid (for example, dexamethasone).

Mouth ulcers

Mouth ulcers are a common problem of children caused by several different diseases. Malnutrition, anaemia, dental decay, poor oral hygiene, bottle-feeding, excessive antibiotic use and measles are contributing factors. Often several factors come together. Whatever the cause, mouth ulcers are frequently painful and affect a child's well-being. Mouth ulcers are often associated with irritability and cause difficulties with drinking and feeding. This may result in dehydration or malnutrition.

Causes of mouth ulcers

- Angular stomatitis
- Oral thrush (candidiasis)
- Herpes gingivostomatitis
- Inflammation of the gums (acute necrotizing ulcerative gingivitis)

General management

1. **Improve oral hygiene** by regular cleansing of the mouth. Add one teaspoon of salt to one cup of clean water and wipe the mouth with a clean cloth soaked in this salt solution at least 4 times daily.
2. **Stop bottle-feeding** and use spoon and cup instead.
3. Apply ***gentian violet*** 0.25% or 0.5% to the ulcers in the mouth. Do not use a solution stronger than 0.5% because that itself can cause mouth ulcers.
4. If the child's mouth is so sore that eating is painful, give ***paracetamol*** 10–15 mg/kg/day every 6 hours ½-1 hour before each meal (maximum every 6 hours).

2–12 months	50–125 mg	up to 4 times daily
1–5 years	125–250 mg	up to 4 times daily
6–12 years	250–500 mg	up to 4 times daily

5. *If there is pus*, apply tetracycline ointment locally every 6 hours. Never use oral tetracycline in children!
6. *If there is a foul smell* from the mouth, suspect anaerobic infection and give oral metronidazole for 5 days.
7. Treat any specific cause.

ANGULAR STOMATITIS

In angular stomatitis, you find cracks and ulcers at the corners of the mouth. These may be caused by malnutrition, vitamin B deficiencies or excessive saliva. Give nutritional advice. You may give Vitamin B complex.

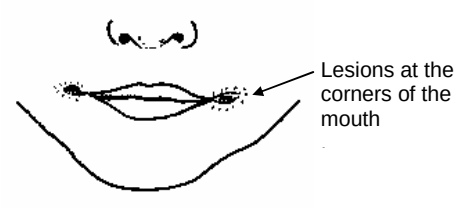


Figure 7–11 ***Angular stomatitis***.

ORAL THRUSH (CANDIDIASIS)

Oral thrush is a fungal infection inside the mouth. It is common in malnourished children and those who have been treated with antibiotics.

Clinical features

- A child drinks poorly.
- Typical white grey plaques on the tongue, inside the cheeks, on the palate or gums. Inflammation and ulcers are common.

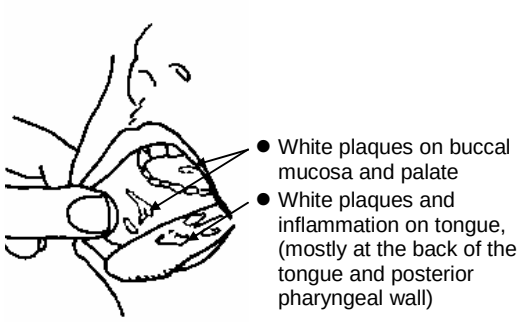


Figure 7–12 ***Oral thrush (candidiasis)***.

Management

1. Give ***nystatin*** 100,000–500,000 units 4 times daily after feeding. Let an older child suck on nystatin vaginal "tablets". For a younger child, crush tablets and put in their mouth. The local effect is important.
2. *If nystatin is not available*, apply gentian violet 0.5% solution 2 times daily for 10 days.

HERPES GINGIVOSTOMATITIS

This is an infection with the herpes virus. It affects usually children who are between 2 and 5 years old.

Clinical features

- Fever, irritability
- Refusal to eat because of painful mouth
- On examination, many small vesicles and ulcers in the mouth, on the lips and around the mouth

Management

The illness resolves itself after one week without specific treatment.

1. Make sure that a child does not become dehydrated.
2. Assure pain relief. Give paracetamol about ½-1 hour before each feed.

INFLAMMATION OF THE GUMS (acute necrotizing ulcerative gingivitis)

This is a bacterial infection caused by poor oral and dental hygiene and malnutrition.

Clinical features

- Swollen and painful gums that bleed easily

Management

1. Give oral ***penicillin V*** for 5 days.
2. Show the family how to clean the child's teeth well (see page 50).
3. If possible, scrape off the dark yellow crust (tartar) that forms where the teeth meet the gums.

NECK SWELLINGS

Neck swellings are a common problem. They are usually caused by lymph gland swellings that accompany many viral upper airway infections. A chronic swelling is often caused by tuberculosis.

Causes of neck swellings

- Lymphadenopathy
- Lymphadenitis
- Mumps
- Tuberculous adenitis
- Tooth abscess
- Goitre
- ***Rare***: lymphoma or leukaemia

How to assess a neck swelling

Take a history

○ Ask about the duration and any discharge.

Examine the child

○ Feel all lymph node sites. Each lymph node drains a certain area (figure 7–13). If you find swollen lymph glands, examine the throat, teeth, skin of the face and scalp for an infection that could have caused the lymph node reaction.

○ Feel for an enlarged spleen or liver.

○ Look for skin changes (for example scars, sinuses, redness).

○ If you suspect an enlarged thyroid gland, ask the child to swallow. A goitre moves up and down with swallowing.

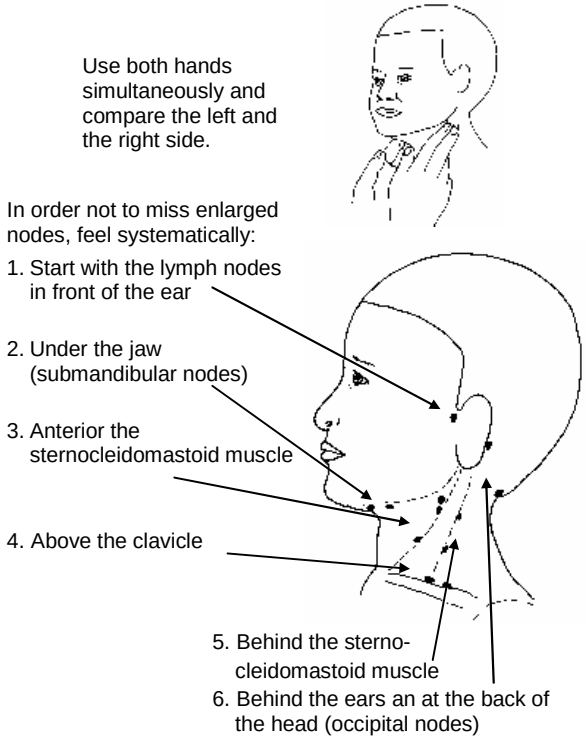


Figure 7–13 ***Examination of the neck***.

LYMPHADENOPATHY

Many children have a few small (less than 1 cm) non-tender lymph nodes in the neck region. They represent reactions to minor infections and injuries. Many viral illnesses cause lymph node enlargement. No treatment is necessary.

LYMPHADENOPATHY	LYMPHADENITIS
● No or only mild fever	● Often fever
● Lymph nodes are not red, not hot and only mildly tender	● Red, hot and tender enlarged lymph nodes
● Enlargement is symmetrical	● Usually, only lymph nodes in one region are enlarged

Figure 7–14 ***How to differentiate between lymphadenopathy and lymphadenitis***.

LYMPHADENITIS

This is a bacterial infection of a lymph node. The infection has usually spread from an infection in the throat. Feel whether there is fluctuation. If this is the case, an abscess has formed.

Management

1. Drain an abscess.
2. Give ***procaine penicillin*** IM for 5 days.

   Alternatives: penicillin V, amoxicillin or in the case of penicillin allergy erythromycin.
3. *If not improving after 3 days or if the inflammation increases and spreads,* give ***chloramphenicol*** and ***cloxacillin*** for 8 days.

MUMPS

Mumps is a viral infection of the parotid glands.

Clinical features

The symptoms begin with mild fever and pain when eating. After one or two days, a tender swelling develops in the region of one or both parotid glands (between the lower jaw and ear), that subsides after one week:

- The swelling is mildly tender, not red or hot and pushes the earlobe upwards and outwards.
- The swelling obscures the outline of the lower jaw.

Sometimes mumps may also cause painful swelling of other glandular organs: the salivary glands, the pancreas, the testes (orchitis) or ovary. A rare complication is meningo-encephalitis.

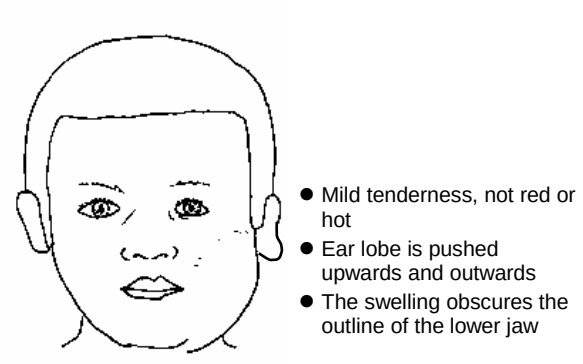


Figure 7–15 ***Mumps***.

Management

No treatment is necessary. Orchitis resolves after 4 days. It may cause testicular atrophy but very rarely complete infertility. A mumps vaccine exists but is not part of the EPI immunisation programme.

TOOTH ABSCESS

A tooth abscess is the result of tooth decay. Dental decay (caries) has destroyed a tooth and infection spreads through the tooth to the jaw. This causes tissue inflammation (cellulitis). (Figure 7–16)

Clinical features

- The swelling is very painful and you cannot feel its edges.
- When you examine the mouth, you find a decayed tooth.
- The gum overlying the dental root is red, swollen and very tender.

Management

1. Give oral ***amoxicillin*** for 5 days.
2. *If no response,* add metronidazole.
3. Pull the affected tooth out 2 days after starting the antibiotic.
4. Advise the family about good dental hygiene (see below).

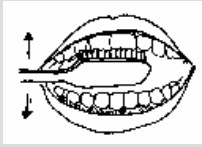
Dental hygiene - how to keep teeth and gums clean and healthy

Taking good care of teeth and gums is important, because strong and healthy teeth are needed to chew and digest food well. Painful cavities and sore gums, that can be prevented by good dental hygiene, may lead to serious infections that may affect other parts of the body.

HOW TO KEEP TEETH AND GUMS HEALTHY

1. Do not bottle feed babies.
2. Avoid sweets. Do not accustom children to sweets or sweet drinks (for example, tea with sugar or cola).
3. Brush the teeth well at least 2 times every day. Start brushing a child's teeth as soon as the teeth appear. Later, teach the child to brush their teeth themselves.

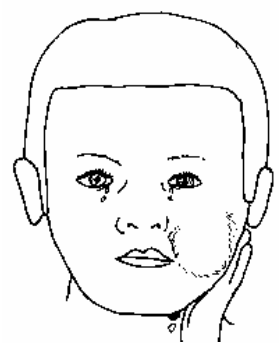
   Brush the teeth starting from the gums to the teeth like this (not just from side to side).
   Brush the front, back, top and bottom of all teeth.



4. To prevent inflammation of the gums, it helps to clean under the gums regularly by passing a strong thin thread between the teeth. At first, this may cause some bleeding but soon the gums will be healthier and bleed less.

A toothbrush is not necessary, you can use the twig of a tree (maswAk) and sharpen one end to clean between the teeth, and chew on the other end and use the fibres as a brush.

Toothpaste is not necessary, just water is enough if you rub well. Rubbing the teeth with something soft but a little rough is what cleans them. Salt can be used to rub the teeth instead of toothpaste.



- Acute painful, tender
- Enlarged regional lymph nodes
- Inside the mouth: carious tooth and red swelling (very tender) of the gum overlying the dental root

Figure 7–16 *Tooth abscess*.

TUBERCULOUS ADENITIS

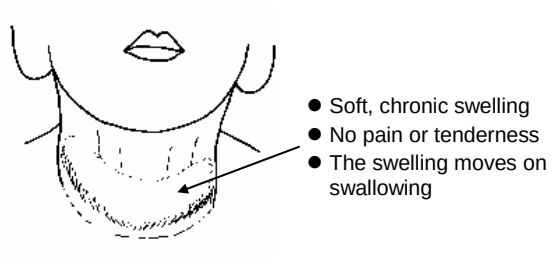
This is a chronic painless swelling that may later open and discharge pus, see in chapter 6. “Tuberculosis”.

GOITRE (STRUMA)

Goitre is an enlargement of the thyroid gland. It occurs in older children. The presence of a goitre is usually not important for the individual patient. A goitre is significant for a community and babies yet to be born because it indicates chronic iodine deficiency in the food. This may lead to babies born with mental handicap.

Clinical features

- Chronic, soft, symmetrical painless swelling at the lower front of the neck
- The swelling moves on swallowing



- Soft, chronic swelling
- No pain or tenderness
- The swelling moves on swallowing

Figure 7–17 *Goitre*.

Management

No treatment is necessary but iodised salt should be used if available. For how to reduce the risk of babies to be born with mental handicap see pages 196–197.

References

1. Bailey D, Hawes H, Bonati G. *Child-to-Child. A resource book Part 2*. 2nd edition. London 1994.
2. Gove S. Remedies for young children. *ARI News* 1990; 18: 2-3.
3. Hussey G. How to....manage mouth ulcers. *Child Health Dialogue* 1996; 5: 11.
4. Illingworth RS. *Common Symptoms of Disease in Children.* 9th edition. London: Blackwell Scientific Publications 1988.
5. King M, King F, Martodipoero S. *Primary Child Care.* Book One. Oxford: Oxford University Press 1978.
6. Smith A, MacKenzie I. Preventing deafness and hearing impairment. *Child Health Dialogue* 1997; 7: 7-8.
7. Stanfield P. *Child Health.* 2nd edition. Nairobi: African Medical and Research Foundation 1997.
8. World Health Organisation. *The management of acute respiratory infections in children. Practical guidelines for outpatient care.* Geneva: WHO 1995.

8. Respiratory problems

For **ear, nose and throat problems**, see the previous chapter.

Respiratory diseases, the commonest paediatric problem

Children with respiratory problems usually present with cough, wheeze, stridor or difficult breathing.

A child suffers about 6-12 acute respiratory infections per year. Most of these are harmless and self-limiting but some are dangerous. Acute respiratory infections (ARI) are the main cause of death in children under 5 years. A doctor faces two challenges: to recognise those children with serious problems and not to over-treat and waste resources on the majority of children who suffer from simple, self-limiting airway infections. Extensive effort has been put into the research of ARI. Effective, simple and proven management guidelines have been developed. Wherever these are put into practice, the death rate from ARI drops by about 30%. In addition, the unnecessary prescription of antibiotics is reduced and resources are saved.

How to assess a child with a respiratory problem

Take a history

- How old is the child?
- Ask for details about the presenting symptom. In wheeze, ask whether the child had the problem before.
- Is the child able to drink?
- Fever?

Examine the child

When you examine a child with a respiratory problem, you will get most of your information simply by observing the child. Counting the breathing rate and looking for chest indrawing are more reliable signs for pneumonia in young children than auscultation with the stethoscope! It is important to look at the child while he is calm. Tell the mother not to undress or disturb him until you have finished your observations.

General inspection

- **Ill or well**?
- **Abnormally sleepy or restless**?
- **Signs of malnutrition** (severe wasting or oedema)?

Observation of the breathing

- **Cyanosis**?
- **Difficulty breathing** (dyspnoea)?

  Two other signs of difficult breathing:

  Grunting

  Grunting is a sign of difficult breathing. It results from partial closure of the vocal cords. It is an attempt to keep the lungs open when many of the alveoli are affected in pneumonia.

  Nasal flaring

  The widening of the nostrils during breathing is another sign of difficult breathing. It shows that the child uses extra effort to breathe.

- **Fast breathing (tachypnoea)**? Count the child's breathing rate per minute and decide whether a child has fast breathing or not (see box). If a child under 2 years is breathing more than 60/minute, repeat the count. The breathing rate of very young children is sometimes irregular. You may misdiagnose him if you do not repeat the count.
- **Chest indrawing**? (see box)

FAST BREATHING

The breathing rate is controlled by the brain. In hypoxaemia (low blood oxygen), the respiratory rate will increase to meet the body's oxygen demands. Hypoxia is most commonly the result of lung disease that disturbs the supply of oxygen to the blood.

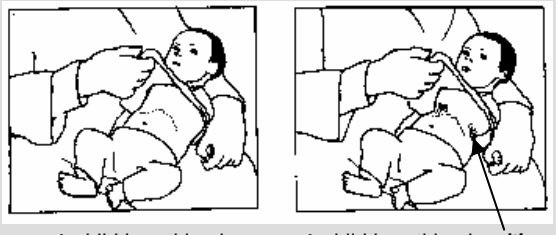
Definition of fast breathing

Less than 2 months	60 or more breaths per minute
2–12 months	50 or more breaths per minute
1–5 years	40 or more breaths per minute
Over 5 years	30 or more breaths per minute

CHEST INDRAWING (RETRACTIONS)

Indrawing of the lower chest while a child is breathing in is an important sign for the severity of a respiratory problem. In older children, just the spaces between the ribs are drawn in. Chest indrawing occurs when a chest problem has lowered the pressure inside the chest.

Slight chest indrawing is normal in young children because their chest walls are soft.



A child breathing in ***without*** chest indrawing

A child breathing in ***with*** chest indrawing

Figure 8–1 *Chest indrawing*.

Importance of chest indrawing

It indicates a severe and possibly dangerous respiratory problem.

- **Symmetrical chest movements** during breathing?
- **Abnormal breathing sounds** (for example, stridor or wheeze) that is audible without using a stethoscope?

Stridor
A child with stridor makes a harsh noise when he is breathing in. It is a sign of obstruction (narrowing) of the larynx, epiglottis or trachea that interferes with air entering the lungs. It is a danger sign.

Wheeze
A child with wheezing makes a soft whistling noise when he is breathing out. Often you can see that it is difficult for him to breathe out and that it takes longer than usual. Wheeze is a sign of obstruction of the airways inside the chest. It can be a danger sign.

Percussion of the chest

- Areas of **dullness**? Always compare both sides of the lungs with each other.

Auscultation of the chest with a stethoscope

- Same **loudness** of breathing sounds on both sides?
- **Wheeze**?
- **Crepitations**?. These are fine crackles that occur when the inflamed alveoli open up during inspiration. They are a sign of pneumonia. Crepitations sound as if you were rubbing your hair between two fingers next to your ear. Be aware that sounds from the nose are often transmitted to the chest. These may be mistaken for crepitations and a child is wrongly diagnosed as pneumonia.

Other body systems

- Do not forget to examine ears, nose and throat (including looking for Koplik's spots of measles), to feel for enlarged lymph nodes, to listen to the heart sounds and to feel for an enlarged liver (possible sign of heart failure).

Danger signs in a child with a respiratory problem

A child with any of those may be at great risk of dying:

- Inability to eat or drink
- Difficulty breathing
- Fast breathing
- Chest indrawing with or without fast breathing
- Cyanosis
- Stridor
- Wheeze (may be a danger sign)
- Convulsions
- Severe malnutrition

Causes of fast breathing

- Pneumonia
- Bronchiolitis
- Asthma
- Heart failure
- Pain or anxiety
- Poisoning (for example, aspirin)
- Severe anaemia
- Sepsis

NOTE: Fever does not cause a significant increase of the breathing rate.

Causes of chest indrawing

COMMON

- Severe pneumonia
- Severe asthma
- Bronchiolitis

LESS COMMON

- Any other problem that severely affects the breathing (for example, epiglottitis or severe croup)

Helpful investigations

- **Chest x-ray**. You can diagnose the majority of problems by careful history and clinical examination and a chest x-ray is usually not necessary. However, it may be helpful in the following situations:
  - Persistent pneumonia
  - If you suspect complications of pneumonia
  - Chronic cough with signs of a serious underlying problem
  - If you suspect a heart problem
- **Blood tests**. Total and differential white blood cell count and ESR may be helpful in some cases but should not be ordered routinely.
- **Sputum examination**. Young children usually swallow their sputum. Examination of 3 sputum samples for tuberculosis bacilli (AFB bacilli) is the first choice test for adults with suspected tuberculosis (TB). In children it is less helpful because of the different pattern of TB disease.

The child with acute cough

Why children cough

Cough itself is not a disease. Cough is a very important defence mechanism of the body to clear secretions out of the lungs and bronchi. Acute episodes of cough are most often due to common cold when nasal discharge runs down the throat, or from bronchitis. Both conditions are self-limiting viral infections.

Some children with acute cough will suffer from pneumonia or another serious condition. You need to recognise those because they may die without treatment.

Causes of acute cough

COMMON

- Acute viral upper airway infections (common cold)
- Viral bronchitis

LESS COMMON

- Pneumonia
- Asthma
- Measles
- Early whooping cough

RARE

- Inhaled foreign body

Assessment of children with acute cough (or difficult breathing)

Easy and effective guidelines have been developed to assess children with so called "Acute Respiratory Infections" (ARI).

These **standard management guidelines** are based on the following information:

- Age of the child (important for the correct choice of antibiotics in pneumonia)
- Respiratory rate
- The presence of chest indrawing
- The presence of other danger signs (see above)

Using these information, you can classify all children with acute cough or difficult breathing into the following three groups:

1. **No pneumonia**. Usually harmless viral upper airway infection (common cold) or bronchitis

   Clinical features
   - Normal breathing rate
   - No chest indrawing
   - No danger signs
2. **Pneumonia likely**

   Clinical features
   - Fast breathing
   - No chest indrawing
   - No danger signs
3. **Severe or life-threatening pneumonia** or (rare) **another serious respiratory disease**

   Clinical features
   - Chest indrawing
   - +/- Fast breathing
   - +/- Danger signs

VIRAL UPPER RESPIRATORY TRACT INFECTION (common cold) and BRONCHITIS

A common cold, or flu as some people call it, is very common in children. There may be cough, sore throat, discharge from the nose or fever. Breathing rate is normal. Fever is not a sign specific for bacterial infection and certainly not an indication for the routine use of antibiotics.

Management

Viral upper airway infections are self-limiting diseases. It is very important to explain to the family the following:

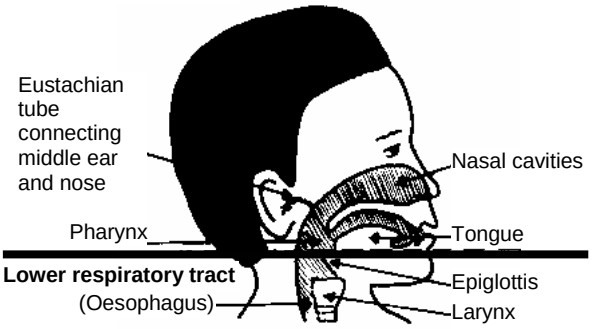
1. **Feed the child** during the illness and increase feeding afterwards.
2. **Increase fluids**. Offer the child extra to drink and increase breastfeeding.
3. **Soothe the throat and relieve the cough** with a safe remedy.
4. **Most important: watch for the following danger signs and return quickly if they occur**:
   - Breathing becomes difficult
   - Breathing becomes fast
   - Child is not able to drink
   - Child becomes sicker

Wrong beliefs about medicines for common cold

Research over the last 10 years suggests that the drugs commonly prescribed to relieve symptoms of a common cold or to prevent complications are not helpful. Instead, they may have serious side-effects and based on the scientific findings, it is time to change the present practice.

- **Antibiotics**. Often doctors feel under pressure from families to prescribe antibiotics for viral upper air-

Upper respiratory tract



WHEN TO GIVE ANTIBIOTICS FOR UPPER RESPIRATORY TRACT INFECTIONS:

Antibiotic	No antibiotic
● Acute otitis media	● Common cold
● Streptococcal tonsillitis	● Non-streptococcal pharyngitis

Figure 8–2 ***Upper respiratory tract infections (URTIs).***

way infections. It is a common misbelief that antibiotics could prevent pneumonia. Others believe antibiotics will shorten the illness. Many studies have looked at treating coughs and colds with antibiotics. They have found that antibiotic treatment of common colds does not shorten their duration nor prevent complications. Instead, antibiotics are harmful because they can have side-effects that may complicate an otherwise self-limiting illness. They lead to antibiotic resistance in a community with the consequence that, when an antibiotic is needed, it may no longer be effective. Lastly, money and resources are wasted.

- **Cough medicines**. Cough medicines very often contain drugs that may make children too sleepy to drink and to clear the secretions from the lungs. Therefore, they may worsen the condition of a child and contribute to malnutrition and death.

  Do not give to children cough or cold medicines that contain any of the following:

  - Atropine
  - Codeine
  - Promethazine or other anti-histamines
  - Alcohol

  Never give any preparations that contain many ingredients. Often cough syrups contain an irrational combination of mucolytics and cough suppressants that are counteractive. Most medicines for common colds do not help the child but only the sales of a drug company.

- **Vitamin C, antihistamines and decongestants**. It has been shown that vitamin C cannot prevent colds, shorten their duration or reduce symptoms. Antihistamines or decongestant drugs (for example, promethazine) are not helpful. They may have serious side-effects in children.

PNEUMONIA

In pneumonia, the lung tissues (walls of alveoli and air spaces) are inflamed. This inflammation disturbs the exchange of oxygen. The larger the affected area, the more severe the pneumonia. The distinction between lobar or bronchopneumonia is of no practical interest, presentation and management are the same. Pneumonia is the single most common cause of death in children. A child with severe pneumonia may die within a few hours. The risk of dying is greatest if pneumonia is associated with measles or malnutrition.

Clinical features

A child with pneumonia can present in different ways:

- Acute cough and fast breathing and fever
- Breathing difficulty
- Acute wheezing
- Signs of severe disease or convulsions as the result of hypoxia.
- A young child may be very ill without showing specific signs. He may not have a fever but a low body temperature.
- In an old child, you may be able to hear localised crepitations on auscultation.

Management

The treatment depends on:

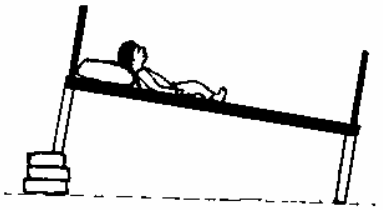
1. **Severity**, judged by clinical findings. If possible, children with severe and very severe pneumonia should be treated at a hospital.
2. **Child's age**. The bacteria causing pneumonia are different at different ages. The recommended "first choice" antibiotic that covers all the likely pathogens therefore depends on a child's age.

*Management of **non-severe** pneumonia*

1. Give a ***"first choice" antibiotic*** for 5 days (see box on page 56).
2. **Reduce a high fever** with paracetamol.
3. **Advise the mother** as described under upper respiratory tract infections. Teach her the danger signs.
4. **Follow-up**. If the child has not improved after 2 days or is getting worse, the mother should bring him back to you. Then reassess the child. Change the antibiotic and treat according to the severity of the disease. Be aware that a child with pneumonia may cough for 2-3 weeks to clear the secretions. Cough itself is not a sign that treatment has not been effective.

*Management of **severe** or **very severe** pneumonia*

1. Give a "***first choice" antibiotic***, see box on page 56.
2. **Give oxygen** if available. For how best to give it, see figure 8–4.
3. **Support the child** in an upright position (see figure 8–3).
4. **Reduce fever**.
5. **Treat wheezing** if present (see page 61).
6. Give one single high dose of ***vitamin A***.
7. **Treat complications**.
8. **Reassess** the child at least every day.



Put bricks under the bed to support the child in an upright position. Cushions are also helpful but need supervision that a family uses them.

Figure 8–3 *Positioning of a child with pneumonia*.

Summary - management of pneumonia

	Clinical characteristics	Recommended antibiotics
Non-severe pneumonia	• Fast breathing, no chest indrawing • Child over 2 months	**Children under 2 months** Always treat as severe pneumonia **Children over 2 months** Treat for 5 days with ***co-trimoxazole*** ***Alternatives***: Amoxicillin or procaine benzylpenicillin
Severe pneumonia	• Chest indrawing but no cyanosis • The child is able to drink	**Children under 2 months** Treat for 10-14 days with: ***Ampicillin*** + ***gentamicin*** IV/IM ***Alternative:*** Benzylpenicillin + gentamicin IV/IM ***If injections are not possible***, give oral ***co-trimoxazole*** **Children over 2 months** Treat for 7-10 days with: ***Ampicillin*** or benzylpenicillin IV/IM for 3 days, then 5 days amoxicillin orally ***If no improvement within 48 hours***, change to ***chloramphenicol*** ***If staphylococcal pneumonia is suspected***: ***cloxacillin*** and ***gentamicin*** for 3 weeks
Very severe pneumonia (life-threatening)	• Cyanosis • The child is unable to drink • Chest indrawing may be present	**Children under 2 months** Treat for 10-14 days with: ***Ampicillin*** + ***gentamicin*** ***Alternative***: ***benzylpenicillin*** + ***gentamicin*** IV/IM **Children over 2 months** Treat for 10-14 days with: ***Chloramphenicol*** ***Alternatives:*** ampicillin + gentamicin or benzylpenicillin + gentamicin ***If no improvement within 48 hours***: suspect staphylococcal pneumonia and consider ***cloxacillin*** + ***gentamicin*** for 3 weeks

Antibiotic doses for pneumonia

Amoxicillin 25–50 mg/kg/day divided into 3 doses

2–12 months	62.5–125 mg	3 times daily
1–5 years	125–250 mg	3 times daily
6–12 years	250 mg	3 times daily

Ampicillin

Children under 2 months 50–100 mg/kg/day divided into 2-3 doses

Under 1 week	200 mg	2 times daily
1 week–2 months	200 mg	3 times daily

Children over 2 months 100–200 mg/kg/day divided into 3-4 doses

2–12 months	250–500 mg	every 6-8 hours
1–5 years	500 mg–1 g	every 6-8 hours
6–12 years	1 g	every 6-8 hours

Benzylpenicillin

Children under 1 week 50,000–100,000 IU/kg/day divided into 2 doses

150,000–200,000 IU every 12 hours

Children over 1 week 100,000–200,000 IU/kg/day divided into 4 doses

1 week–2 months	200,000 IU	every 6 hours
2–12 months	200,000–400,000 IU	every 6 hours
1–5 years	400,000–750,000 IU	every 6 hours
6–12 years	750,000 IU–1.5 M IU	every 6 hours

Chloramphenicol 100 mg/kg/day divided into 3-4 doses, reduce after 2 days to 50 mg/kg/day

2–12 months	62.5–125 mg	every 8 hours
1–5 years	125–250 mg	every 8 hours
6–12 years	500 mg	every 8 hours

Cloxacillin 100 mg/kg/day divided into 3-4 doses

2–12 months	125–250 mg	every 8 hours
1–5 years	250–500 mg	every 8 hours
6–12 years	500 mg	every 8 hours

Co-trimoxazole

0–1 month	120 mg	2 times daily
2–12 months	240 mg	2 times daily
1–5 years	480 mg	2 times daily
6–12 years	480 mg	2 times daily

Gentamicin

Children under 1 week 5 mg/kg once daily

15 mg once daily

Children over 1 week 7,5 mg/kg once daily

1 week–2 months	20 mg	once daily
2–12 months	20–60 mg	once daily
1–5 years	60–100 mg	once daily
6–12 years	100–200 mg	once daily

Procaine benzylpenicillin 50,000–100,000 IU/kg once daily

2–12 months	300,000–500,000 IU	once daily
1–5 years	1,000,000 IU (1 M IU)	once daily
6–12 years	1,500,000 IU (1.5 M IU)	once daily

If a child deteriorates very quickly or pleural effusion and lung abscesses develop rapidly, then suspect **staphylococcal pneumonia**. This is a very serious pneumonia that is caused by staphylococcus bacteria. Suspect it in any child with very severe pneumonia whose condition is worsening despite appropriate treatment.

Complications of pneumonia and their management

- **Convulsions**. Give oxygen and diazepam.
- **Heart failure**. This can occur especially if the child is anaemic. A high fever (over 39°C) is another risk factor because fever increases the workload of the heart. A good clinical sign of heart failure is an enlarged liver. Fast pulse may also be caused by fever. Treatment is described on page 122.

Causes why a child with pneumonia does not improve

- Wrong choice of drugs or wrong dosage
- Wrong diagnosis or unrecognised additional problem: bronchospasm, heart disease, inhaled foreign body
- Complications have developed: pleural effusion, empyema, lung abscess, lung collapse
- Pneumonia has been caused by rarer bacteria that are not covered by the chosen antibiotics: staphylococcus, chlamydia, mycoplasma or tuberculosis

- **Further spread of infection**. If the infection is not controlled, complications such as pleural effusion, empyema, lung abscess or lung collapse may develop (see below under "Persistent pneumonia").

INDICATIONS FOR OXYGEN:

PRIORITY if oxygen supplies are limited:

- Central cyanosis
- Inability to drink

If oxygen is more widely available:

- Severe chest indrawing
- Respiratory rate over 70/minute (in children aged 2 months to 5 years)
- Grunting (in children less than 2 months old)
- Restlessness (if oxygen improves the condition)

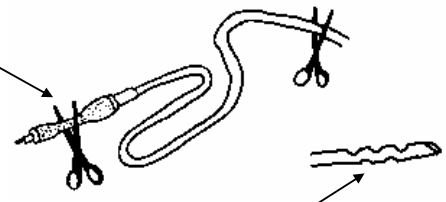
WAYS TO GIVE OXYGEN:

- **Mask**: usually ineffective!
- **Nasal catheter**

  Insert as demonstrated in the pictures.
  - Oxygen flow 0.5–1 litre/minute. Do not go above this level. A humidifier is not required.
  - Take the catheter out 2 times a day and clean it to prevent mucous from blocking up the holes.

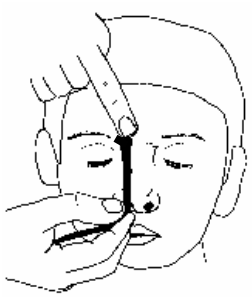
HOW TO USE A NASAL CATHETER:

If a nasal catheter is not available, take the giving set of an infusion. Cut the rubber part like this and attach it to the plastic tube coming from the oxygen bottle or to the bottle directly.

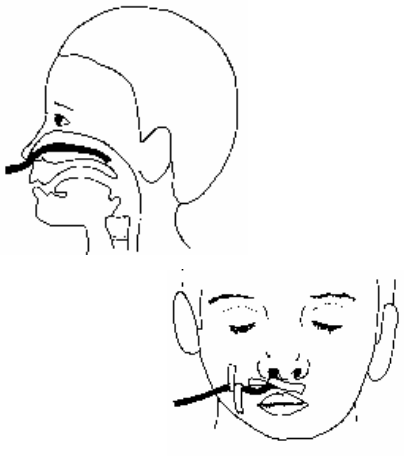


Cut several holes in the tube and cut the tip oblique.

1. Measure the length before insertion. The length is equal to the distance from the base of the nostril to the inner edge of the eyebrow.

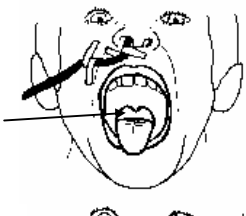


2. Insert the catheter and fix it.



3. Check that is has been inserted correctly. The tip should not be visible when the child's mouth is open. Correct the position if necessary.

CORRECT
Tip of catheter is ***not*** visible



WRONG
Tip of catheter is visible.

Figure 8–4 ***Oxygen - placement of a nasal catheter***.

Persistent pneumonia - what to do if a child is not improving

Most children recover in a few days with correct treatment. Occasionally a child remains ill with fever, fast breathing or chest indrawing. In these children consider the following problems:

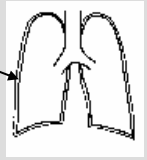
1. **Check that the child took the appropriate antibiotic** in the correct dose for the correct time. If not, give another course and make sure the child takes it correctly.
2. **Reconsider your diagnosis**. Sometimes the symptoms are caused by another problem.

   Assess for the following:

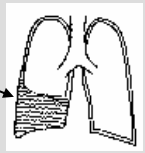
   - Signs of **bronchospasm**: wheezing?
   - Signs of a **heart problem**? Children with congenital heart problems often suffer from frequent chest infections and recover more slowly (see page 123).
   - Could the child have **inhaled a foreign body**?
   - Has the child signs of **rickets**?
3. Consider whether the child has developed any of the following complications:
   - **Pleural effusion or empyema** (for details see box below). If pus stays in the pleural space, the infection is difficult to cure with antibiotics and the child may die or the pus may turn later into thick scar tissue that will prevent the lung from working properly. Therefore, a large effusion has to be drained. Antibiotics should be given for 4 weeks.
   - **Lung abscess**. The child becomes very ill and does not respond to treatment. Diagnosis is made by x-ray.
   - **Lung collapse (atelectasis)**. It can be a complication of pneumonia when mucous blocks off one bronchus. Sometimes pneumonia may be the result of an inhaled foreign body that blocks one bronchus. In this case usually the right lung is affected. Diagnosis is by x-ray. Get a pa and a lateral view if possible.
4. **Check your choice of antibiotics** and consider any of the following bacteria as a possible cause of persistent pneumonia:
   - **Staphylococcus bacteria** (see above).
   - **Chlamydia** is a possibility in children under 6

Pleural effusion

The lung is covered by two layers of small skin (pleura). Usually there is only a very small amount of fluid between these two layers (pleural space).



If an infection spreads into the pleural space, the amount of fluid increases (pleural effusion). If it is very infected it can turn into thick pus (empyema).



Common causes of pleural effusion

● Bacterial (complication of pneumonia)	The child is acutely ill
● Tuberculosis	The child's breathing is often surprisingly little affected, even by a large effusion. He has been ill for several weeks.

Clinical examination

- Reduced expansion (the side with the effusion moves less during inspiration)
- Percussion: dullness over the effusion
- Reduced or absent breath sounds over the effusion
- If large effusion: trachea deviated away from effusion

X-ray signs

- White base of lung with concave upper border. No air bronchogram.
- Trachea may be deviated away from affected lung

How to drain a pleural effusion

1. Wash your hands and put on some gloves.
2. Lie the child on his back.
3. Clean the skin with an antiseptic for at least 2 minutes.
4. Select a point in the mid-axillary line (at the side of the chest) at nipple level and inject 1 ml of 1% lignocaine into the skin and subcutaneous tissues.
5. Take a wide bore needle (for example 14 gauge) and attach a 5 ml syringe to it. Hold the needle with one hand about 1 cm from its sharp end. This will prevent it from being pushed too far into the lung.
6. Blood vessels and nerves run along the bottom of each rib, so push the needle into the chest slightly above the rib. Aspirate (suck) gently with the syringe as you push the needle in. You may feel a click as you go through the pleura and fluid will flow into the syringe.
7. If the fluid is thin, it is possible to aspirate it through the needle. However it is safer to thread a catheter through the needle into the pleural space. A 16 gauge catheter will go through a 14 gauge needle. When the catheter is in the pleural space, remove the needle and aspirate through the catheter as much fluid as you can.
   - ***If the fluid is clear brownish-yellow***, remove the catheter after aspiration and put a dressing with plaster over the hole in the chest.
   - ***If the fluid is thin pus (like milk),*** leave the catheter in so that you can suck out more pus several times a day. Seal the end of the catheter with a clamp so that no air can get in or set up an underwater drain.
   - ***If the fluid is thick pus*** and will not come out properly, the child needs surgery.

months. It responds to co-trimoxazole and erythromycin but not to amoxicillin, ampicillin or penicillin (see page 192).
- **Mycoplasma** is a possibility in children over age 5 years. It responds to erythromycin.
- **Tuberculosis** should be considered if all other possibilities seem unlikely.

How to prevent pneumonia

While it is not possible to prevent pneumonia by treating a common cold with antibiotics, there are some proven ways how the incidence and death rate can be reduced:

1. Ensure that all children are immunised against measles and whooping cough.
2. Encourage breastfeeding.
3. Encourage good feeding habits to reduce malnutrition.
4. Spread the knowledge about danger signs of pneumonia in your community.
5. Treat all cases of pneumonia according to recommended standard guidelines.

Aspiration pneumonia

Sometimes a child aspirates food or vomit into his lungs. At risk are especially unconscious children whose cough and swallowing reflex are reduced, and handicapped children with spasticity and mental handicaps. The aspirate causes inflammation of the lungs and pulmonary oedema. Cough, wheezing, fever and fast breathing occur usually within 1 hour after the aspiration. Acute complication is lung failure.

Management

1. Thorough suction of the upper and lower airways
2. If available, oxygen
3. Ampicillin and gentamicin
4. Corticosteroids (for example, dexamethasone)

Chronic cough - a cough lasting for more than 4 weeks

Causes of chronic cough

- Asthma
- Whooping cough
- Tuberculosis
- Bronchiectasis
- Postnasal drip
- Inhaled foreign body
- Heart problem

When you see a child with chronic cough, make sure the cough has lasted for more than 4 weeks. Sometimes a child is simply suffering from repeated episodes of acute viral infections with cough. It is normal for a child to cough after an airway infection for 2-3 weeks.

Danger signs for a serious cause of chronic cough

- Persistent fever
- Malnutrition
- Persistent fast breathing
- Chronic green sputum

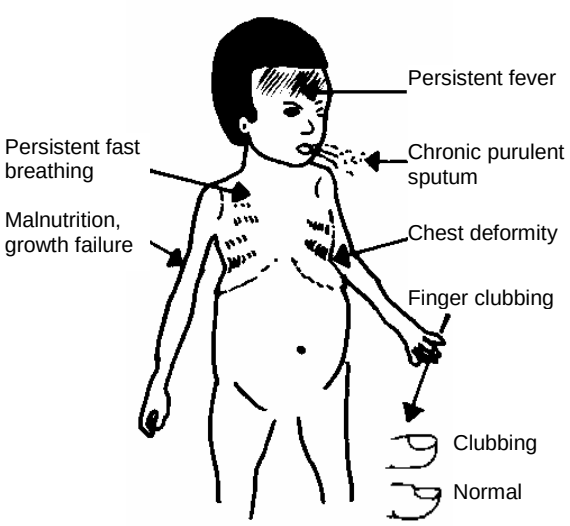


Figure 8–5 ***Signs in a child with chronic cough indicating a serious underlying condition***.

Some causes of finger clubbing

- Bronchiectasis
- Certain congenital heart diseases
- Endocarditis
- Liver cirrhosis
- It may be a normal finding without any specific underlying pathology

ASTHMA

Asthma is the most common cause of a chronic cough. The following symptoms suggest that chronic cough is due to asthma:

- Recurrent cough that is worse at night or during certain seasons
- Cough that gets worse when a child is running
- Other family members suffer from asthma or eczema

Cough may be the only symptom of asthma; wheeze is not always present. If you are not sure, give a bronchodilator such as salbutamol. If the cough improves, it is likely from asthma.

WHOOPING COUGH (PERTUSSIS)

In China, whooping cough is called "100 days cough" because a child coughs for several months. Unlike measles, whooping cough can develop soon after birth because children do not receive any protection against it from the mother. Early immunisation is therefore important. The first of three vaccinations should be given when a child is 6 weeks old. Be aware that even if a child has completed his immunisations, he can develop a mild form of whooping cough.

Clinical features

Typical is a very thin child between 2-6 years old who coughs in spasms and "whoops" or vomits afterwards. The child is well between the attacks and without fever. Another sign of whooping cough is bleeding in the white of the eyes (subconjunctival haemorrhages), sometimes he may cough up blood, which is not dangerous. Young children often present with episodes of not breathing (apnoea) rather than the typical coughing fits of older children.

Management

1. **Prevent malnutrition**. The main danger of whooping cough is malnutrition. Management concentrates on explaining to the family that the cough may last for up to 3 months. Make sure that they understand the risk of malnutrition. Advise them to give high protein and energy foods, for example super-flour, page 15.
2. **Antibiotics** (erythromycin or co-trimoxazole) are only helpful during the first 10 days of the illness when the child has not yet developed the typical cough. Later, antibiotics are not effective.
3. **Treat complications**. Secondary pneumonia is rare. Suspect it if the child is not well between the coughing attacks, has fast breathing, chest indrawing or fever. Treat with chloramphenicol.

NOTE: Cough medicines or anti-emetics cannot stop the cough nor vomiting. Do not prescribe them.

BRONCHIECTASIS

Bronchiectasis is the result of previous tuberculosis, pneumonia or whooping cough (figure 8–6). It is underdiagnosed. A child may have had tuberculosis in the past. When chronic cough occurs it is often thought that TB has recurred, but TB treatment does not help.

Clinical features

The following are suggestive signs for bronchiectasis:

- History of tuberculosis, severe pneumonia or whooping cough
- Recurrent chronic cough that is worse in the morning
- Plenty of green sputum
- Intermittent fever but the child is not very ill
- Finger clubbing may develop
- On examination, coarse crepitations and wheeze due to fluid in the distended parts of the lung.

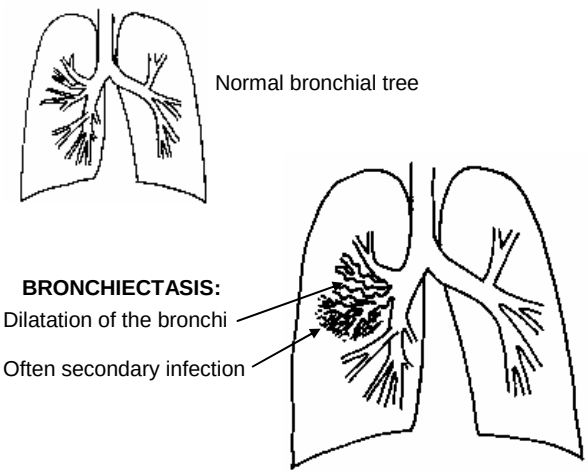


Figure 8–6 *Bronchiectasis*.

Management

Explain the condition to the family. Treat with antibiotics during acute episodes. Drainage of secretions (postural drainage) is most important. Consult a physiotherapist.

TUBERCULOSIS

Tuberculosis is another cause of chronic cough. Suggestive signs are:

- Persistent fever, often low grade in the evening
- Weight loss and loss of appetite
- History of contact with TB in members of the same household
- Failure of standard antibiotics for ARI to provide a cure
- Recent history of measles

Further details, see chapter 6. "Tuberculosis".

POSTNASAL DRIP AND SINUSITIS

Some children have an irritating cough that is worse at night. The child is not ill and the cough disturbs the family more than it disturbs the child. There is nasal discharge but some mucous also drips down from the nose into the throat and causing irritation of the airways. Reassure the family. In older children (over 5 years) look for signs of sinusitis: headache, tenderness over cheeks or forehead on percussion. Treat sinusitis with co-trimoxazole or amoxicillin for 12 days.

INHALED FOREIGN BODY

An inhaled foreign body is a problem mainly occurring in children under 5 years because they tend to put

things into their mouth. In the majority of cases, there is a history of choking and coughing. The foreign body is usually in the right lung. Beside chronic cough, children present with recurrent pneumonia that is typically always at the same site, or localised wheeze. If the foreign body is not removed within the first week, permanent damage to the lung develops.

Wheeze

Wheeze is a soft whistling sound when a child breathes out. Sometimes it can be heard without a stethoscope. It is a sign of narrowing of the airways inside the thorax and can result in difficult breathing. In children under 1 year wheezing is most commonly caused by acute airway infections such as bronchiolitis or pneumonia. In older children the commonest cause of wheezing is asthma that typically presents with recurrent wheezing episodes.

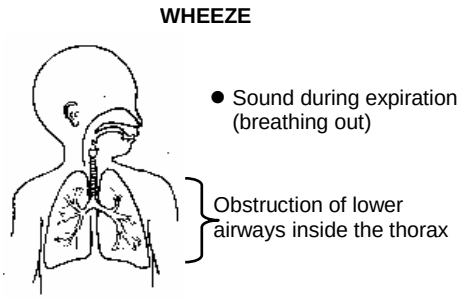


Figure 8– 7 *Wheeze*.

Causes of wheeze

COMMON

- Bronchiolitis (children under 1 year old)
- Asthma (children over 2 years, recurrent wheeze)
- Pneumonia

RARE

- Inhaled foreign body
- Mediastinal mass (for example, tuberculous lymph nodes)
- Aspiration pneumonia
- Anatomical abnormalities

Assessment and management of wheeze

The first priority when you see a child with wheeze is to find out whether he has pneumonia or not. This is especially important in young children and those who have their first wheezing attack.

Assess the child for fast breathing and chest indrawing and other signs of difficult breathing:

1. *If the child has no signs of difficult breathing*, treat with a bronchodilator only.
2. *If the child has sign of difficult breathing*, give a rapid acting bronchodilator (salbutamol inhaled or orally or adrenaline subcutaneously - dosages see box “Drugs used in asthma” on page 62).
3. Reassess the child after 30 minutes. If the child has still fast breathing or chest indrawing, treat with an antibiotic according to the recommendations for pneumonia and with a bronchodilator.
4. Give oxygen if the child is unable to drink or is cyanosed.

NOTE: In children under 2 years, salbutamol and adrenaline are sometimes not effective because of the immaturity of the child’s lung.

ACUTE BRONCHIOLITIS

Acute bronchiolitis is the commonest lung infection in children between 1-12 months. It is not caused by bacteria but by viruses. This means, antibiotics cannot change the natural course of the illness. The wheeze is not caused by bronchospasm but by swelling of the airways and mucous, meaning that bronchodilators are not effective.

Clinical features

Typically a young child who already suffered from a common cold for a few days, develops fast breathing, wheezing and commonly chest indrawing. There is usually a fever. The breathing difficulty is getting worse for 2-3 days before the child recovers spontaneously over about 2 weeks.

Usually the illness is only mild but sometimes a child can develop dangerous problems:

- He becomes exhausted from the fast breathing and hypoxia and dies of respiratory failure.
- He becomes malnourished and dehydrated because he is too breathless to drink.

Management

Although the illness is self-limiting and antibiotics do not help, it is usually not possible to exclude pneumonia by clinical examination. It is therefore appropriate to give an antibiotic in order not to miss a bacterial pneumonia.

1. Give an antibiotic according to the recommendations for pneumonia (see page 56).
2. Humidify the room.
3. If a child is unable to drink or cyanosed, give oxygen.
4. If a child is not able to drink, give 75% of the daily fluid requirements IV, which is about 60 ml/kg/24 hours. Be careful not to overload the child with fluids. Empty the infusion bottle/bag that only the required amount is left that you want to give over

the next 24 hours. If available, use half strength normal saline + glucose 5%.

5. Salbutamol is not likely to be effective. Count the breathing rate, then give one dose salbutamol and count the breathing rate again after 30 minutes. If the breathing rate has slowed down, continue salbutamol, otherwise stop it.

NOTE: Corticosteroids are not effective and should not be given.

Explain to the parents the natural course of the disease and warn them that the child may have wheezing attacks with viral infections in the future, 25% of children with bronchiolitis may later develop asthma.

ASTHMA

Older children have sometimes repeated episodes of cough, wheeze and breathlessness. Between the attacks they are usually well. These children have asthma. Asthma is not an infectious disease. It is caused by an over-reaction (hyper-reactivity) of the airways to different stimuli (trigger) such as viral infections, smoke, cold air, exercise or aspirin (acetylsalicylic acid). These triggers cause spasm and inflammation of the bronchi. Often several members of one family will suffer from asthma, eczema or allergic rhinitis, which are all so-called atopic diseases with a similar pathophysiology.

Management of acute asthma attacks

1. Give bronchodilators and possibly steroids according to the severity of the attack, see table on page 63.
2. Remove or reduce the exposure to the trigger that causes asthma. Tell the family that no-one should smoke inside the house or near the child.

NOTE: Antibiotics are only indicated if pneumonia cannot be excluded. Do not give them routinely.

Management of a child with chronic symptoms

If a child has recurrent asthma symptoms, such as a disturbing cough or wheeze at night, discuss with the family the need to remove triggers. Give aminophylline as a trial for several weeks but not permanently. Salbutamol is not effective for prophylaxis.

Newer drugs for prevention of recurrence of asthma are very expensive and usually not available: inhaled steroids (beclomethasone or budesonide) prevent asthma if given regularly every day, oral ketotifen or inhaled cromoglycin may be helpful in allergic asthma.

Drugs used in asthma

Salbutamol

Salbutamol is a bronchodilator that causes the airways to expand. It is the most useful drug for acute attacks. It is most effective when give by inhalation. It is sometimes not effective in children under 2 years. When it has been given for several days its effect becomes less.

INHALATION (Use a spacer, see picture A–6 on page 205.)

1–2 puffs when needed (***In an emergency***, you can give up to 20 puffs at one time)

ORAL 0,3 mg/kg/day divided into 3 doses

2–5 years	1–2 mg	3 times daily
6–12 years	2 mg	3 times daily

Aminophylline

Aminophylline is a bronchodilator that opens the airways and also reduces inflammation. It has more side-effects than salbutamol. It can cause arrhythmias, convulsions and death when given IV or in a dose too high.

During treatment, watch for signs of toxicity because the margin between therapeutic and toxic levels is very small.

Early toxic signs: vomiting, restlessness, sleeplessness, tachycardia, fever

Reduce or stop aminophylline at these early signs.

Late toxic signs: convulsions, patient stops breathing

ORAL 12–15 mg/kg/day divided into 3 doses

1–5 years	25–50 mg	3 times daily
6–12 years	50–150 mg	3 times daily

IV: give 5 mg/kg in 5 % glucose very slowly over 20 minutes followed by 0.9 mg/kg/hour continuous infusion.

If continuous infusion is not possible, repeat the initial dose after 8 hours.

If the child took aminophylline or theophylline in the last 24 hours, give half the dose.

Adrenaline

Adrenaline opens the airways rapidly. It can also have serious side-effects. The dose has to be calculated carefully and diluted for young children.

For children under 5 years dilute 1 ampoule adrenaline 1:1000 with 9 ml sodium chloride 0.9% or fluid for injection.

SC	1–12 months	0.05 mg	= 0.5 ml diluted solution
	1–2 years	0.1 mg	= 1 ml diluted solution
	2–5 years	0.2–0.4 mg	= 2–4 ml diluted solution
	6–12 years	0.5 mg	

Corticosteroids (Prednisolone, dexamethasone, hydrocortisone)

Steroids reduce inflammation of the airways. They are very effective and safe when given in a high dose for 4-5 days.

- ***Prednisolone*** ("first choice") 1–2 mg/kg/day, maximum 40 mg/day

2–12 months	5 mg	once daily in the morning
1–5 years	5–10 mg	once daily in the morning
6–12 years	10–30 mg	once daily in the morning

- ***Dexamethasone*** 0.2–0.5 mg/kg per day

0–6 years	2–4 mg	one single dose
6–12 years	4–8 mg	one single dose

Drugs that are often wrongly used in asthma

- **Anti-histamines**

Do not use them. They thicken the secretions in the airways and make it more difficult for the child to clear his lungs.

- **Cough syrups**

They are not effective. Do not use them.

Summary - management of asthma

Classification	Clinical findings	Recommended drug therapy
Mild asthma	• Wheeze • No difficult breathing	***Salbutamol*** inhaled when needed (***Alternatives***: oral salbutamol or oral aminophylline for 5 days)
Moderate asthma	• Wheeze • Fast breathing • Some chest indrawing	***Salbutamol*** inhaled 6-8 hourly (***Alternatives***: oral salbutamol or oral aminophylline for 5 days) + Oral ***prednisolone*** high dose for 4 days
Severe asthma	• Wheeze • Chest indrawing • Unable to speak • Unable to eat ***If very severe***: • Cyanosis	***Salbutamol*** inhaled + ***Steroids*** oral or IV + ***Aminophylline*** IV ***(Alternatives***: aminophylline IV + steroids orally or IV or adrenaline SC + steroids orally or IV)

Stridor

Stridor is a harsh noise that can be heard when children breathe in. It is a sign of narrowing of the airway in the region of the larynx, epiglottis or trachea. It is most commonly caused by acute viral infections, so called infectious croup. Rare, but dangerous is acute epiglottitis.

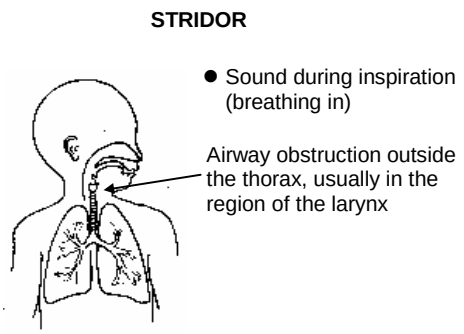


Figure 8–8 *Stridor*.

How to assess a child with stridor

It is first priority to find out whether the child has difficult breathing or not: assess the child for fast breathing and chest indrawing. Stridor with difficult breathing is dangerous. Monitor the child closely, best at a hospital.

NOTE: Do not examine the throat of children with suspected epiglottitis because this can cause a sudden complete obstruction of the airway.

Causes of stridor - practical clinical points how to differentiate between them

COMMON	
• Infectious croup	The child is young. The onset of stridor is gradual, accompanied by a typical barking cough, especially at night.
RARE	
• Acute epiglottitis	The child becomes suddenly very ill with high fever. Swallowing is painful and saliva drools out of the child's mouth.
• Diphtheric laryngitis	It is usually a progression of diphtheria that started in the nasopharynx. You find the typical grey membranes on the palate and tonsils.
• Measles croup	The child shows the typical clinical signs of measles
• Inhaled laryngeal foreign body	Typical history and findings
• Angioedema (allergy)	Typical history and findings

INFECTIOUS CROUP (acute laryngotracheobronchitis)

Different viruses cause inflammation of larynx, trachea and bronchi and obstruction at the level of the larynx. It is usually a mild illness affecting children who are 3 months–3 years old. After a few days of common cold, a child develops a barking cough, hoarseness of voice and mild stridor. Symptoms are usually worse at night. The stridor improves after 2-3 days, the cough clears over about 2-3 weeks. Recurrence with future viral upper airway infections is common.

Management

1. Humidify of the air.
2. Give prednisolone for 3 days.
3. Antibiotics are not needed.

ACUTE EPIGLOTTITIS

It is a dangerous bacterial infection, usually caused by Haemophilus bacteria. It causes acute swelling of the epiglottis with severe obstruction. Affected children are usually between 2-6 years old. The onset is very sudden. The child develops a high fever and difficulty swallowing within a few hours. The throat is painful and saliva drools out of his mouth. There is stridor and difficult breathing and the child is very ill. A child may develop complete obstruction and needs a tracheotomy.

Management

1. Chloramphenicol IV/IM
2. Dexamethasone or hydrocortisone IV
3. Oxygen
4. Disturb the child as little as possible

Chronic stridor from birth

Chronic stridor from birth can occur when the larynx is very soft (laryngomalacia). This condition will improve when the child grows older. Typically there is no stridor at rest and no difficult breathing. Reassure the parents. If the stridor also occurs at rest or is associated with difficult breathing, refer to an ENT specialist.

References

1. Ahmad T, Parkin M. Why you can diagnose pneumonia without a stethoscope. *ARI News* 1990; 16: 7-8.
2. Behrmann RE, Kliegman RM, Nelson WE. *Textbook of Paediatrics*. 15th edition. Philadelphia: W B Saunders Company 1996.
3. Brewster D. Pertussis. Clinical Management. *ARI News* 1990; 16: 4-5.
4. Campbell H. Rapid acting bronchodilators. *ARI News* 1992; 23: 6.
5. Cattaneo A. Oxygen for severe pneumonia. *ARI News* 1994; 29: 2-3.
6. Cherian T. A guide to treatment and care (that young infants with severe disease need). *ARI News* 1992; 24: 3-4.
7. Ebrahim GJ. *Paediatric Practice in Developing Countries.* 2nd edition. London: Macmillan 1993.
8. Gadomski A. Misuse of antibiotics to treat the common cold. *ARI News* 1993/94; 27: 7.
9. Gove S. Remedies for young children. *ARI News* 1990; 18: 2-3.
10. Henry R. Management of recurrent wheeze. *ARI News* 1993-94; 27: 2-3.
11. Illingworth RS. *Common Symptoms of Disease in Children.* 9th edition. London: Blackwell Scientific Publications 1988.
12. King M, King F, Martodipoero S. *Primary Child Care.* Book One. Oxford: Oxford University Press 1978.
13. Muhe L. Managing pneumonia. *Child Health Dialogue* 1996; 2+3: 13.
14. Murtagh K. Persistent pneumonia. *ARI News* 1991; 20: 2-3.
15. Shann F. How to manage pleural effusion and empyema. *ARI News* 1995; 31: 7.
16. Stanfield P. *Child Health.* 2nd edition. Nairobi: African Medical and Research Foundation 1997.
17. Stanfield P. Brueton M. Chan M. Parkin M. Waterston T. *Diseases of Children in the Subtropics and Tropics.* 4th edition. Kent: Edward Arnold 1991.
18. World Health Organisation. WHO/ARI/90.10. *Antibiotics in the treatment of acute respiratory infections in young children.* Geneva: WHO 1990.
19. World Health Organisation. *Charts for Integrated Management of Childhood Illness*. Geneva: WHO ca. 1996.
20. World Health Organisation. *The management of acute respiratory infections in children - practical guidelines for outpatient care*. Geneva: WHO 1995.

9. Diarrhoea

Intensive research has resulted in very successful management of diarrhoea

Diarrhoea is the second common cause of death in children. Death is usually from dehydration, the loss of fluid and salts. Diarrhoea is also an important factor in the development of malnutrition. It is defined as passing loose or watery stools. The frequent passing of normal stools is not diarrhoea.

Diarrhoea is a very common problem in young children. Studies have estimated that a young child may suffer about 3-5 episodes of diarrhoea every year. Because it is such a common problem with a high burden of morbidity and death, intensive research efforts have been made to better understand diarrhoea. These efforts have resulted in important developments. Successful and simple practical management guidelines have been developed and wherever they are put into practice, the mortality from diarrhoea is decreasing.

Sadly, this knowledge is still not put into practice everywhere. It has become a tradition in many places to treat diarrhoea wrongly with antibiotics or other drugs instead of following the well proven recommended standard treatment. A family is often happy to buy and trust medicines as is the one who has prescribed them as he fulfils the family's expectations. However, this practice is not according to latest knowledge and results in unnecessary morbidity and mortality of many children.

Summary - essential knowledge for the correct management of diarrhoea

- Diarrhoea is closely related to unsafe food preparation, poor water supply and lack of breastfeeding.
- In the majority of cases, diarrhoea is a self-limiting illness, caused by hypersecretion of fluids from a damaged gut mucosa. Recovery depends on how long it takes the body to replace the damaged cells.
- The main dangers of diarrhoea are death from dehydration, the development of malnutrition and, in some children with bloody diarrhoea, sepsis.

The essential knowledge for correct management of diarrhoea

Diarrhoea - a problem of poverty and living conditions

Diarrhoea is a common problem during the summer months when water supplies may become less and food is quickly contaminated with pathogens. Bacterial growth can reach dangerous levels in freshly cooked food within 30 minutes of its preparation. If a family does not follow the rules of safe food preparation as explained in detail on page 16, this will invariably lead to the occurrence of diarrhoea. Children who are not breastfed also suffer more episodes of diarrhoea than breastfed babies.

Diarrhoea is therefore closely related to the social circumstances and hygienic conditions in a family. These conditions need as much consideration as the treatment of the actual episode of diarrhoea if you want to reduce morbidity and mortality from diarrhoea. Often simple health education can bring about a major change.

The causes and mechanisms of diarrhoea

The majority of children with diarrhoea suffer from acute watery diarrhoea (80%). Bacteria are found only in a small number of diarrhoea cases; a large number is caused by viruses.

The mucosa of the small intestine consists of cells (enterocytes) responsible for secretion of fluids and absorption of food. Older cells are constantly replaced by younger cells and shed into the gut lumen. Bacteria and viruses can affect these functions in different ways: some bacteria produce toxins (enterotoxins) that cause the enterocytes to secrete large amounts of fluid into the gut lumen. This is called hypersecretion. Viruses cause hypersecretion by directly damaging the mucosal cells. Hypersecretion leads to the loss of large amounts of fluid resulting in watery diarrhoea.

Recovery depends on the shedding of those mucosal cells that are affected by bacterial toxin or viral damage. Once the damaged cells are replaced by younger, healthy cells, the diarrhoea stops by itself. This process of self-healing takes usually about 2-4 days. It is delayed in malnourished children (figure 9–1).

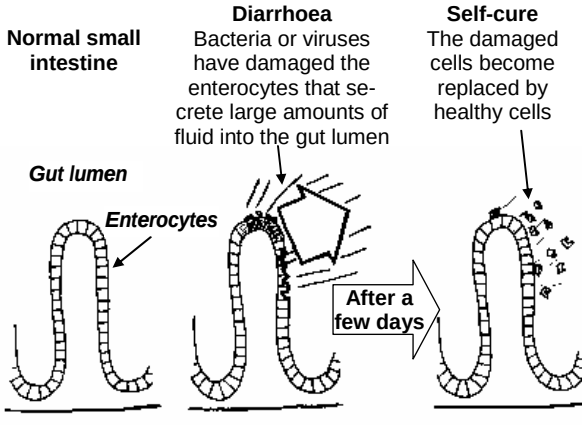


Figure 9–1 ***Pathophysiology of watery diarrhoea (simplified).***

The main dangers of diarrhoea

The main dangers of diarrhoea are:

- Dehydration due to the loss of fluid and salts
- Malnutrition
- Sepsis (in some children who pass blood with their stools)

Effective management has to concentrate first of all on the prevention and treatment of dehydration, and the prevention of malnutrition.

How to assess a child with diarrhoea

Take a history

- What is the **duration** of the diarrhoea? Is it acute or persistent diarrhoea?
- Has there been **blood** in the stools?
- **General condition**:
  - Is the child drinking?
  - Is he very sleepy?
  - Did he have convulsions?
- **Associated symptoms:**
  - Fever?
  - Cough?
  - Ear pain?

  (Any of these could point to a systemic disease being responsible for the diarrhoea)
- **Feeding practice**:
  - How was the mother feeding her child before the illness: breastmilk, bottle-feeding?
  - How is she feeding him now during the illness?

  (These questions will help you to teach the mother about good feeding practices. You will recognise the family's understanding of diarrhoea and which points to stress when you discuss the child's illness with the family.)
- **Previous treatment:** has the child received any medicines or traditional treatment already?

Examine the child

- **General condition**: does the child appear well or very ill?
- **Dehydration:** (figure 9–2)
  - Is the child dehydrated?
  - To what degree?

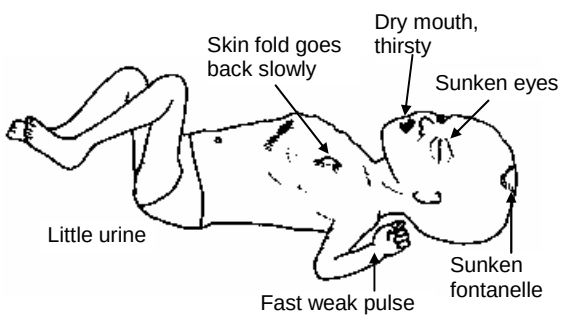
HOW TO ASSESS A CHILD FOR DEHYDRATION

LOOK
- General condition?
- Drinking?
- Eyes:
  - sunken or not?
  - wet or dry?
- Mouth - wet or dry?

FEEL
- Skin pinch over chest
- Pulse

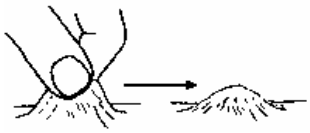
DECIDE

CLINICAL SIGNS OF DEHYDRATION:



How to check for skin elasticity (skin pinch)

Pinch the skin over an area with little fat (for example, over the sternum). Take a skin fold and pull it up. Watch the speed with which it is going back. The skin fold normally disappears immediately.



General condition	Well, interested in surroundings	Irritable, restless	Lethargic, floppy, comatous
Drinking	Not thirsty	Thirsty	Drinking poorly or unable to drink
Eyes / fontanelle in infants	Not sunken	Sunken	Very sunken
Eyes / mouth	Not dry	Dry	Very dry
Skin pinch	Goes back quickly	Goes back slowly	Goes back very slowly
Pulse	Normal	Fast	Fast, weak or absent radial pulse
	NO DEHYDRATION	**"SOME" DEHYDRATION**	**SEVERE DEHYDRATION**

Figure 9–2 ***How to assess a child for dehydration***.

(After examining a child, you should know the degree of his dehydration. This is very important because your estimation determines the amount of fluid necessary to replace the child's fluid loss, see picture)

- **Signs of severe malnutrition** (severe muscle wasting or oedema)?
- **Signs of a systemic infection**? Examine the child carefully, especially ears, throat and chest.

GENERAL MANAGEMENT OF DIARRHOEA

Dehydration - prevention and management

Children with diarrhoea must be rehydrated according to the degree of dehydration in relation to their body weight. Any ongoing fluid losses must also be replaced. For practical reasons, divide children with diarrhoea into three groups:

1. Children **without** dehydration
2. Children with "**some**" dehydration
3. Children with **severe** dehydration

Prevention - it must start with the first diarrhoeal stool

Children who die from diarrhoea die mainly from dehydration. All deaths from dehydration could be prevented. It is important to understand that dehydration starts long before any of the clinical signs of dehydration appear. Dehydration, which is loss of body fluid, starts actually with the first diarrhoeal stool but clinical signs will not appear unless 5% or more of the body fluid has been lost. Prevention of dehydration must therefore start with the first watery or loose stool by constantly replacing fluid and electrolyte losses.

Which fluids can be used to prevent dehydration?

Very good fluids

- Oral rehydration solution (ORS)
- Wheat salt solution (WSS)
- Salted drinks (salted rice water or salted yoghurt drinks)
- Salted soup

Possible fluids

- Clean water
- Green tea without sugar

Dangerous fluids, do not use them

- Tea with sugar
- Soft drinks (for example, fanta, pepsi, coke)
- Sweetened fruit juice

Diarrhoea *without* signs of dehydration

Clinical features

- The child is well, he is not thirsty and drinks normally.
- No clinical signs of dehydration.

Management

1. Explain to the family that the child needs more fluid than usual to prevent dehydration.
2. Teach them to give extra good fluid each time a child has passed a diarrhoeal stool or has vomited (for suitable fluids, see box).

   They should give:

Under 2 years	¼–½ glass for each stool
2–10 years	½–1 glass for each stool
Over 10 years	1–2 glass for each stool

Which fluids can be used for oral rehydration therapy

ORAL REHYDRATION SALTS (ORS)

When salt is absorbed from the gut, it draws water into the body. Researchers found that glucose increases the absorption of salt and water from the gut. Someone called this one of the most important discoveries of this century. It means that a special glucose salt solution is able to increase the absorption of water from the gut and can be used to replace fluid losses easily. This discovery has formed the basis for oral rehydration salts (ORS).

How to prepare ORS

If an ORS package is available:

Dissolve the contents of one package in 4 glasses (around 1 litre) of boiled water. It can also be dissolved in weak, unsweetened green tea.

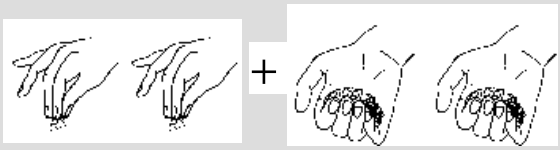
If ready-made ORS packages are not available teach the mother how to prepare wheat salt solution (WSS).

WHEAT SALT SOLUTION (WSS)

WSS is a very cheap home-made oral rehydration solution that is used in many parts of Afghanistan.

How to prepare WSS

Mix 2 pinches of salt and 2 full fists of wheat flour in 1 litre (4 glass) of water and stir it.



Bring it to boil, let it cool down and give to the child.

Storage: it can be stored during summer for 6 hours, during winter for 12 hours.

A child with "some" dehydration

Clinical features

- The child is restless or irritable and thirsty.
- Reduced skin elasticity. The skin goes back slowly after being pinched.

- Sunken eyes
- Dry mucosal membranes

The child has lost about 5-10% of his body fluids and needs treatment for rehydration

Management

Rehydrate the child with oral rehydration solution (ORS) over the next 4 hours. After 4 hours, the child's fluid deficiency should have been replaced.

How much ORS to give: the amount to give depends on the child's body weight. If you know a child's weight, give 75 ml/kg ORS over 4 hours. If you do not know the child's weight, use the following table as guideline:

Age	Approximate amount of ORS to give during the first 4 hours
Less than 4 months	200–400 ml (1–2 glasses)
4–11 months	400–600 ml (2–3 glasses)
12–23 months	600–800 ml (3–4 glasses)
2–4 years	800–1200 ml (4–6 glasses)
5–14 years	1200–2200 ml (6–11 glasses)

How to give it: it is best to prepare ORS in the presence of the mother and to show her how to give it:

1. Give one teaspoon ORS every minute to a child under 2 years and frequent sips from a cup for older children. A bottle must never be used!
2. If a child vomits, usually ORS had been given too fast. Wait 5-10 minutes and then continue, giving ORS more slowly (for example one teaspoonful every 2-3 minutes).

Give ORS by cup or spoon - never use a feeding bottle!

Figure 9–3 *How to give ORS*.

The differences between ORS and IV fluids

IV fluids are overused and carry a significant risk for children. They should only be given on very strict clinical indications. Never give them on demand of the family.

The only indications for intravenous rehydration therapy are:

- Severe dehydration
- Severe persistent vomiting
- The fluid loss is greater than the amount that can be replaced orally (for example, in severe cholera)

COMPARISON OF ORS AND IV REHYDRATION FLUIDS

The following table shows the important differences between ORS and IV fluids and clearly demonstrates the superiority of ORS compared with IV fluids in most cases. One of the most important differences is the education of families. It is essential that a family learns about ORS because it is widely available. If they have not learned about ORS, they may think only IV fluids can help and many children will die before they reach a health facility able to set up a drip. When you teach a family about ORS or WSS, they will take this knowledge back to their home and family and pass it on to others.

	ORS or WSS	IV fluids (Ringer-lactate or sodium chloride 0.9%)
Indications	• Prevention of dehydration • Treatment of mild and moderate dehydration	• Treatment of severe dehydration • Persistent severe vomiting • Very high fluid losses (for example, in severe cholera)
Contents	Similar, also contains potassium	Similar
Danger of overhydration?	No	Yes, especially in small children and malnutrition.
Risk of sepsis?	No	Yes, if non-sterile equipment or technique is used.
Painful for the child?	No	Yes
Costs	Very cheap	Expensive
Possible for families in remote areas without health facilities?	Yes	No, the child may have died of dehydration before reaching a health facilities if the family does not know about ORS.
Does it encourage health education and better care for sick children by the family?	Yes	No

Severe dehydration

Clinical features

The clinical signs of dehydration like sunken eyes and reduced skin elasticity are marked. The child is lethargic or unconscious and drinks poorly or is not able to drink. Beside these, he shows signs of shock: he is pale, tachycardic (fast pulse) with a weak or absent radial pulse and cold arms or legs.

Management

Severe dehydration is an emergency.

A child with severe dehydration needs fluid replacement urgently and this should be given intravenously (IV). Use ringer lactate because it will also correct an existing metabolic acidosis. If ringer lactate is not available, use sodium chloride 0.9% (physiological saline, normal saline). Do not use glucose 5% (dextrose), it is not suitable for replacing fluid losses.

A child who can drink, should be given ORS until the drip is running. As soon as he is able to drink without difficulty, usually after 2-4 hours, start him on ORS solution. This provides additional potassium and treatment for acidosis that may not be sufficiently supplied by the IV fluid.

1. Give ***ringer lactate*** 100 ml/kg divided as follows:

   Children under 1 year

   30 ml/kg in the first hour and then 70 ml/kg over 5 hours.

   Children older than 1 year

   30 ml/kg over 30 minutes, then 70 ml/kg over 2.5 hours.

   If you cannot weigh a child, estimate his weight and give accordingly. As a general rule, give the IV-fluids fast until you can palpate the radial pulse. Then give the remaining fluid more slowly over 2.5 or 5 hours, depending on the child's age (see above).

2. Assess a severely dehydrated child every 15-30 minutes until a strong radial pulse can be felt. Then assess him every hour to make sure he is improving. If not, give the drip more rapidly.

   After 6 hours (children under 1 year) or after 3 hours (older children), reassess the need of further treatment:

   - *If there are no signs of dehydration*, continue to replace fluid losses and start feeding.
   - *If he still shows some signs of dehydration*, continue rehydration with ORS over 4 hours, then start feeding.
   - *If his radial pulse is still very weak or not palpable*, continue IV fluids at once.

Summary - management of dehydration

Assessment	Degree of dehydration	Management
No signs of dehydration	Fluid deficit less than 5% of body weight (= less than 50 ml/kg)	1. Give the child as much ORS or other suitable fluids as he wants. 2. Continue feeding. 3. Replace ongoing fluid losses.
"Some signs" of dehydration	Fluid deficit 5-10% of body weight (= 75 ml/kg)	1. Give ORS 75 ml/kg over 4 hours. 2. Continue feeding after 4 hours. 3. Replace ongoing fluid losses.
Severe dehydration	Fluid deficit more than 10% of body weight (= more than 100 ml/kg)	1. Give ringer-lactate 100 ml/kg. If ringer-lactate is not available, use sodium chloride 0.9%. If the child is able to drink, start ORS until the drip is running. ***If you cannot weigh a child***: Estimate the needed amount and give the IV fluids fast until you can palpate the radial pulse, then give the remaining fluid over 2.5 or 5 hours, depending on the child's age. ***If you can weigh a child***: Children under 1 year, give 30 ml/kg over 1 hour, then 70 ml/kg over 5 hours. Children over 1 year, give 30 ml/kg over 30 minutes, then 70 ml/kg over 2.5 hours. 2. Monitor the child closely. 3. Start ORS as soon as the child can swallow. 4. Continue feeding as soon as the child is rehydrated. 5. Replace ongoing fluid losses.

How to feed a child with diarrhoea

Diarrhoea can have a disastrous effect on nutrition. Beside dehydration, malnutrition is the other major killer of children with diarrhoea and often follows a poorly managed episode of diarrhoea. In any illness, a child looses some weight due to poor appetite and an increased need of nutritients. In addition to these, in diarrhoea the absorption of food is also reduced. Wrong beliefs about feeding and diarrhoea can worsen this dangerous situation. Some families allow children with diarrhoea to starve because they believe this will stop the diarrhoea. Others may give diluted food or milk or give a special diet that is poor in helpful nutritients.

As explained, diarrhoea is usually a self-limiting illness. Its cure depends on replacing damaged mucosal cells. Starving or giving a diet poor in nutritients will delay this repair of the mucosal cells and may cause atrophy of the gut mucosa with reduction of food absorption. Children who are not fed correctly will have diarrhoea for a prolonged duration, their intestinal function will recover more slowly and they are at high risk to become malnourished. Therefore, continue feeding during diarrhoea and increase the child's feeds afterwards. The aim is to give the child as much nutrient-rich food as he will accept.

Nutritional rules based on latest knowledge

1. **Do not stop breastfeeding**, continue it also throughout the rehydration phase.
2. **Start feeding as soon as the treatment of dehydration is completed** (after 4 hours).
3. **Give normal food**. Food that is good for healthy children is also good for children with diarrhoea. Feeding super-flour (see page 15) is excellent because the pulses in super-flour contain good amounts of potassium and zinc. At first, the amount of diarrhoea may increase because not all food will be digested and absorbed. However, some food is absorbed and helps to restore the intestinal functions.

   Young children who are not breastfed but drink powdered or cow's milk may be given their normal amount of milk. However, make sure that the milk is prepared under clean conditions because unclean preparation or the use of a contaminated feeding bottle may have been the source of diarrhoea in the first place. Clinically significant milk intolerance is very rarely a problem. It can be recognised by an immediate increase in stool volume when milk is given, and worsening of the signs of dehydration (see page 76).
4. **Give the child frequent feeds**. Give food every 3-4 hours and add 1 spoon vegetable oil to each serving of cereal.
5. After the diarrhoea stops, give the child one more meal than usual every day for 2 weeks.

The importance of vitamin A and zinc in diarrhoea

Children with diarrhoea need vitamin A and minerals, especially zinc. Vitamin A is essential to keep mucosal membranes like the intestinal mucosa intact. It is also needed for the repair of damaged mucosal cells. It has been shown that children with diarrhoea who receive one single high dose of vitamin A recover better from diarrhoea. Give one single dose of vitamin A to all children with diarrhoea except to those who definitely received a previous dose within the last 4 months.

The importance of zinc and some other minerals for the repair of mucosal membranes, especially for children with persistent diarrhoea, has recently been discovered. Give zinc and other minerals to all children with persistent diarrhoea. Super-flour (see page 15) contains a lot of zinc, this is another reason why it can be highly recommended for feeding during diarrhoea.

Drugs in diarrhoea - facts against the widespread misuse of antibiotics and anti-diarrhoeal drugs

Sadly, drugs are frequently misused in diarrhoea. In fact, they are rarely indicated. This is obvious when we understand the aetiology and pathophysiology of diarrhoea.

5 Facts against the widespread use of antibiotics

Fact 1: The aetiology of paediatric diarrhoea. Many studies have shown that viruses cause most cases of watery diarrhoea in countries like Afghanistan. From the clinical presentation, it is not possible to distinguish these from bacteria. Doctors sometimes claim from their experience that antibiotics have helped an individual patient. However, diarrhoea is self-limiting and the prescription of antibiotics and the point of self-cure of the diarrhoea are usually simply a coincidence.

Fact 2: The pathophysiology of diarrhoea. As explained, the pathophysiology of watery diarrhoea is based on hypersecretion of mucosal cells that have been damaged by either bacterial toxins or viruses. The process of replacing these damaged cells takes

usually 2-4 days, then the diarrhoea will stop by itself. Even if the damage has been caused by bacteria, antibiotics will not be able to speed up the process of cell replacement. Antibiotics may even prolong diarrhoea by destroying the normal flora of gut bacteria.

Fact 3: Antibiotics for treatment of diarrhoea can be dangerous. Beside the above mentioned change of the normal gut flora, they can have dangerous side-effects and may result in the development of bacterial resistance to antibiotics.

Fact 4: The costs. Antibiotics cost money and prescribing them irrationally means wasting money and resources.

Fact 5: Misleading the family. It is beyond any doubt that ORS and continued feeding are the most important and most effective ways of treating diarrhoea. Prescribing antibiotics or other drugs when they are not indicated misleads the family. A family may wrongly trust in ineffective drugs instead of using ORS and continue feeding the child.

The few indications for antibiotics

- **Diarrhoea with blood** (dysentery). About 10% of all diarrhoeal cases are associated with blood in the stool (dysentery). This may be a sign that bacteria have invaded the mucosal wall and antibiotics may be indicated.
- **Suspected cholera with severe dehydration.**
- **Diarrhoea caused by a specific infection outside the gastro-intestinal tract**. Especially in young children, diarrhoea can be an intestinal reaction to an infection outside the gastro-intestinal system, especially of the respiratory tract. Antibiotic therapy is therefore indicated to treat that specific infection.
- **Diarrhoea with sepsis**. In a child with diarrhoea who appears very ill, consider sepsis and treat accordingly, see on page 73 under “Dysentery”.
- **Intestinal parasites.** Treat intestinal parasites with an appropriate drug if they are responsible for diarrhoea. However, they are not a common cause of acute diarrhoea in children.

Facts against anti-diarrhoeal drugs in children

Anti-motility drugs such as loperamide (Imodium), Lomotil or codeine are contra-indicated in children with diarrhoea. Never use them. These drugs paralyse the intestine. They may stop the stools from coming out but do not affect the hypersecretion of the damaged cells. They do not stop or reduce the loss of fluids. They give the wrong impression that the diarrhoea has improved. In reality, the fluid collects inside the gut lumen causing a kind of occult dehydration. Anti-diarrhoeal drugs do not only mask the fluid loss, they can also cause death of children from paralytic ileus.

It has been shown that stool-binding drugs like kaolin are not effective. The development of anti-secretory drugs that were logical to give is still in an experimental stage.

Facts against medicines containing a combination of drugs against diarrhoea

In pharmacies, there are many medicines that contain a combination of anti-protozoal drugs (for example, metronidazole), antibiotics and anti-diarrhoeal drugs. Some contain out-dated drugs such as furazolidone, others contain dangerous drugs, others contain drugs in an amount too small to be effective. It is irresponsible of the producing drug companies to advertise these as a treatment or cure for diarrhoea. All these preparations are irrational and possibly dangerous, never use any of them.

Associated problems

Vomiting in diarrhoea

Vomiting is common in children with diarrhoea, especially during the onset of the illness. Usually ORS is tolerated and can be given. However, do not give it too fast but follow the rules explained above.

Do not give anti-emetics. Those that are anti-histamines (for example, promethazine - Phenergan) may make the child too sleepy to drink; metoclopramide in children may be associated with extrapyramidal side-effects.

Once you have corrected dehydration, vomiting usually stops spontaneously. Very few children with persistent severe vomiting need ringer-lactate IV (for the differential diagnosis of vomiting, see page 91).

Fever in diarrhoea

Fever in diarrhoea can have a variety of causes. It is not an indication to prescribe routinely an antibiotic. Many viruses can cause a fever that may even be high. Fever may be a sign of dehydration. Fever may point to a systemic illness outside the gastro-intestinal system. Therefore, examine all children with diarrhoea carefully, but especially those with fever.

Electrolyte disturbances in diarrhoea

During diarrhoea, fluid and electrolytes are lost. Electrolyte disturbances are common but they usually do not change the general management. Occasionally they can cause fits (hyper- or hyponatraemia) muscle weakness, paralytic ileus, impaired kidney function or arrhythmia (all in hypokalaemia). Electrolyte disturbances are best and most safely treated by giving ORS. Once the dehydration has been treated, the electrolytes will also return back to normal.

What parents should know – the danger signs in diarrhoea

The education of parents is one basic part of the management of diarrhoea. As outlined above, families need to know how to prepare and give ORS and how to feed children with diarrhoea. However, it is also important to teach them about danger signs in diarrhoea. Before they go home with their child, tell them to bring him back to you immediately, if any of the following signs occur that may indicate that the child is in danger:

- The child passes blood with the stool.
- The child is sleepy.
- The child is drinking poorly.
- The child has a high fever.
- The child is vomiting repeatedly.
- The child is passing many watery stools.

SPECIFIC DIARRHOEA MANAGEMENT ACCORDING TO CLINICAL PRESENTATION

Prevention and treatment of dehydration and continued feeding are the basis for management in all cases of diarrhoea. For practical purposes divide all children with diarrhoea into four groups according to their clinical presentation:

1. Children with **acute watery diarrhoea**, that may last for several hours or days
2. Children with **acute diarrhoea with blood** (dysentery)
3. Children with **persistent diarrhoea** that has lasted for more than 14 days
4. **Severely malnourished children with diarrhoea**

Acute watery diarrhoea

Management

1. Assess the child for dehydration, malnutrition and systemic illness (especially ears, throat and chest).
2. Rehydrate according to the degree of dehydration.
3. Give one single dose of vitamin A.
4. Teach the family how to use ORS or WSS at home.
5. Explain to the family how to feed the child..
6. Teach the family about the danger signs in diarrhoea. Ask them to bring the child back to you if any of those appear.

NOTE: Do not give routinely antibiotics. Never prescribe anti-diarrhoeal drugs.

SPECIAL CASE - CHOLERA

Cholera is different from other cases of watery diarrhoea in three aspects:

1. Large amounts of watery diarrhoea can lead to severe dehydration within a few hours.
2. Cholera occurs in large epidemics that involve adults and children.
3. Certain antibiotics may shorten the duration of the illness.

When to suspect cholera

Suspect cholera in any child **over 5 years** who develops severe dehydration from acute watery diarrhoea within a few hours. Usually there is vomiting.

In children **between 2 and 5 years** suspect cholera in any child with acute watery diarrhoea when a cholera outbreak is known in your area.

Younger children **under 2 years** may also develop cholera but it is difficult to distinguish from other causes of watery diarrhoea.

Management

1. Rehydrate aggressively, replace all ongoing losses. If a child is losing more fluid than he is able to replace by drinking ORS, give IV ringer-lactate. The fluid loss is worse in the first 24 hours.
2. Give erythromycin or cotrimoxazole for 3 days to all children who are severely dehydrated. Antibiotics reduce the number and volume of cholera stools.
3. Explain to the family about the importance of safe stool disposal and the use of safe water. These measures are essential for stopping further spread of cholera in a community.

Acute diarrhoea with blood (dysentery)

Diarrhoea with visible blood in the stools is called dysentery. The blood is caused by ulceration and damage to the mucosal cells by invading pathogens. The most common cause in children is bacillary dysentery (often shigella bacteria). Amoebic dysentery is rare in young children. It is responsible for less than 3% of all cases. Therefore, do not treat young children with bloody diarrhoea routinely for amoebae.

Treatment for amoebae is only indicated if microscopy of a fresh stool sample shows trophozoites of E. histolytica containing red blood cells. Do not diagnose amoebic dysentery if you find amoebic cysts only. Probably about 30-50% of all Afghan children are asymptomatic cyst carriers, meaning you find cysts in their stool but these do not cause any disease.

The following table shows differences between bacillary and amoebic dysentery. The most important differences are that bacillary dysentery is a very common cause of bloody diarrhoea (more than 97% of cases) and that children with bacillary dysentery are sicker and more likely to be dehydrated than children with amoebic dysentery.

	Bacillary dysentery	**Amoebic dysentery**
Incidence	Very common: more than 97% of all cases of bloody diarrhoea in young children	Rare in young children
Onset	Sudden onset	Slow onset
Prodromal symptoms (body pains, fever before the onset of dysentery)	Yes	No
General condition	The child is unwell, poor appetite	The child is well
Fever	High fever	Fever occurs in young children but is usually not high
Vomiting	Common	Uncommon
Duration if untreated	Self-limiting after a few days to 10 days	Several weeks
Recurrence	No relapses	It recurs at variable intervals and the infection can persist for many years
Dehydration	Common	Uncommon
Main complications	Dehydration, convulsions, sepsis, malnutrition	Malnutrition, amoebic liver abscess

Management of bacillary dysentery

1. Assess for dehydration and malnutrition.
2. Rehydrate according to the degree of dehydration.
3. Teach the family how to use ORS or WSS at home.

Causes of diarrhoea with blood

COMMON

- Bacillary dysentery

LESS COMMON

- Amoebic dysentery
- Pseudomembranous enterocolitis (caused by Clostridium difficile). It follows the use of antibiotics.

RARE

- Trichuriasis (whipworm)
- Inflammatory bowel disease

4. Explain to the family to continue feeding.
5. Treat for 5 days with co-trimoxazole or ampicillin.
6. Give one single dose of vitamin A.
7. Ask the family to bring their child back to you after 2 days if*:*
   - He is not getting better. Getting better means that his appetite has returned, the fever has disappeared and he has diarrhoea less often with less blood.
   - He is less than 1 year old.
   - He had signs of dehydration when you saw him first.
   - He had measles within the last 6 weeks.

   If he is not better after 2 days:
   - Check that he received the antibiotic and that he took it in the correct dose.
   - If he took the antibiotic correctly, change it to nalidixic acid.
   - Again, discuss ORS and nutrition with the family.

Antibiotics in bacillary dysentery

Which drug to choose?

Antibiotic resistance of shigella has become widespread. It is therefore important only to give one antibiotic at a time in order not to increase further the risk of bacterial resistance. The "first choice" is usually cotrimoxazole or ampicillin. Nalidixic acid should not be given as the "first choice" drug but kept as a "reserve drug" for resistant cases.

- ***Co-trimoxazole*** 48 mg/kg/day divided into 2 doses

6 weeks–12 months	120 mg	2 times daily
1–5 years	240 mg	2 times daily
6–12 years	480 mg	2 times daily

- ***Ampicillin*** 50–100 mg/kg/day divided into 3 doses

2–12 months	125–250 mg	3 times daily
1–5 years	250–500 mg	3 times daily
6–12 years	500 mg	3 times daily

- ***Nalidixic acid*** 50 mg/kg/day divided into 4 doses

2–12 months	62.5–125 mg	4 times daily
1–5 years	250 mg	4 times daily
6–12 years	500 mg	4 times daily

Do not use any of the following to treat bacillary dysentery

The following drugs are ineffective for the treatment of bacillary dysentery: amoxicillin, cephalexin and other first and second generation cephalosporins, chloramphenicol, doxycycline, erythromycin, furazolidone, gentamicin, metronidazole, streptomycin and tetracycline.

Management of amoebic dysentery

1. Assess for dehydration and malnutrition.
2. Rehydrate according to the degree of dehydration.
3. Teach the family how to use ORS at home.
4. Explain to the family about continued feeding.
5. Treat with ***metronidazole*** 35–50 mg/kg/day divided into 3 doses for 5-10 days.

2–12 months	50–100 mg	3 times daily
1–5 years	100–200 mg	3 times daily
6–12 years	200–400 mg	3 times daily

If a child does not improve after 2 days, reconsider whether the child could have bacillary dysentery. Do a stool test if possible and confirm your diagnosis by finding trophozoites of E. histolytica containing red blood cells.

In the rare, very severe cases, give the maximum dose of metronidazole for 10 days. Dehydroemetine is the drug of choice for very severe cases. Unfortunately, it is usually not available. Add doxycycline instead if there is no response to a correct dose of metronidazole in a very severe case.

About the use of diloxanide in amoebic disease

Diloxanide is not effective in treating acute amoebic dysentery and there is no advantage by using a combination of diloxanide and metronidazole. Diloxanide is used to kill the cyst stage of amoebae. It is rarely indicated, as it does not make sense to treat asymptomatic cyst carriers who live in an environment where they will be re-infected quickly. The only indication to give diloxanide is amoebic liver abscess.

Persistent diarrhoea

This is diarrhoea, with or without blood, which is lasting for more than 14 days. It is commonest in the first year of life.

Persistent diarrhoea is mainly a nutritional disease that is commonly associated with malnutrition and a lack of certain micronutrients. This lack delays the repair of the damaged mucosal cells and the absorption of nutrients from the gut is disturbed (malabsorption). Many children with persistent diarrhoea will suffer from a severe non-intestinal infection, especially urinary tract infection, pneumonia and otitis media.

Sometimes persistent diarrhoea starts after an episode of acute diarrhoea that was inappropriately managed with antibiotics, anti-diarrhoeal drugs or prolonged starving. Previous measles infection or other diseases that reduce the immunity are other factors. Persistent diarrhoea almost never occurs in children who are breastfed.

Factors responsible for persistent diarrhoea

Often there is more than one factor causing persistent diarrhoea.

MAIN FACTORS

- Poor nutrition and malabsorption
- Poor food hygiene
- Unrecognised extra-intestinal infection (especially lungs, ears, urinary tract)

OTHER FACTORS

- Previous measles
- Lactose intolerance
- Poorly managed acute diarrhoea
- Side-effects of antibiotics
- Intestinal parasites (giardiasis, amoebic dysentery, very rare: specific worm infestation)

Management

When you see a child with persistent diarrhoea, take a careful history to make sure it is really persistent diarrhoea rather than passing several soft stools per day, which is normal for breastfed babies.

The management of persistent diarrhoea consists of four main parts:

1. Giving of appropriate fluids to treat or prevent dehydration (see page 67)
2. Giving the child good food that does not cause diarrhoea to worsen (see below)
3. Replacement of lacking vitamins and minerals (see below)
4. Searching for infections, especially extra-intestinal and treating accordingly

How to feed a child with persistent diarrhoea

You will not be able to cure a child with persistent diarrhoea if you do not concentrate on good nutrition.

- **Continue breastfeeding**. Make every effort to keep up the breastmilk supply. Give more frequent and longer breastfeeds, day and night. Try to avoid or reduce animal milk because it may worsen the diarrhoea. This is because of the inability of the damaged gut to digest animal milk (lactose intolerance).
  - If yoghurt is available, give it in place of any animal milk that the child usually takes. Yoghurt contains less lactose and is better tolerated.
  - If yoghurt is not available, limit the animal milk intake to half of the usual amount (limit to about 50 ml/kg per day) and give it with nutrient-rich food (for example, super-flour). Do not dilute the milk.

- Give other good foods appropriate for the child's age as explained. Super-flour is excellent because it provides also essential minerals. It can be given instead of animal-milk feeds.
- Use the opportunity to teach the child's mother about good nutrition because the normal diet of children who develop persistent diarrhoea is usually inadequate.

Replacement of vitamins and minerals

Children with persistent diarrhoea lack essential vitamins and minerals that are necessary for the body to repair the mucosal cells. Of greatest importance are vitamin A, zinc, folic acid, iron, magnesium and copper.

1. Give retinol (***vitamin A***) one single dose (three doses if the child is malnourished) to all children.
2. If the child is anaemic, give:
   - Folic acid for 2 weeks
   - Ferrous sulphate for 3 months

Minerals and multivitamins are best supplied through good food. Do not prescribe multivitamins routinely. Otherwise all credit for improvement goes to the medicines and not to the food, which means, the mother is likely to stop giving good food and will ask for more medicines.

Assessment for infections

Always thoroughly examine the child.

If the child is well and not dehydrated and you could not find any sign of infection on physical examination, there is no need for further investigations at that point. Advise on good nutrition and review the child after 5 days. Only then, if there has not been any improvement, investigate the child further.

If the child is ill and shows signs of dehydration, investigate thoroughly for an underlying-infection.

Helpful investigations

- Always perform urine microscopy.
- Other useful investigations are: white blood cell count (total and differential), chest x-ray, ESR and stool microscopy.

Management

1. Treat any specific infection you have diagnosed.
2. Do not give antibiotics routinely. They are not effective in stopping the diarrhoea but can make the diarrhoea worse and delay healing. Good food is most important.
3. If a child comes from a malarious area, give one course of chloroquine.

Follow-up

Re-assess the child after 5 days. Your treatment is successful if the child takes his food, is gaining weight, passing fewer stools and is not having any fever.

Summary - management of persistent diarrhoea

Make sure it is persistent diarrhoea (lasting for more than 14 days).

Take a careful history and examine the child thoroughly.

***If the child is well and not dehydrated*:**

1. Advise on good nutrition and good food hygiene:
   - Continue and increase breastfeeding
   - Replace animal milk with yoghurt or half of it with nutrient-rich food, for example super-flour.
2. Give one single dose vitamin A.
3. Stop all unnecessary medicines.
4. Review after 5 days.

If the child is dehydrated or not well or ***if he has not improved after 5 days with nutritional advise:***

1. Treat dehydration according to its severity.
2. Advise on good nutrition as above.
3. Give one single dose vitamin A.
4. Stop all unnecessary medicines.
5. Examine and investigate for underlying extra-intestinal infections. Always do urine microscopy. Also useful: total and differential WBC, chest-x ray, ESR and stool examination.

Signs of improvement are:

- Increased appetite
- Weight gain
- Fewer stools are passed
- No fever

Specific causes of persistent diarrhoea

WEANLING DIARRHOEA

Many children develop persistent diarrhoea at the time of weaning that is the time when other foods are introduced in addition to breastfeeding. The reason for diarrhoea is poor food hygiene. Ask the family how they prepare and store food and identify the problems. Discuss with them in detail about good food hygiene (see page 16).

Weaning food may cause harmless stool changes. It may change the stool frequency, consistency or colour. This is normal and you can reassure mothers, unless the child is passing watery stools.

INTESTINAL PARASITES

Finding intestinal parasites on stool examination does not necessarily mean that they are responsible for any

symptoms. Treat them, but follow also all the other treatment guidelines given above.

Giardia and amoebae

Giardia and amoebae can both cause persistent or recurrent diarrhoea. In amoebic dysentery, blood is sometimes, but not always passed with stool.

- Examine a fresh stool sample. If you find trophozoites of E. histolytica containing red blood cells, treat for amoebic dysentery (see above).
- If cysts or trophozoites of giardia are found, treat for giardiasis with ***metronidazole*** 40 mg/kg once daily for 3 days or 15 mg/kg/day divided into 3 doses for 10 days.

2–12 months	250 mg	once daily for 3 days
1–5 years	500 mg	once daily for 3 days
6–12 years	1 g	once daily for 3 days

Worms (helminths)

The following worms are very rarely a cause of persistent diarrhoea:

- Trichuriasis (whipworm)
- Hymenolepsis nana
- Strongyloides

For further details, see page 83.

ANTIBIOTIC-INDUCED DIARRHOEA

Most antibiotics can cause diarrhoea. There is no place for routine antibiotics in the treatment of chronic persistent diarrhoea. They may worsen the situation. A child may sometimes develop severe diarrhoea with blood following treatment with antibiotics. This is caused by infection with Clostridium difficile bacteria. Treat with metronidazole for 10 days.

LACTOSE INTOLERANCE

Damage to the mucosal cells, either during acute or persistent diarrhoea, may result in a deficiency of the enzyme lactase that is responsible for digesting animal milk.

Suspect lactose intolerance if...

- ...a child develops an increase in stool volume and worsening of the signs of dehydration when animal milk is given
- ...there are watery diarrhoea, colicky abdominal pain, abdominal distension and flatus.

Clinically relevant lactose intolerance is rarely a problem. However, most children with persistent diarrhoea will suffer from some lactose intolerance and therefore, animal milk should be replaced by yoghurt or super-flour for about 5-10 days as explained above. Breastmilk does not contain lactose and must be continued.

RARE: ABDOMINAL TUBERCULOSIS

If a child with persistent diarrhoea does not respond to any of the above measures, consider tuberculosis. You can commonly find associated symptoms like fever, severe wasting or a poor appetite but not necessarily pulmonary symptoms.

Diarrhoea with severe malnutrition (marasmus or kwashiorkor)

This is a special situation, in which, for example, ORS solution needs to be adapted. The practical management of these children is explained on pages 8–9.

References

1. Adhikari RK, Krantz ME. *Child Nutrition and Health*. 2nd edition. Kathmandu: Health Learning Material Centre 1997.
2. AHRTAG. Clinical update: persistent diarrhoea – report on a meeting held in Mombasa, Kenya in 1991. *Dialogue on Diarrhoea* March 1992.
3. Ebrahim GJ. *Paediatric Practice in Developing Countries.* 2nd edition. London: Macmillan Education Ltd. 1993.
4. Illingworth RS. Common Symptoms of Disease in Children. 9th edition. London: Blackwell Scientific Publications 1988.
5. Sibal A, Patwari AK, Anand VK, Chhabra AK, Chandra D. Associated Infections in Persistent Diarrhoea – Another Perspective. *Journal of Tropical Paediatrics* 1996; 42: 64.
6. Sommer A. *Vitamin A deficiency and its consequences.* 3rd edition. Geneva: WHO 1995.
7. UNICEF promotes the use of Wheat Salt Solution (WSS) for home treatment of diarrhoea. *Salamati* 1995; 3, 4-8 (in Dari).
8. World Health Organisation. *The treatment of diarrhoea – a manual for physicians and other senior health workers.* Geneva: WHO 1993.
9. World Health Organisation. *Charts for Integrated Management of Childhood Illness.* Geneva: WHO (ca. 1996).

10. Abdominal problems

There is a wide variety of abdominal problems in children. It is of greatest importance not to miss an acute surgical emergency. History and a careful examination are the key to identify most causes of abdominal problems. Therefore, this chapter starts by explaining "how to examine the abdomen". Specific points in history and examination are explained later in this chapter together with the relevant abdominal problems or diseases.

How to examine the abdomen

The abdomen is divided into different areas. This helps you to describe your findings. To record findings, use a simplified drawing of the abdomen, which helps you to accurately define what you have observed and to judge a child's progress when you re-examine him later (figure 10–1)

Abdominal examination is best done while the child is lying down or lying in the arms of his mother. Warm your hand before placing it on a child's abdomen.

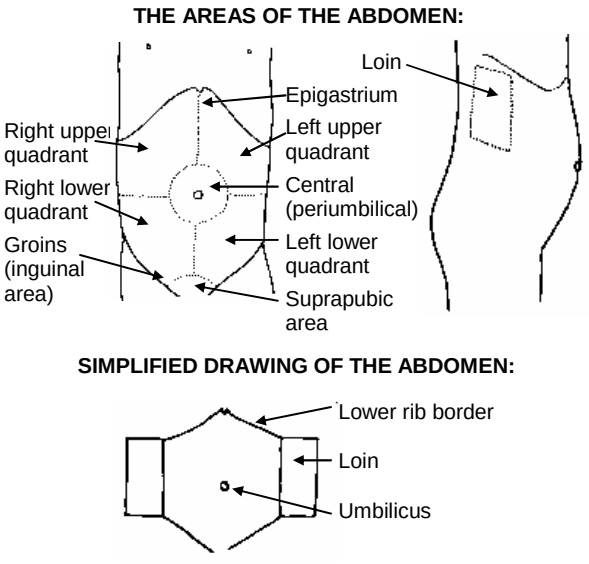


Figure 10–1 ***The areas of the abdomen***.

Look at the whole child

- Ill or well? Lying still or moving round?
- Dehydration?
- Jaundice?
- Anaemia?
- Shock?

Look at the abdomen

- What is the abdominal shape: normal? distended? bulging flanks?

Feel (palpate) the abdomen

This consists of two parts:

- **Palpation for tenderness**. Gently feel all quadrants of the abdomen to find areas of tenderness. Place your hand flat on the abdomen and feel by gently bending your fingers. While you are doing this, do not look at the abdomen but watch the child's face for any expression of discomfort or pain.
  - Is the abdomen **soft or rigid**?
  - Are there any areas of **tenderness**? Where? How severe is the tenderness?
    At an area of tenderness find out:
    – Is there involuntary muscle spasm when you palpate? This is called **guarding**. It is a reflex to guard (to prevent) you from touching an inflamed or infected area.
    – Is there **rebound tenderness** (jumping back tenderness)? Test this by quickly taking away your fingers from a tender area during deep palpation. If the child feels extra pain when you do this, he has rebound tenderness. It is a sign of peritoneal inflammation.

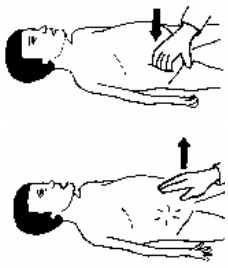


Figure 10–2
Rebound tenderness.

- **Palpation for enlarged organs and masses**
  - Palpate the different abdominal organs.
  - Palpate deeply to feel for any mass. If you feel a mass or an enlarged organ, define its size and exact location.
  - Do not forget to examine the groins and testes.

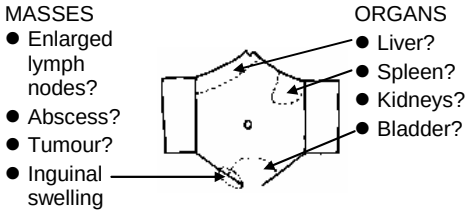


Figure 10–3 ***Abdominal palpation for masses and enlarged organs.***

Rectal examination

Rectal examination is important in children with acute abdomen, constipation or rectal bleeding. Examine the child while he is bending his knees:

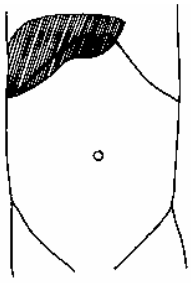
- Look at the anal opening (for example, for a fissure).
- Then palpate the rectum with your little finger. Before you introduce your finger, lubricate it with some vaseline or another lubricant. Observe the tonus of the rectal sphincter muscle (how tightly is the anus closed?). Feel for intra-abdominal tenderness or a mass.
- After you have taken your finger out, look for blood or faeces on it.

Helpful investigations

- Urine examination for signs of infection and indicators of renal involvement
- Total and differential white blood cell count (WBC)
- Stool microscopy for eggs (ova), cysts and parasites
- Abdominal x-rays, supine and erect and special x-rays
- Ultrasonography
- Liver function tests

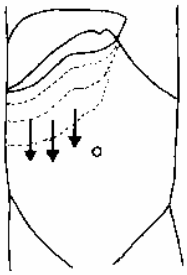
HOW TO EXAMINE THE LIVER:

Normal position of the liver:



The lower liver edge is often palpable 1-2 cm below the rib margin, especially in young children

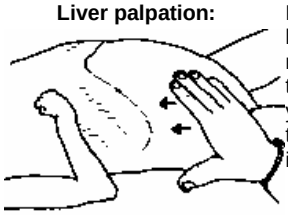
Direction of enlargement:



The liver enlarges straight downwards.

Therefore, start palpating in the right lower quadrant:

Liver palpation:

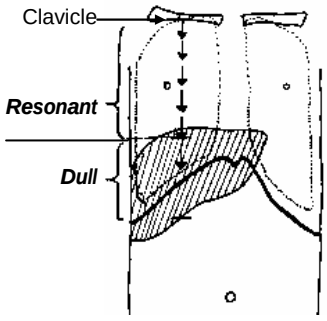


Press gently with your flat hand on the abdomen and move slowly upwards. Feel for the liver edge with the side of your index finger. Note the texture of the liver and whether it is tender or not.

If you are able to feel the liver, determine the actual liver size because sometimes (for example in bronchiolitis), the liver is pushed down into the abdomen by an over-inflated lung but is not truly enlarged.

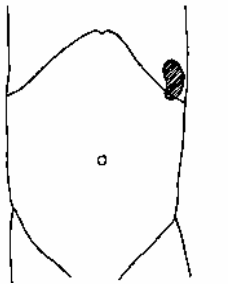
Percussion of the upper liver border:

Determine the upper liver border by percussion. Start at the middle of the right clavicle and percuss downwards. The upper liver border is at the place where the ***resonant*** percussion sound changes to ***dull***.



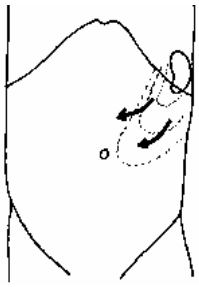
HOW TO EXAMINE THE SPLEEN:

Normal position of the spleen:



The spleen is usually not palpable, except in young children.

Direction of enlargement:



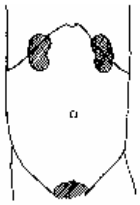
The spleen enlarges towards the right abdomen.

Therefore, start palpating in the right lower quadrant and move towards the left upper quadrant.

Palpation of spleen:

Feel with the flat side of your right hand. Use the left hand to push the spleen gently forward.

HOW TO EXAMINE THE KIDNEYS:



The kidneys are situated retroperitoneal (behind the abdominal cavity). Palpate with both hands, one from the front, the other from the back.

How to differentiate between an enlarged spleen and an enlarged kidney

It is sometimes difficult to judge whether a mass in the left upper abdomen is caused by an enlarged spleen or an enlarged kidney.

- An enlarged spleen is common, a large kidney is rare.

Remember that the spleen is located inside the abdomen while the kidneys are located behind the abdominal cavity, therefore:

- In splenomegaly, you cannot get your finger between the mass and the ribs but you can feel the medial and lower borders of the mass. In kidney enlargement, you can get your fingers between mass and ribs but cannot feel its medial and lower margins.
- In splenomegaly, percussion sounds over the mass are dull; they are normal (tympanic) in kidney enlargement.

Figure 10–4 ***Clinical examination of liver, spleen and kidneys***.

Abdominal pain

Abdominal pain can originate from three different locations:

1. **Intra-abdominal organs**. The pain is typically dull and comes and goes. It is projected to certain areas (dermatomes) that are typical for each organ.
2. **The peritoneum**. Peritoneal pain is typically continuous, increases steadily and is located over the inflamed area. On examination, you find guarding and rebound tenderness over that area.
3. **Extra-abdominal pathology**. Especially in chest, ear or throat diseases in children, pain can be referred to the abdomen and be felt as abdominal pain.

A child with abdominal pain can present a diagnostic challenge. When a child comes to you decide first to which group he belongs to:

1. Children with **acute abdominal pain**
2. Children with **chronic or recurrent pain**. The pain has lasted for more than 1 week or is recurrent. Recurrent means the child had one or more episodes of similar pain before

How to assess a child with abdominal pain

Take a history

- **Onset of pain**: did the pain start suddenly or was the onset slowly?
- **Duration**: when did the pain start? How many hours ago? More or less than 1 week ago?
- **Progression**: is the pain getting worse, remaining the same or is getting less?
- **Character**: is the pain there all the time or is it coming and going (colicky pain)?
- **Localisation and radiation**: where is the pain most severe? Where did it start? Does it radiate anywhere else?
- **Intensity**: is the pain mild or severe? It is not always easy to assess the severity of pain in children. However, a child with severe pain does not play, does not eat and looks pale. A baby who stops crying when his mother picks him up is not suffering from severe pain.
- **Associated factors**: do any factors, such as food or cough, start or increase the pain?
- **Associated symptoms**:
  - Vomiting?
  - Diarrhoea?
  - Fever?
  - Weight loss?
  - Poor appetite?
  - Pain or blood on passing urine ?

Important causes of acute abdominal pain

SURGICAL EMERGENCIES –ACUTE ABDOMEN

- Appendicitis
- Strangulated hernia
- Intestinal obstruction
- Perforated typhoid ulcer
- Intussusception (children under 2 years)
- Peritonitis
- Torsion of the testis

ABDOMINAL CAUSES THAT DO NOT NEED URGENT SURGICAL REFERRAL

- Diarrhoea (gastro-enteritis)
- Mesenteric adenitis
- Typhoid fever
- Hepatitis
- Urinary tract infection
- Side-effects of drugs
- Constipation
- Bladder or renal stones
- Poisoning

PAIN REFERRED FROM A NON-ABDOMINAL PROBLEM

- Any illnesses with fever, especially ear or throat infections
- Pneumonia
- Malaria
- Spinal pathology

Examine the child

Besides examining the abdomen carefully, you should also do a full physical examination because pain may be referred to the abdomen from an extra-abdominal problem (for example pneumonia).

Acute abdominal pain – how to identify a surgical emergency

Highest priority must be to identify those children who need urgent surgical treatment. If you miss them, they may die. It is always helpful to reassess a child after 2-4 hours. Do not give a painkiller unless a diagnosis has been established or a surgical emergency excluded because drugs can mask pain from peritonitis (inflammation of the peritoneum). This means that although the pain is relieved by the drug, the actual disease is still progressing.

Any of the following symptoms presented in a child could be a possible indicator of a surgical emergency (acute abdomen):

- Child appearing very ill or lying very still
- Continuous pain for more than 3 hours that is increasing in intensity (commonest cause: appendicitis)

- ◆ Persistent vomiting (for example, bowel obstruction)
- ◆ Localised tenderness with guarding and rebound tenderness (localised inflammation of the peritoneum)
- ◆ Palpable mass in the groin or abdomen (for example, strangulated hernia, ascaris bowel obstruction, intussusception)
- ◆ Rigid abdomen (peritonitis)
- ◆ Pain that increases with coughing and movement (peritonitis)

Acute abdomen - surgical emergencies

APPENDICITIS

Appendicitis is the commonest acute surgical condition in children. It can occur at any age but is usually seen in children over 5 years. It is easily missed in young children who may present with irritability, vomiting and high fever. The disease can progress from initial symptoms to perforation within a few hours. Older children often show the typical symptoms: an initial central pain becomes localised in the right lower abdomen (right iliac fossa). It is accompanied by low-grade fever and vomiting. You find tenderness and peritoneal signs (guarding and rebound) localised in the right lower abdomen. If the appendix has already perforated, you may feel a tender mass in the right lower abdomen.

Atypical presentations are quite common and you should consider appendicitis in any child with acute abdominal pain. The appendix may be in the pelvic position. This can be dangerous as the only symptom is periumbilical pain until the appendix perforates. The only way to diagnose it before perforation occurs is on rectal examination when the child feels pain at the tip of your finger.

Management of appendicitis is by appendicectomy and, if perforation has occured, treatment with ampicillin, gentamicin and metronidazole (alternative: chloramphenicol and metronidazole), see below under "Peritonitis".

HERNIA

Inguinal hernia and its complications

A hernia is found when part of the gut or other intestinal contents come through a hole in the muscles of the abdominal wall. Typical place is the groin (inguinal to scrotal hernia). A child may give a history of a painless swelling that was coming and going and

Causes of groin swelling

See also causes of scrotal swelling on page 102.

- Inguinal hernia
- Enlarged lymph node

How to differentiate between a hernia and an inguinal lymph node swelling

- A swollen lymph node is hard, a hernia soft.
- If the swelling is tender, it can either be a strangulated hernia or lymphadenitis.
- A lymph node does not increase in size on coughing, a hernia does.
- In lymph node enlargement, you often find a septic lesion on the legs or buttock.

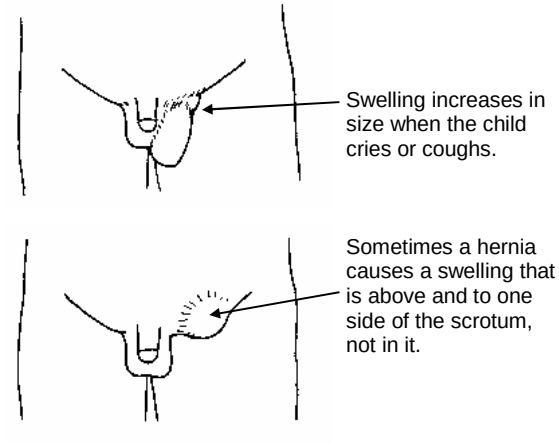


Figure 10–5 *Inguinal hernia*.

increased in size when the child was crying or coughing. Complications occur when the hernia gets stuck in the hole in the abdominal wall (inguinal canal).

Complications of a hernia

When a hernia gets stuck in the inguinal canal, it has become irreducible. After a few hours, the gut inside the hernia becomes oedematous, the blood supply is blocked and necrosis of the gut develops, the hernia is then called a strangulated hernia (see figures 10–5 and 11–9).

Danger signs that a hernia has become strangulated are:

- ◆ The swelling has become painful
- ◆ The swelling is hard and tender
- ◆ Vomiting

Management of a hernia and its complications

1. If you find any of the above danger signs, assume that the hernia has strangulated. The child needs urgent surgery.
2. If the hernia is irreducible but there are no danger signs, try gently to push it back (reduction of hernia). It is helpful to sedate a child and put his legs up at 90 degree for 2-3 hours. In this position often

a hernia will go away spontaneously. If not, apply gentle pressure. For sedation give promethazine 1 mg/kg orally as one single dose.

1–5 years	5–15 mg
6–12 years	10–25 mg

If you cannot reduce the hernia, the child needs urgent surgery.

3. Even an uncomplicated inguinal hernia needs an operation as soon as possible because strangulation can occur at any time.

Umbilical hernia

Parents are worried when their child has an umbilical hernia but this is not associated with an increased risk of complications nor does it usually cause any symptoms. When a child grows older and his abdominal muscles become stronger the hernia will go away by itself. An operation is not necessary.

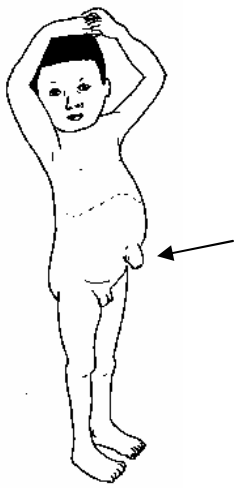


Figure 10–6 *Umbilical hernia*.

Epigastric hernia and hernia in scars

Hernia in the midline between umbilicus and sternum (epigastric hernia), or hernia in scars need to be operated on because of the risk of complications (strangulation).

INTESTINAL OBSTRUCTION

Intestinal obstruction can be caused by several conditions, see box.

Causes of intestinal obstruction

- Ascaris
- Strangulated hernia
- Intussusception
- Intestinal malformations that make the gut more susceptible to abnormal rotation

Clinical features

- A child with intestinal obstruction is ill with severe colicky abdominal pains and vomiting.
- No or little stool is passed.
- The abdomen is distended.
- Sometimes you are able to see bowel movements through the abdominal wall, sometimes you are able to feel a mass of ascaris worms.

Management

Insert a naso-gastric tube, give IV fluids to maintain circulation, treat shock and stabilise the child for operation.

For specific management of ascaris bowl obstruction, see page 84.

PERFORATED TYPHOID ULCER

A child with a perforated typhoid ulcer has been ill with a fever for more than one week. He developed abdominal discomfort and distension followed by the acute onset of severe pain and vomiting with peritonitis.

Management, see page 25.

How to differentiate a perforated typhoid ulcer from a perforated appendix:

It is usually not difficult to distinguish a perforated typhoid ulcer from a perforated appendix. Find out, which symptom was first:

- In perforated typhoid ulcer, the child has been ill with fever for 1-2 weeks before pain and abdominal symptoms started.
- In perforated appendicitis pain and abdominal symptoms started first and then the child became very ill with high fever.

INTUSSUSCEPTION

Intussusception occurs in children under 2 years. One part of the bowel, usually the ileum, is drawn (invaginates) into the next part, usually the colon. It is like an arm drawn into a sleeve. This causes severe colicky abdominal pain, followed by signs of intestinal obstruction, blood in the stools or rectum that look like apple jelly. Later peritonitis may occur. Sometimes you can feel the affected parts of the bowel as a banana-shaped mass in the right upper abdomen. The child needs urgent surgery.

PERITONITIS

Peritonitis is an acute septic infection with pus in the abdominal cavity. The commonest causes are perforated appendix and perforated typhoid ulcer. Peritonitis can occur after abdominal or pelvic surgery

usually if has not been performed under sterile conditions.

Primary peritonitis due to pneumococcus bacteria can occur in children and may be associated with nephrotic syndrome and ascites (see page 101).

Clinical features

- The child is very ill with fever and he is often dehydrated.
- The child lies still and avoids all movements because peritonitis causes severe constant pain that increases with any change of the pressure inside the abdomen.
- The abdomen will not move during breathing (absent abdominal breathing).
- The abdomen is rigid and tender with positive rebound.

Management

- Urgent surgery and broad spectrum antibiotics are needed. Give ***ampicillin + gentamicin*** + ***metronidazole***. *Alternatives*: ampicillin + benzylpenicillin + metronidazole, or chloramphenicol + metronidazole.

TORSION OF THE TESTIS

See page 102.

Acute abdominal pain - non-surgical causes

DIARRHOEA (GASTRO-ENTERITIS)

Gastro-enteritis is the commonest cause of acute abdominal pain. Increased bowel movements are causing colicky pain that gets less after stool has been passed. Diarrhoea management see chapter 7. “Diarrhoea”.

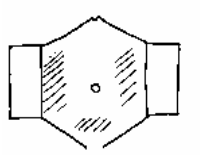
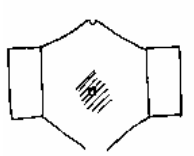
MESENTERIC ADENITIS

Mesenteric adenitis is caused by inflammation of intra-abdominal (mesenteric) lymph nodes. The inflammation causes painful colicky bowel movements and mild inflammation of the peritoneum that present as vague peri-umbilical or generalised abdominal pain. On examination, you often find signs of an upper airway infection. The pain improves over a period of hours and is a self-limiting problem. There is no specific treatment.

Chronic recurrent abdominal pain

Gastro-intestinal parasites are the commonest cause of chronic recurrent abdominal pain in Afghanistan. As in other chronic symptoms, it is important to identify those few children who suffer from a serious condition. Signs indicating serious pathology are explained in figure 10–7.

For giardiasis and amoebic dysentery, see pages 74 and 76.

Possibly organic cause if any of those:	**Likely non-organic cause:**
● Pain away from umbilicus	● Pain central
	
● Abnormal findings on physical examination	● Normal physical examination
● Abnormal growth	● Normal growth
● Poor appetite	● Normal laboratory findings
● Abnormal WBC, ESR, urine or stool examination	

ALWAYS CONSIDER AND TREAT WORMS!

Figure 10–7 ***Chronic abdominal pain***.

Important causes of chronic or recurrent abdominal pain

ABDOMINAL CAUSES

- Gastro-intestinal parasites (worms, giardiasis)
- Infantile colic
- Gastro-enteritis
- Intermittent obstruction (large ascaris worm load, adhesions in the abdomen from previous inflammation due to surgery or injury)
- Constipation
- Hepatitis
- Urinary tract infection
- Bladder or kidney stones

Rare

- Tuberculosis
- Tumours

NON-ABDOMINAL CAUSES

- Psychological, often as an expression of stress or traumatic experiences
- Referred pain from chest, ears or throat, genitals or spine
- Side-effects of drugs

WORMS (HELMINTHS)

Many children are infected with worms. Most worms live in the gut and lay eggs that can be found on stool microscopy. Finding eggs in the stool does not necessarily mean that the worm is responsible for causing symptoms. Whether the worms cause symptoms or not depends on the number of worms living in a child's gut (worm load). Worms cannot multiply inside the body like bacteria. Part of their life is spent outside the child's body. Each type of worm has its own specific life cycle, passing through an egg and a larval stage before becoming a mature worm. People who are infected with worms pass the eggs with their stools. A child becomes infected by eating food or dirt that has come into contact with infected stools. This can happen when stools are not passed into latrines and infect the soil, or when flies carry eggs from stools onto food. This is the route in which ascaris and trichuris are acquired. In hookworm (see page 108) and strongyloides, the larva develops in soil and will penetrate the skin of children when they walk or play without shoes in contaminated soil.

How to prevent worm infestation

We can break the life cycle of worms by passing all faeces into latrines. People have to understand how dangerous faeces is. Beside worm eggs, it can also contain many other dangerous bacteria (for example, salmonella causing typhoid fever) and viruses (for example the poliomyelitis virus). Mothers should teach their children not to play in a place where faeces are present. Children should wash their hands before they eat.

Which clinical symptoms may be caused by worms

Beside abdominal pain, worms can cause weight loss and malnutrition (ascaris, trichuris, hookworm), anaemia (hookworm, trichuris), anal itching (enterobius), rarely diarrhoea (Hymenolepsis nana, trichuris, strongyloides) and contribute to rectal prolapse (trichuris).

Ascaris (roundworm)

Infestation with ascaris is the commonest worm infection in Afghanistan. On its way through the gut, the larvae pass through the lungs and may cause pneumonitis with wheezing and cough. During pneumonitis, the differential WBC shows an eosinophilia (increased number of eosinophiles). The adult worms swim in the gut and feed on the child's food.

Drugs used to treat worms

MASS TREATMENT OF WORMS

Because a great number of Afghan children suffer from worm infections with significant consequences for their health, some health programmes treat all children of a certain age regularly (for example every year) with anti-worm medicine (**mass treatment**). All malnourished children should receive one dose of a broad-spectrum anti-worm drug.

A suitable drug for children over age 2 years is ***mebendazole*** at one single dose of 500 mg. If resources are limited, one single dose of 200 mg will reduce the worm load of children significantly.

Alternatively, you can give one single dose of ***pyrantel***:

7–12 months	62.5 mg
1–5 years	125 mg
6–12 years	250 mg

NOTE: Do not use piperazine because it is only effective against roundworm and pinworm.

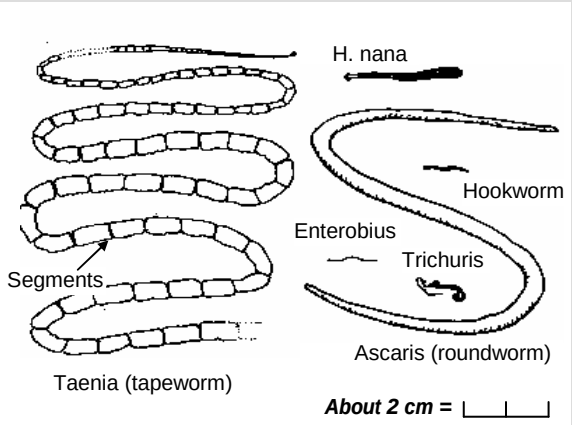


Figure 10–8 *Worms*.

THE EFFECTIVENESS OF THE DIFFERENT ANTI-WORM DRUGS

0 = not effective
\+ = some effect (less than 60% cure rate)
++ = effective (60-80% cure rate)
+++ = very effective (over 80% cure rate)

	Albendazole	*Mebendazole*	*Niclosamide*	*Piperazine*	*Pyrantel*
Ascaris	+++	+++	0	++	+++
Enterobius	+++	+++	0	++	+++
Hookworm	+++	++	0	0	+++
Hymenolepsis nana and other tape-worms	+	+	+++	0	0
Strongyloides	+++ (drug of choice)	+	0	0	0
Trichuris	+++	++	0	0	+

Clinical importance of ascaris

A heavy worm load may cause the following problems:

- Malnutrition because the worms eat much of the child's food
- Chronic abdominal pain, abdominal distension or a poor appetite
- Partial or total intestinal obstruction because sometimes many roundworms form a big ball that obstructs the gut.

Rarely, roundworms may leave the small intestine and wander into the stomach, larynx or bile duct.

Management

Mebendazole

Children over 2 years	100 mg	2 times daily for 3 days
OR	500 mg	one single dose

Alternatives: albendazole (children over 2 years 400 mg once daily for 3 days), pyrantel one single dose (7–12 months 62.5 mg; 1–5 years 125 mg; 6–12 years 250 mg) or piperazine 75 mg/kg one single dose.

How to treat intestinal obstruction from ascaris

Do not give worm medicine because it will either paralyse or kill the worms and make it impossible for them to disentangle. Pass a naso-gastric tube and maintain hydration by IV fluids. If the obstruction is incomplete, you can try an enema with sodium chloride 0.9% (physiological saline). You can also try to milk the worms by intermittent palpation. If there is no relief after a few hours, surgery is necessary. Give anti-worm drugs after the obstruction has resolved.

Hymenolepsis nana (H. nana, dwarf tapeworm)

H. nana is the second commonest worm in Afghanistan.

Clinical importance of Hymenolepsis nana

H. nana is rarely responsible for symptoms. A heavy worm load in young children may cause abdominal discomfort and watery diarrhoea.

Management

Niclosamide

Under 2 years	on the first day 500 mg, then 250 mg once daily for 6 days
2–12 years	on the first day 1 g, then 500 mg once daily for 6 days

"Second choice" drug, only in children over 2 years mebendazole 200 mg 2 times daily for 3 days.

Taenia saginata (beef tapeworm)

Infection is acquired by eating raw or undercooked beef.

Clinical importance of beef tapeworm

It rarely causes problems and is usually not noticed until the whitish mobile segments are found in the stools.

Management

Niclosamide one single dose only

Under 2 years	500 mg
2–12 years	1 g

Strongyloides

Strongyloides worms lay eggs in the small gut where larvae soon hatch. Therefore, on stool examination you find the larvae but not the eggs.

Clinical importance of strongyloides

Heavy loads of strongyloides cause bloody diarrhoea and chronic abdominal pains. Typical finding on blood examination is an eosinophilia. Patients with severe weakness of their immune system are at risk of developing a severe, systemic strongyloides infection that is often fatal.

Management

Albendazole

Children over 2 years	400 mg once daily for 3 days

"Second choice" drug, only in children over 2 years mebendazole 200 mg 2 times daily for 3 days.

Trichuris (whipworm)

These are small worms that look like a whip and live in the large intestine.

Clinical importance of trichuris

A heavy worm load can cause abdominal pain, weight loss, diarrhoea with blood, anaemia and rectal prolapse.

Management

Mebendazole

Children over 2 years	100 mg	2 times daily for 3 days
OR	500 mg	one single dose

Alternatives: albendazole (children over 2 years 400 mg once daily for 3 days) or pyrantel (7–12 months 62.5 mg one single dose; 1–5 years 125 mg one single dose; 6–12 years 250 mg one single dose)

Rectal prolapse

Sometimes a child's rectum prolapses (comes out) from his anus. Rectal prolapse is not serious.

Common causes of rectal prolapse

- Trichuris (whipworm)
- Malnutrition with loss of peri-anal fat
- Prolonged diarrhoea

Management

1. Bend the child's knees and gently push the prolapse back. If there are difficulties in pushing it back, sedate the child and put his legs up at 90 degrees for 2 hours. Then try again.

After reducing the prolapse:

2. Strap the buttocks together with sticky plaster.
3. Give treatment for trichuris, improve the child's nutrition and treat any other problems.
4. Advise the family to build a kind of toilet chair for the child so that he is sitting and not squatting when passing stools, which increases the risk of recurrence of the prolapse.
5. An operation is only necessary when the rectum continues to prolapse for more than 3 months despite following the above measures.

Anal itching - enterobius (oxyuris, pinworm or threadworm)

Pinworms live in the caecum. At night the female worm comes out of the gut and lays her eggs on the skin around the anus. Sometimes it also lays its eggs into a girl's vulva. The eggs make children itch, when a child scratches, eggs get under his finger nails. When the child then puts his finger to the mouth, he becomes re-infected by swallowing the eggs.

Clinical features

Night-time anal itching with sleep disturbance is the common clinical complaint. Girls may complain about dysuria (painful urination) because enterobius caused soreness of the vulva. You cannot find the eggs of these worms on stool examination. If you bend a child over his mother's knee and quickly spread his buttocks apart you will often see the worms that look like little threads, before they have the time to disappear into the anus.

Management

Eradication of pinworm is difficult because the eggs are usually spread with dust throughout a household.

For eradication, it is necessary to treat all members of the child's household, even those without symptoms, at the same time. The bedding should be washed at that time. Children's fingernails should be cut short.

Mebendazole

Children over 2 years 100 mg one single dose, repeat after 2 weeks

Alternatives: albendazole or pyrantel

Abdominal swelling

Abdominal swelling or distension is a common complaint. It is not necessarily a sign of disease because in children the abdomen appears normally to be more swollen than in adults.

◆**Dangerous**: an acute swelling that develops over a few hours or days is probably serious, especially if accompanied by vomiting and abdominal pain, see above "Acute abdomen".

During gastro-enteritis, the abdomen may become slightly distended from increased bowel gases.

The commonest cause of a chronic abdominal swelling is malnutrition. Malnutrition weakens the abdominal wall muscles so that the child's gut comes forward. In addition, malnutrition is often accompanied by malabsorption. Food is not digested or absorbed normally and more bowel gas is produced.

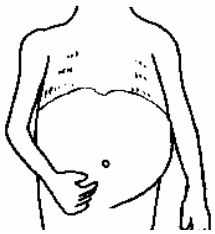
A heavy worm load of ascaris worms can cause abdominal swelling. Other cause is the enlargement of abdominal organs (for example, spleen or liver). Sometimes a swollen abdomen is caused by fluid (ascites) or rarely by abdominal tumours.

In older children in whom abdominal examination is normal, the complaint of abdominal swelling may be an expression of unrelieved stress or fears.

By taking a history and doing a physical examination, it is usually easy to determine what causes the abdominal swelling (see box).

Management if you cannot find a specific cause of chronic abdominal swelling

If you cannot find a specific cause in a child with chronic abdominal swelling, treat the child with worm medicine, discuss good nutrition and reassure the family.



COMMON CAUSES:

- Malnutrition
- Heavy worm load
- Enlarged spleen or liver

Figure 10–9 ***Chronic abdominal swelling***.

Causes of the large abdomen

- Normal (the abdomen just seems enlarged due to lumbar lordosis)
- Weak abdominal wall in malnutrition
- Abdomen filled with air
  - – Gastro-enteritis
  - – Intestinal obstruction
  - – Malabsorption
- Abdomen filled with worms
  - – Heavy ascaris worm load
- Ascites (abdomen filled with fluid)
- Enlarged organs
  - – Large liver
  - – Large spleen
  - – Large kidney
  - – Large bladder
- Faeces (Constipation)
- Mass
  - – Tumour

Ascites

Ascites is a collection of fluid inside the abdominal cavity.

There are two types of ascites fluid:

1. COMMON: **exudate**, which is caused by inflammation of the peritoneum. Commonest causes are tuberculosis or peritonitis, rarely a tumour. Exudate characteristically contains much protein (more than 30 g/l). You may find many white blood cells and sometimes red blood cells or visible blood in it.

2. RARE: **transudate**. Transudate is the result of fluid loss from the vascular system into the abdomen. It may be caused either by a low protein content of the blood (hypoalbuminaemia) as in nephrotic syndrome, or by increased pressure inside the venous blood vessels leading to the liver as in portal hypertension from end-stage liver disease or heart failure. The protein content of transudate is characteristically low (less than 30 g/l).

Causes of ascites

COMMON

- Tuberculosis
- Intestinal perforation - peritonitis

LESS COMMON

- Nephrotic syndrome
- Liver disease
- Heart failure

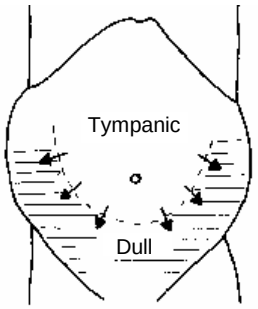
RARE

- Tumours

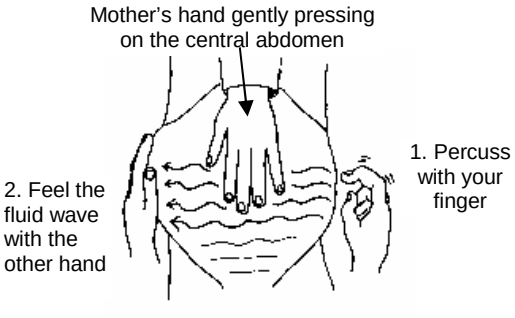
HOW TO ASSESS FOR ASCITES

1. **Inspection**:
   Bulging flanks

2. **Percussion**:
   Start central and percuss to the periphery



3. **Fluid wave**:



4. **Shifting dullness**:
   Lie the child on his side and percuss the abdomen. Mark the point where the sound becomes dull. Then turn the child on his other side. In ascites, the point where the sound becomes dull has changed.

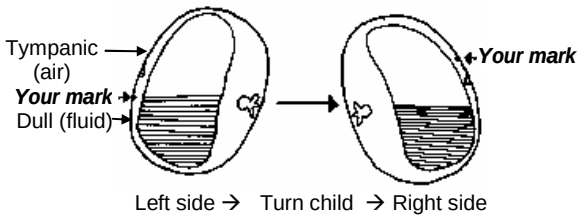


Figure 10–10 ***Examination for ascites***.

How to find the cause of ascites

The cause of ascites is often obvious from history and clinical findings:

- Acute onset of ascites in abdominal perforation
- Slow onset over several days or weeks in tuberculosis
- Swelling of face and high protein content in the urine in nephrotic syndrome
- Other signs of liver disease in liver failure, history of jaundice
- Enlarged heart and liver in heart failure

NOTE: children with kwashiorkor only very seldom develop ascites.

Helpful investigations

If you are uncertain about the diagnosis, you may want to examine ascitic fluid for protein and cells. However, the main indication for a so-called peritoneal tap is severe discomfort and pain caused by the ascites. Depending on the most likely diagnosis, arrange other tests such as liver function tests, chest x-ray, urine

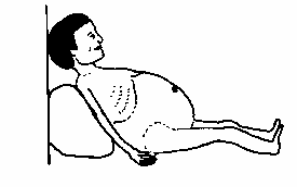
examination. Only about 50% of all children with abdominal tuberculosis have signs of pulmonary disease.

Management

1. Treat the underlying problem.
2. If the child is in severe discomfort or pain, aspirate about 500 ml–2 litre ascitic fluid, depending on the child's age (figure 10–11).
3. If ascites is caused by liver disease, give spironolactone 2 mg/kg/day divided into 2-3 doses.

HOW TO PERFORM A PERITONEAL TAP:

1. The child should empty the bladder.
2. Lie the child down with his back supported so that the fluid collects in the lower abdomen.



3. Clean the skin. The tap must be done as aseptic procedure under sterile conditions.
4. Insert the needle at either of the two sides shown below (halfway between umbilicus and pubic bone, or halfway between umbilicus and iliac spine) and withdraw the fluid.

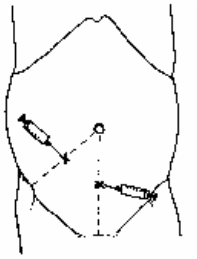


Figure 10–11 ***Peritoneal tap***.

Liver disease

The liver is the largest organ of the body. It fulfils many different functions:

- Production of proteins and most of the factors for blood coagulation
- Maintenance of the blood glucose level
- Production of bilirubin from breakdown of red blood cells
- Inactivation of many drugs
- Immune defence against infections, especially against those bacteria or viruses that enter through the gastro-intestinal tract
- Metabolism of lipids (fats)

A great variety of conditions can disturb these liver functions.

Manifestations of liver disease are:

COMMON

- Enlarged liver (hepatomegaly)
- Jaundice

LESS COMMON

- Metabolic disturbances, especially low blood glucose or high ammonium, that may cause encephalopathy
- Bleeding problems in end-stage liver disease, including upper gastro-intestinal tract bleeding
- Oedema (due to low protein)

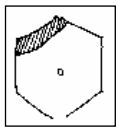
Enlarged liver (hepatomegaly)

The normal liver has a soft edge and is not tender. In young children the liver edge can often be felt 1-2 cm below the right rib margin. In some chest diseases such as asthma, bronchiolitis, or chest deformity from rickets, the liver is pushed down into the abdomen where you can feel it, although it is not truly enlarged. Defining the upper border of the liver by percussion helps to determine the actual liver size (see figure 10–4).

Besides estimating the size of the liver, also feel for tenderness and determine the liver texture (soft, firm or hard).

An enlarged liver may be a transient finding in acute infections such as viral hepatitis, many other viral infections, typhoid fever or septicaemia. In these cases, the enlargement will resolve after about 4-8 weeks.

Causes of an enlarged liver (hepatomegaly)



INFECTIONS

- Viral hepatitis
- Many unspecific viral diseases
- Typhoid fever
- Malaria
- Septicaemia
- Tuberculosis

LIVER

- Chronic hepatitis
- Amoebic liver abscess

HEART DISEASES

- Heart failure

BLOOD DISEASES

- Leukaemia
- Lymphoma

OTHERS

- Kwashiorkor
- Hydatid disease
- Rare: inherited metabolic storage disorders

How to find the cause of hepatomegaly

Clinical examination usually provides guidance towards the likely cause of liver enlargement:

Hepatomegaly + jaundice

COMMON

- Liver disease: viral hepatitis, liver cirrhosis, drug reaction

LESS COMMON

- Malaria, septicaemia

RARE

- Lymphoma, leukaemia

Hepatomegaly + no jaundice

- Unspecific viral illness, sepsis, heart failure, tuberculosis, typhoid fever, amoebic liver abscess, hydatid disease

Hepatomegaly + severe malnutrition

- Malnutrition

Hepatomegaly + splenomegaly (large spleen)

- Malaria, brucellosis, some viral illnesses, tuberculosis, typhoid fever; rare: leukaemia or lymphoma

Hepatomegaly + mental retardation + cataract

- Rare genetic metabolic problems (for example, galactosaemia)

Helpful investigations

- Total and differential white blood cell count (WBC) as an indicator of infection
- Ultrasound, especially to show a mass or cyst
- Repeated liver function tests (GPT, alkaline phosphatase, bilirubin) to check the function of the liver and to measure disease progress
- Hepatitis A and B serology if available

Normal values of liver enzymes

Alkaline phosphatase	1–9 years	145–420 U/l
	10–11 years	130–560 U/l
Bilirubin	Over 5 days	0.2–1.0 mg/dl (3.4–17.1 micromol/l)
Gamma-GT		5–32 U/l
GPT (ALAT)	Over 4 months	5–45 U/l

Jaundice (icterus)

Jaundice is best detected by looking at the sclera (the whites of the eyes) that have turned yellow. It is best to examine a child's sclera in daylight to confirm that he is jaundiced. Clinical signs of jaundice can be found when the bilirubin is above 3 mg/dl.

What is jaundice?

Each red blood cell (RBC) lives about 120 days. Then it is destroyed and part of the old haemoglobin is made into a yellow substance, called bilirubin. The liver metabolises the bilirubin (conjugation) and excretes it through the bile duct into the gut. Bilirubin is responsible for the brown colour of normal stools.

The three groups of jaundice

1. **Haemolytic (prehepatic jaundice)**. It is caused by an increased destruction of red blood cells leading to an increase in bilirubin production. Haemolytic jaundice is usually mild.
2. **Liver cell jaundice (hepatocellular jaundice)**. The liver is diseased and cannot metabolise and excrete the bilirubin normally.
3. **Obstructive jaundice (posthepatic jaundice)**. The extrahepatic bile duct is obstructed and bilirubin cannot be excreted.

Causes of jaundice after the newborn period

HAEMOLYTIC OR PREHEPATIC JAUNDICE

- Haemolytic anaemia (malaria, G6PD deficiency, snake poison, transfusion reaction)

HEPATOCELLULAR JAUNDICE, LIVER CELL DAMAGE

- Hepatitis virus
- Severe bacterial infection (septicaemia, severe urinary tract infection)
- Unspecific viral diseases
- Chronic hepatitis, cirrhosis
- Drug-induced hepatitis (for example caused by isoniazid, rifampicin, pyrazinamide, ethambutol, paracetamol overdose, griseofulvin, and many others)

POSTHEPATIC JAUNDICE, OBSTRUCTIVE JAUNDICE

- Congenital abnormality of bile duct
- Ascaris obstructs bile duct

How to find the cause of jaundice

It is usually not difficult to differentiate haemolytic jaundice from the other two groups by simply asking for the colour of stools and urine. If there is any doubt, examine urine for bilirubin and urobilinogen or do liver function tests. The spleen is often enlarged in haemolytic anaemia.

It is more difficult to differentiate between jaundice due to liver cell damage and posthepatic obstruction of the bile duct. In liver cell damage, enzymes that are usually inside the cells, GPT (alanine aminotransferase, ALAT), leak into the blood. AP (alkaline phosphatase) and gamma-GT (gamma-glutamyl transpeptidase, GGT) are mainly contained in the epithelium of bile canaliculi (small bile ducts) and are typically very high in obstruction. However, they are also often increased with liver cell damage, because there is some obstruction due to inflamed and swollen cells.

Posthepatic obstruction is rare in children, but if jaundice persists for more than 3 weeks, an ultrasound should be done to look for dilated bile ducts.

Practical points how to differentiate between the different causes of jaundice

Clinical examination	Haemolytic jaundice	Liver cell damage and obstructive jaundice
Stool colour	dark	clay-white
Urine colour	normal	dark-brown like black tea
Palpation of abdomen	enlarged spleen	enlarged liver
Laboratory investigations		
URINE		
• Bilirubin	0	++++
• Urobilinogen	++++	0
BLOOD		
• Liver function tests	normal	abnormal GPT, GOT and alkaline phos-phatase are raised

VIRAL HEPATITIS

Five different types of viral hepatitis have been described (Hepatitis A-E) and more are likely to be identified in the future:

- Commonest is hepatitis A virus. It is also called infectious hepatitis and is transmitted via the fae-cal-oral route. It does not cause complications nor chronic hepatitis.
- Hepatitis B virus is transmitted by injections with dirty syringes and through blood transfusions. Transmission from a mother who is a chronic carrier of the virus to her newborn baby is possible. Immunisation against hepatitis B to all babies at birth may become part of the immunisation programmes in the future. Hepatitis B can progress to acute or chronic liver failure and cirrhosis. It is the commonest cause of liver failure in older chil-dren and young adults.

Clinical features

Viral hepatitis typically begins with mild fever and loss of appetite. Even the sight or smell of food will often make a child sick. He is tired and complains about mild abdominal pain. About one week later, his urine turns dark, his stools pale and he becomes jaundiced. With the onset of jaundice, the child's general condition improves. The jaundice resolves spontaneously after several weeks. Chronic hepatitis may develop, depending on which hepatitis virus has caused the hepatitis.

Management

There is no specific treatment. Bed rest is sometimes recommended while jaundice is obvious but will probably not make any difference to the course of the illness. There is no need for a special diet. Protein intake should not be reduced except in liver failure with encephalopathy. Vitamins are useless. Do not give vitamin K routinely. Treatment is supportive by managing complications.

AMOEBIC LIVER ABSCESS

The liver is the most common site of amoebic disease outside the gut. It occurs when active amoebic forms (trophozoites) are carried through the venous system from the gut wall into the liver where they cause necrosis of a well-defined area of liver tissue. Complications arise from local compression of the liver tissue or perforation of the abscess.

Clinical features

Clinical signs are intermittent fever, weakness, tender right upper abdomen with enlarged liver, often crepitations in the right lower lung. There is usually no jaundice. Pain may be referred to the right shoulder. Stool examination does usually not show any amoebic cysts and is not helpful. Ultrasound examination can be used to confirm the diagnosis.

Management

Metronidazole for 10 days, followed by diloxanide for 10 days. Aspiration of the abscess is only indicated in a few cases if the abscess does not resolve or is very large and about to perforate.

Dosages:

Metronidazole 20–30 mg/kg/day divided into 3 doses

1–5 years	100 mg	3 times daily
6–12 years	200 mg	3 times daily

Diloxanide 20 mg/kg/day divided into 3 doses

1–5 years	125 mg	3 times daily
6–12 years	250 mg	3 times daily

HYDATID DISEASE (echinococcosis)

Hydatid disease is caused by the larval stage of the dog tapeworm (echinococcus). Children become infected through dog faeces containing the echinococcus eggs. This may happen either through contact with an infected dog or playing with contaminated soil. A pre-larval stage hatches in the child's gut, penetrates the gut wall and in most cases reaches the liver. However, it may also reach lungs, brain or other sites. Fluid-filled cysts develop that increase slowly in size (1-5 cm per year). Clinical symptoms occur once the cyst is large enough to cause pain or dysfunction from compression of surrounding tissues. Ultrasound can confirm the diagnosis.

A feared complication that can occur spontaneously or during operation is rupture of the cyst. The cyst fluid is filled with larval forms that can produce either an allergic reaction ranging from urticaria to severe anaphylaxis, or spread with the development of further cysts in many more sites of the body. Because of these risks, never aspirate a cyst.

Management

Treatment of hydatid liver cysts is by surgery but only in the hands of an experienced surgeon. The treatment outcome, also for cysts that are not accessible to surgery, has been remarkably improved with the development of albendazole:

Albendazole 10 mg/kg/day divided into 2 doses

2–5 years	50–100 mg	2 times daily
6–12 years	100–200 mg	2 times daily

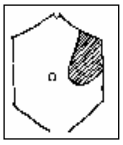
- *Prior to surgery* give albendazole for 4 weeks followed by 14 tablet-free days. Repeat the cycle once, then operate.
- *If the child did not have albendazole before surgery,* give albendazole for 4 weeks followed by 14 tablet-free days, repeat the cycle once.
- *If surgery is not possible,* give albendazole for 4 weeks followed by 14 tablet-free days, repeat the cycle up to three times if necessary.

Large spleen (splenomegaly)

The spleen has different functions. It takes old or damaged red blood cells out of the blood stream, it produces defence cells (lymphocytes) and can become a site of production of blood cells.

The tip of a normal spleen is only palpable in young children. When the spleen becomes palpable, it is a sign of its enlargement, called splenomegaly. For causes of splenomegaly see box:

Causes of large spleen (splenomegaly)



INFECTIONS

- Malaria
- Typhoid fever
- Unspecific viral illnesses
- Brucellosis

BLOOD

- Haemolytic anaemia
- Leukaemia, lymphoma

LIVER

- End-stage liver disease with portal hypertension

OTHERS

- Rare: metabolic storage disorders (genetic diseases)

Other abdominal masses

Enlargement of the kidneys can be caused by obstruction (hydronephrosis), renal cysts or rarely a kidney tumour. The bladder is enlarged in urinary outflow obstruction.

Abdominal tumours are rare in children and whenever you can feel an abdominal mass it is usually an enlarged organ. Sometimes intestinal lymph nodes can be felt in tuberculosis, sometimes faeces is mistaken for a mass. The commonest childhood tumour (the so-called Wilms tumour) is a nephroblastoma, a kidney tumour that starts from embryonic kidney tissue. It presents usually in children under 5 years as an abdominal mass with fever, poor appetite, vomiting, abdominal pain or blood in the urine.

Vomiting

Vomiting is a very common, unspecific symptom. It is usually not serious. Many acute infections start with initial vomiting that does not require any specific therapy. The causes of vomiting in newborns (see page 191) and infants (children under 1 year) are different from those of older children (see boxes).

How to assess a child with vomiting

Look for an underlying serious cause of the vomiting and treat accordingly. Any of the following can point to a serious cause of the vomiting:

- Persistent vomiting
- Abnormal sleepiness or drowsiness (for example, meningitis, severe dehydration)
- Abdominal distension (abdominal obstruction)
- Refusal to eat
- Visible peristalsis (abdominal obstruction)
- Bulging fontanella, convulsions, meningeal signs (meningitis)

Management

Treat dehydration and replace any fluid loss with oral rehydration salts (ORS). ORS is usually well tolerated. Show the family how to prepare ORS and teach the mother to give the child one teaspoon ORS every 2-3 minutes to a child under 2 years and frequent sips from a cup for older children. A bottle must never be used! Even if a child vomits again, some fluid got absorbed. If a child vomits, sometimes ORS has been given too fast. Wait 5-10 minutes and then continue, giving ORS more slowly, for example one teaspoonful every 2-3 minutes. In the case of dehydration, once you have corrected the fluid deficiency, vomiting usually stops spontaneously. Only very few children with persistent severe vomiting need ringer-lactate IV. For the correct amount of ORS needed, see chapter 9. “Diarrhoea”.

NOTE: **Do not give anti-emetics**. Those that are anti-histamines (for example, promethazine - Phenergan) may make the child too sleepy to drink; metoclopramide in children may be associated with extrapyramidal side-effects, presenting as abnormal movements.

Causes of vomiting in children between 1-12 months

FEEDING

- Feeding problems
- Regurgitation (gastro-oesophageal reflux)

INFECTIONS

- Gastro-enteritis
- Any viral infection
- Otitis media
- Urinary tract infections
- Septicaemia
- Meningitis

INTESTINAL OBSTRUCTION

- Babies between 3-8 weeks old: pyloric stenosis
- Intussusception

NERVOUS SYSTEM

- Head trauma
- Hydrocephalus

OTHERS

- Rare: metabolic disorders (inherited enzyme disorders)

Causes of vomiting in children over 1 year

INFECTIONS

- Gastro-enteritis
- Any viral infection
- Otitis media
- Urinary tract infections
- Septicaemia
- Meningitis

NON-INFECTIOUS CAUSES

- Acute appendicitis
- Poisoning
- Travel sickness
- Vomiting may be a sign of underlying fear, unhappiness or post-traumatic stress

FOOD POISONING AND GASTRO-ENTERITIS

When food is not prepared or stored according to the principles of good food hygiene, bacteria in the food may produce toxins. When a person eats food that contains these toxins he develops food poisoning. Often several people who have shared the same food are affected.

Typical clinical symptoms, starting several hours after the meal, are vomiting and often diarrhoea. The symptoms usually only last for several hours or a few days.

Replace the fluid loss with oral rehydration solution. Antibiotics are not indicated.

REGURGITATION (gastro-oesophageal reflux)

Sometimes a mother complains that her child is vomiting after every feed. However, by taking a careful history you will find out that the child is not really vomiting but having regurgitation, which is different from vomiting. In regurgitation, stomach contents flow freely from the stomach back into the oesophagus (gastro-oesophageal reflux) and are brought back through the mouth. It is caused by weakness and immaturity of those mechanisms that close the oesophagus against the stomach and is a very common complaint of the young child under 1 year (infant). The baby is not vomiting with force, food is just dribbling out of his mouth after each meal. This problem improves by the age of 6-12 months. It is a help to nurse a child in an upright position during and after feeds. As long as the child is growing, putting on weight and there is no blood in the vomit there is no reason to be concerned and parents can be reassured.

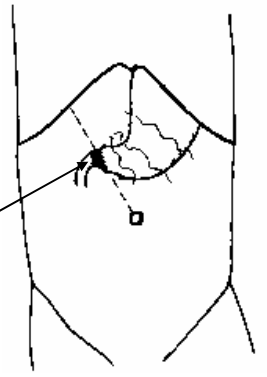
PYLORIC STENOSIS

Pyloric stenosis is due to hypertrophy of the pyloric muscle that closes the exit of the stomach to the duodenum. Boys are more often affected than girls.

HOW TO EXAMINE A CHILD WITH PYLORIC STENOSIS:

Clinical features

- Symptoms start at age 3-8 weeks
- Often boys
- Projectile vomiting after feeds
- Dehydration and malnutrition
- Palpable rubbery small tumour between middle of right rib border and umbilicus



Examination

To feel the tumour, examine the child like this, while he is feeding:

Figure 10–12 *Pyloric stenosis*.
Figure adapted with permission from Churchill Livingstone, see page ii.

Clinical features

Symptoms develop in the first 3-8 weeks of life. Vomiting that starts later than 10 weeks is very unlikely to be from pyloric stenosis. Characteristically the child vomits persistently after every feed. The vomiting is projectile. The child soon becomes dehydrated and malnourished. Peristalsis of the stomach may be visible. Examine a child while he is feeding, often you can then feel the pyloric thickening as a small rubbery tumour on deep palpation. Diagnosis of pyloric stenosis is based on clinical findings.

Management

Treatment is by surgery. Correct electrolyte disturbances and dehydration before operation.

Vomiting with blood

Vomiting with blood (haematemesis) causes great concern to parents. However in most cases, blood comes from a harmless tear of oesophageal mucosa from repeated vomiting, or from swallowing blood during nosebleeds. Serious causes are rare, they include bleeding disorders, peptic ulcer, acute poisoning, or ruptured oesophageal varices in liver cirrhosis.

Constipation

Constipation is difficulty or delay in passing stools. Although it causes concern to parents, serious causes are very rare. It is common during illnesses with fever, when food and fluid intake are reduced. It may be caused by intermittent obstruction from a heavy ascaris worm load. In the absence of disease constipation is usually related to diet or toilet habit.

Acute constipation is common. Hard stools can cause a painful fissure or abrasion of the rectal mucosa with the result that the child will be afraid of passing stools and becomes more constipated. If chronic constipation develops, the child may have signs of abdominal distension and you feel the faeces as multiple firm mobile masses on abdominal examination. Children with chronic constipation seem to be at higher risk of urinary tract infections.

How to assess a child with chronic constipation

- ○ Exclude spinal abnormalities (spina bifida).
- ○ Do a rectal examination:
  - Look for anal fissure or abrasion.
  - Assess the tightness of the sphincter and feel whether there is stool in the rectum.

Management

1. Discuss sufficient fluid intake and a diet with fibre-rich foods. Explain the need to develop a habit of going to the toilet regularly. In the rare severe cases, an oral laxatives (for example, lactulose) or an enema with sodium chloride 0.9% may be necessary. Do not give laxatives or enemas unless a child has not passed stool for more than 5 days.
2. Treat the child for worms.

Treatment of Hirschsprung disease is by operation.

Causes of constipation

VERY COMMON

- Diet
- Reduced food intake during illnesses with fever
- Irregular habit of going to the toilet
- Anal fissure or abrasion

LESS COMMON

- Intestinal obstruction

RARE

- Spinal abnormality
- Anal abnormality
- Hirschsprung disease
- Hypothyroidism

How to differentiate between chronic constipation and the rare Hirschsprung disease

- In **chronic constipation**, you can feel hard faeces near the anal opening in a dilated rectum.
- In **Hirschsprung disease**, parts of the bowel are not supplied by nerves (ganglion cells). These parts of the bowel, most often in the rectum, do not open to let stool pass. On rectal examination, you do not feel stools and the anal opening may be very tight (increased tone of anal sphincter).
- While **chronic constipation** usually affects older children, **Hirschsprung disease** presents in newborns or children under 1 year.

References

1. Behrmann RE, Kliegman RM, Nelson WE. *Textbook of Paediatrics*. 15th edition. Philadelphia: W B Saunders Company 1996.
2. Ghai OP. *Essential Paediatrics.* 3rd edition. New Delhi: Interprint 1993.
3. Hull D, Johnston DI. *Essential Paediatrics*. 3rd edition. Edinburgh: Churchill Livingstone 1993.
4. Illingworth RS. *Common Symptoms of Disease in Children.* 9th edition. London: Blackwell Scientific Publications 1988.
5. King M, King F, Martodipoero S. *Primary Child Care*. Book One. Oxford: Oxford University Press 1978.
6. Stanfield P. *Child Health*. 2nd edition. Nairobi: African Medical and Research Foundation 1997.
7. Stanfield P. Brueton M, Chan M, Parkin M, Waterston T. *Diseases of Children in the Subtropics and Tropics*. 4th edition. Kent: Edward Arnold 1991.
8. Turner R, Blackwood R. *Lecture Notes on History Taking and Examination.* 2nd edition. London: Blackwell Scientific Publications 1991.

11. Urinary tract and genital problems

URINARY TRACT PROBLEMS

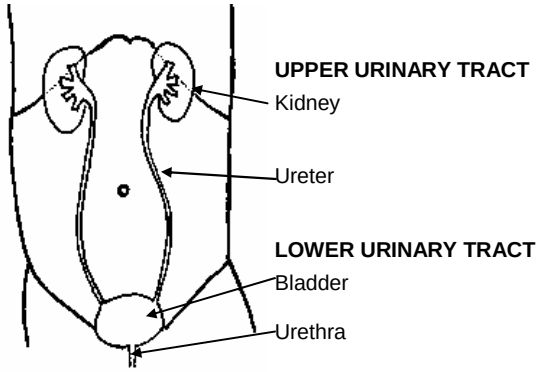


Figure 11–1 *Urinary tract*.

Presentation of urinary tract problems

Urinary tract diseases sometimes present with symptoms that immediately draw the attention to a possible problem of the urinary tract. Sometimes children will come with non-specific symptoms and the diagnosis of a urinary tract problem is easily missed.

Symptoms more specific for a urinary tract problem (how to assess and manage children with these problems is explained below):

- Pain on passing urine (dysuria)
- Visible blood in urine (haematuria)
- Swelling (oedema)
- Passing little or no urine (oliguria or anuria)
- New appearance of enuresis

Unspecific symptoms. Always consider the possibility of a urinary tract problem in a child with any of the following signs or symptoms:

- Irritability and fever
- Vomiting, especially with fever
- Acute or chronic abdominal pain
- Persistent fever
- Malnutrition, especially if not responding to nutritional management
- Convulsions
- Headache (high blood pressure)

How to assess a child with a possible urinary tract problem

Take a history

If you suspect a urinary problem ask specifically:

- When did the child last pass urine?
- What is the urine colour?
- Is passing urine painful?
- Vomiting?
- Abdominal pain?
- Fever?

Examine the child

- Ill or well?
- Any swelling around the eyes (first sign of oedema)?
- Examine the abdomen including the genitalia, look especially for renal masses, tenderness, an enlarged bladder or ascites.
- Always take the blood pressure when you suspect a renal problem (for "How to take the blood pressure in children", see page 122).

Helpful investigations

- **URINE EXAMINATION.**

  1. Look at the **colour** of the urine.

Urine colour	Interpretation
Yellow	• Normal
Dark yellow	• Bile (see jaundice, page 88) • Treatment with rifampicin
Dark colour	• Concentrated urine indicating that the child did not drink enough (for example, during fever)
Red-brown, dark-smoky	• Blood (haematuria) • Haemoglobin (haemoglobinuria)
Dark-brown, black	• Treatment with metronidazole

2. If available, examine the urine with "**dipsticks**". Several kinds of dipsticks are available. A dipstick contains fields to test for one or several different substances in the urine. Testing is simple: dip the paper strip into urine, then wipe the urine off. After one minute look at the colour of the different test fields. The reference table on the dipstick package tells you the interpretation of each colour change.
   NOTE: Storage under hot conditions or use beyond expiry date may give false results.

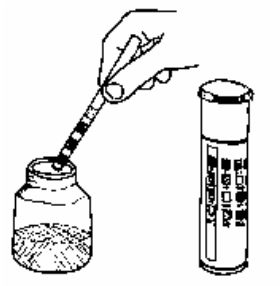


Figure 11–2 *Dipsticks*.

Test	Interpretation of abnormal results
Protein	See below "Proteinuria"
Blood	See below "Haematuria"
Nitrates	• Urinary tract infection. 90% of urinary tract infections show positive nitrate. However, a normal result (no nitrate) does not exclude an infection.
Urobilinogen	• Haemolytic anaemia
Bilirubin	• Liver jaundice
Sugar	• Diabetes mellitus or defect of kidneys to reabsorb glucose. Do a blood glucose test to confirm diabetes.
Ketones	• Sign of acidosis or dehydration showing that the body uses its reserves to produce energy. Important in diabetic ketosis
pH	Usually not important

3. **Urine microscopy**
   NOTE: Only a sample taken under clean conditions will give a correct result (figure 11–3). The urine must be examined within one hour, an older sample may give a wrong result.

Finding	Normal values	Interpretation of abnormal results
WBC (pus cells)	Less than 5-10 per field	***If higher number***: possibly urinary tract infection.
RBC (red blood cells)	Less than 3-5 per field	***If higher number***: haematuria (including urinary tract infection, for other causes see below).
Bacteria	None	***If bacteria***: urinary tract infection or contamination of the sample.
Epithelial cells	Few	No importance.
Crystals	Variable number	No importance. They do not indicate renal stones! Often found in old urine.
Casts	None	***If found:***
– Hyaline casts		No importance
– Red blood cell casts		Glomerulonephritis
– White blood cell casts		Pyelonephritis
– Granular casts		Renal problem, especially glomerulonephritis or tubular necrosis

4. **Urine culture**. Sometimes urine culture is available. However, quality and reporting are often not satisfactory. A trustworthy report should include the name of the pathogen, sensitivities to common antibiotics and the number of bacteria per ml. Only more than 10^5 (=100,000) bacteria/ml prove an infection.

HOW TO TAKE A CLEAN URINE SAMPLE:

OLDER CHILD

1. Give the child a drink and wait 20 minutes.
2. Fetch a clean bottle with a wide mouth.

3. Clean the opening of the urethra.
4. Catch the middle portion of the urine (mid-stream urine):

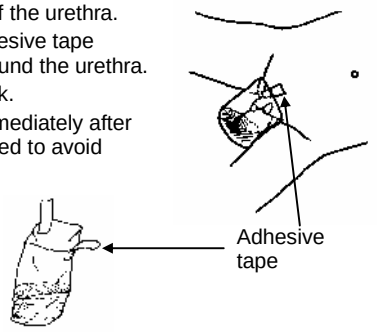
first **middle** last portion

5. Keep the urine sample cool and examine it within 1 hour.

BABY

The mother should try to catch urine in a clean bottle as described for the older child.
If this fails, use a clean plastic back to catch the baby's urine:

1. Clean the opening of the urethra.
2. Fix the bag with adhesive tape (sticking plaster) around the urethra.
3. Give the baby a drink.
4. Remove the bag immediately after urine has been passed to avoid contamination.



5. Keep the urine sample cool and examine it within 1 hour.

Figure 11–3 *How to take a clean urine sample*.

- **X-RAYS**
  - **Plain abdominal/pelvic x-rays** will show about 90% of stones in the urinary tract. Depending on the quality of the x-ray, you may be able to judge the size of the kidneys.
  - **Urography (IVU, IVP)** is a special contrast x-ray examination to demonstrate renal function and anatomical structure.
- **ULTRASOUND**

  Its main indications are suspected urinary obstruction, renal failure and further investigation of haematuria.
- **BLOOD TESTS**
  - Creatinine.
  - Urea.
  - Electrolytes, especially sodium and potassium.

Normal values	Interpretation
Creatinine 1–12 months 0.2–0.4 mg/dl (18–35 µmol/l) Over 12 months 0.3–0.7 mg/dl (27–62 µmol/l)	If the renal function (glomerular flow rate) is reduced to 30-50%, creatinine will rise in the blood. Creatinine is not affected by food. The higher the creatinine, the worse the renal impairment. If creatinine is over 4.5 mg/dl renal impairment is severe.
Urea 5–18 mg/dl (1.8–6.4 mmol/l)	Urea rises when the renal function is reduced to 50%. However, urea may also be raised if the patient ate plenty of protein-rich food or is starving. Urea is less sensitive than creatinine for assessing renal function.
Electrolytes These tests are often not available. They are useful in renal failure when the electrolyte balance is disturbed. ● **Sodium** 138–145 mmol/l ● **Potassium** 2–12 months 3.5–6.0 mmol/l Over 12 months 3.5–5.0 mmol/l	

Dysuria (pain or burning on passing urine)

Only 25% of all children complaining about dysuria suffer from a urinary tract infection. Any soreness in the genital area can cause pain or burning during passing urine (micturation).

How to assess a child with dysuria

- ○ Assess the child as explained above.
- ○ Look at the perineal area.
- ○ Examine the urine.

Causes of dysuria

- Poor hygiene
- Irritation of genital area (vulvitis or balanitis), often from pinworm (enterobius)
- Bacterial urinary tract infections (only 25% of all children with dysuria)
- Viral infections
- Fungal infections (candidiasis)

Management

- If urine examination is normal, advise a high fluid intake and ask the family to wash the child with soap daily.
- Treat for pinworm (see page 85).

NOTE: Do not treat with antibiotics unless there are other clinical signs suggestive of a urinary tract infection or positive findings on urine examination.

Haematuria (visible blood in the urine)

The commonest causes of haematuria are acute glomerulonephritis, infection and urinary tract stones. With the help of the history, associated clinical and laboratory findings, you are usually able to find the cause of the haematuria.

Important causes of haematuria

- Glomerulonephritis
- Urinary tract infection
- Bladder stones
- Trauma

RARE

- Tumour
- Bleeding disorder

How to assess a child with haematuria

First, confirm haematuria by urine microscopy or dipsticks.

Take a history and ask specifically about:

- ○ Abdominal pain?
- ○ Recent skin or throat infections?
- ○ Fever?
- ○ Any previous attacks of haematuria?
- ○ Recent abdominal or pelvic trauma?

Examine the child

- ○ Oedema, especially around the eyes.
- ○ Examine the abdomen and genitalia. Examine specifically for tenderness, enlarged bladder or kidneys.
- ○ Take the blood pressure.

Helpful investigations

- ● Urine microscopy for signs of infection
- ● Plain abdominal/pelvic x-ray for urinary tract stones

How to find the cause of haematuria

History, clinical examination and the results of investigations provide you with helpful information towards the cause of haematuria, see table:

Diagnosis	History and clinical examination	Investigations
Glomerulo-nephritis	• Recent skin or throat infection • High blood pressure • Oedema of the face	• Red blood cell casts • Proteinuria
Urinary tract infection	• Abdominal pain • Vomiting • Fever	• Many WBC • Many bacteria • Sometimes granular casts
Urinary tract stones	• Often recurrent haematuria • Abdominal and loin pain • Vomiting • Recurrent urinary tract infections	• Stone seen on abdominal/pelvic x-ray • Possibly signs of urinary tract infection
Injury to urinary tract	• Recent abdominal or pelvic trauma • Bruises	
Renal tumour	• Palpable abdominal mass	
Bleeding disorder	• Bleeding at other places (for example, from the gums)	

Oedema

Oedema can be caused by a variety of mechanisms and by different diseases. In children, oedema is often first noticed as swelling around the eyes.

Causes of oedema

DIAGNOSIS	*CLINICAL FINDINGS*	*FINDINGS IN URINE EXAMINATION*
KIDNEY PROBLEMS		
• Nephrotic syndrome	– Obvious and generalised oedema, ascites	– Much protein in urine
• Glomerulonephritis	– Oedema mainly in the face – Haematuria – High blood pressure	– RBC and casts in the urine – Protein in the urine
MALNUTRITION		
• Kwashiorkor	– Oedema mainly of the legs – Moonface, often skin changes – Miserable child	– No or little protein in the urine
BLOOD DISEASE		
• Anaemia	– Oedema mainly around ankles – Very pale	– No or little protein in the urine
HEART PROBLEMS		
• Heart failure	– Oedema of legs in older children – Large and tender liver – Signs of heart disease, severe anaemia, severe pneumonia or high blood pressure	– No or little protein in the urine
OTHERS		
• Allergy (angioedema), localised infection, burns	– Localised oedema	
RARE: LIVER DISEASE		
• Liver failure	– Large or hard liver – Jaundice – Ascites	– No or little protein in the urine

How to assess a child with oedema

- Is the oedema localised or generalised?
- Are there clinical findings that point to a specific cause (for example malnutrition, anaemia or heart failure, see box above)?
- If you are uncertain about the diagnosis, examine the urine for protein and blood.

Interpretation of results of urine examination for protein and blood:

Results		Interpretation
Protein	+++/++++	Nephrotic syndrome
Protein Blood	++ ++/++++	Glomerulonephritis
Protein	negative / +	Oedema not caused by renal problem, investigate for other causes

Oliguria - acute renal failure

In renal failure, the kidneys are no longer able to regulate the body's fluid and electrolyte balance. The commonest and most obvious sign is oliguria, the child is passing only very little urine, less than 1 ml/kg/hour. Laboratory findings are a high creatinine or urea and often electrolyte disturbances (low or high sodium and high potassium).

NOTE: In illnesses that may lead to renal failure (for example, diarrhoea with dehydration) always ask when the child has passed his last urine. This helps to diagnose renal failure early, before the kidney suffers permanent cell damage.

Causes of renal failure

Renal failure can be caused in three ways:

1. PRE-RENAL PROBLEMS

These are problems that are associated with a reduced blood volume or hypotension. Therefore the blood flow to the kidneys is reduced.

- Severe dehydration
- Shock from blood loss
- Other causes of shock (sepsis)

2. RENAL PROBLEMS

In these, the kidneys are directly damaged.

- Glomerulonephritis
- Drug toxicity
- Renal cell death (tubular necrosis) from very low blood pressure with reduced renal blood flow during shock or severe dehydration

3. POST-RENAL PROBLEMS

These are caused by obstruction of the urinary tract at the level of kidneys, ureter, bladder or urethra.

- Urinary tract stones
- Congenital abnormalities

How to assess and manage a child with renal failure

The key question in a child with renal failure is whether the renal dysfunction has been caused by a pre-renal or post-renal problem, because these are often readily treatable.

- Suggestive for a **pre-renal problem** is the history: diarrhoea with dehydration? Heavy blood loss? Low blood pressure? Assess the child for dehydration and shock.
- **Post-renal obstruction** can be suspected from clinical examination: are the bladder or the kidneys palpable? An ultrasound is the most helpful investigation to confirm obstruction.

Management of pre-renal failure

If the urine output does not increase *after* the fluid deficiency has been corrected, give sodium chloride 0.9% 20 ml/kg over 30 minutes together with frusemide 2 mg/kg slowly IV (do not give more than 4 mg/minute). In most cases, this will cause a response within 2 hours, shown as a marked increase in urine output.

Management of post-renal obstruction

Release the obstruction by catheterisation, suprapubic puncture or nephrostomy.

Management of renal failure

If the renal failure is caused by damage to the kidneys, specific treatment is usually not available. Treatment consists on restricting fluid, salt and potassium intake, treating symptoms and complications while you are waiting for the renal function to recover. For details, see below:

Complications	Mechanisms and clinical features	Prevention and therapy
Water overload	***Cause*** • Inability of the kidneys to excrete fluid ***Clinical features*** • Oedema • Possibly heart failure	Restrict the fluid intake according to the urine output over the last 24 hours: measure the urine output over 24 hours and give that amount + 12 ml/kg for the next 24 hours
High blood pressure	***Causes*** • Sodium overload and oedema • Release of blood-pressure increasing substances from damaged kidney tissue ***Clinical features*** • Headache • Heart failure • Convulsions • Further kidney damage	Restrict salt intake. Treat with nifedipine, atenolol, methyldopa or hydralazine.

High blood urea	***Cause*** • Inability of the kidneys to excrete toxic substances ***Clinical features*** • Nausea and vomiting • Headache • Confusion • Convulsions • Finally coma and death	Restrict protein in the diet.
High potassium	***Cause*** • Inability of the kidneys to excrete potassium ***Clinical features*** • Dangerous cardiac arrhythmias	If potassium over 7 mmol/dl or ECG changes, give calcium gluconate 10% 0.5 ml/kg IV over 5 minutes. If hyperkalaemia persists, give sodium bicarbonate 8.4% 2 ml/kg IV over 20 minutes. If the hyperkalaemia still persists, give 1 ml/kg of dextrose 40 % (= 0.4 g/ml) + 1 unit insulin per 10 ml glucose IV

Follow-up and prognosis:

1. Check the child's weight and creatinine (or urea) frequently.
2. Watch for complications.
3. If the kidney function recovers, be aware that the oliguric stage during which the child passes very little urine, is followed by a polyuric stage during which the child passes large amounts of urine. It is important to keep a careful fluid balance until the child's urine output is stable.

The prognosis depends on the underlying cause.

Enuresis (passing urine at night during sleep)

It sometimes causes great concern to parents when an older child still passes urine at night while asleep. *If the child has never been dry*, an organic reason is rare. Often other family members, including father or mother, were having the same problem. *If the child had been dry and enuresis newly started*, an organic pathology or a psychological cause (unrelieved stress) is very likely.

How to assess a child with enuresis

Your main aims are to rule out a urinary tract infection or diabetes mellitus.

Take a history

- ○ Has the child ever been dry?
- ○ Were other family members having a similar problem?

Examine the child

- ○ Examine the back for spina bifida.
- ○ Examine genitalia for hypospadia (abnormal opening of the urethra).
- ○ Examine the abdomen for any abnormality.

Helpful investigations

- ● Urine examination to exclude a urinary tract infection
- ● Urine or blood sugar

Management

If clinical examination and all tests are normal, assure the parents that enuresis is a common problem that will improve when the child is growing older. There are no statistics for Afghanistan but we know from other countries that 10% of all 5–year old children and 5% of all 10–year olds are still passing urine during sleep. If children experience traumatic disruption of their life, as many did in Afghanistan, the rate of enuresis may even be higher. Tell the family to be patient and to encourage the child. Medicines, drastic interventions or punishments are not the way to success. Almost all children will become dry eventually.

Specific diseases

URINARY TRACT INFECTION

It is important to diagnose and treat urinary tract infections in children because untreated infections, especially in young children, can cause scarring of the kidneys and renal failure in later life. In older children, urinary tract infections are more common in girls than in boys. In children under 5 years, there is no difference between the sexes.

Two mistakes in diagnosing an urinary tract infection are common:

Mistake 1: to diagnose an urinary tract infection when there is no infection. Many think burning on passing urine is a definite sign of urinary tract infection. This is a wrong belief, see "Dysuria" on page 95.

Mistake 2: to miss an infection when there is, because clinical signs were unspecific.

Clinical features - when to think about a urinary tract infection? (Figure 11–4)

In **young children under 5 years,** symptoms are very unspecific. Fever or vomiting may be the only signs. Think about the possibility of a urinary tract infection in a young child with any of the following:

- Vomiting
- Fever and irritability
- Poor feeding and growth failure
- Convulsions
- Abdominal pain
- Prolonged jaundice in the newborn

In **older children,** the symptoms are more typical but unspecific symptoms remain common:

- Fever, vomiting, abdominal pain
- Dysuria, frequency, abdominal pain, with or without fever

How to confirm a urinary tract infection

In any child in whom you suspect a urinary tract infection, take a clean urine sample for microscopy. If there are doubts, a white blood cell count will show an increased number of total cells with a high percentage of neutrophiles.

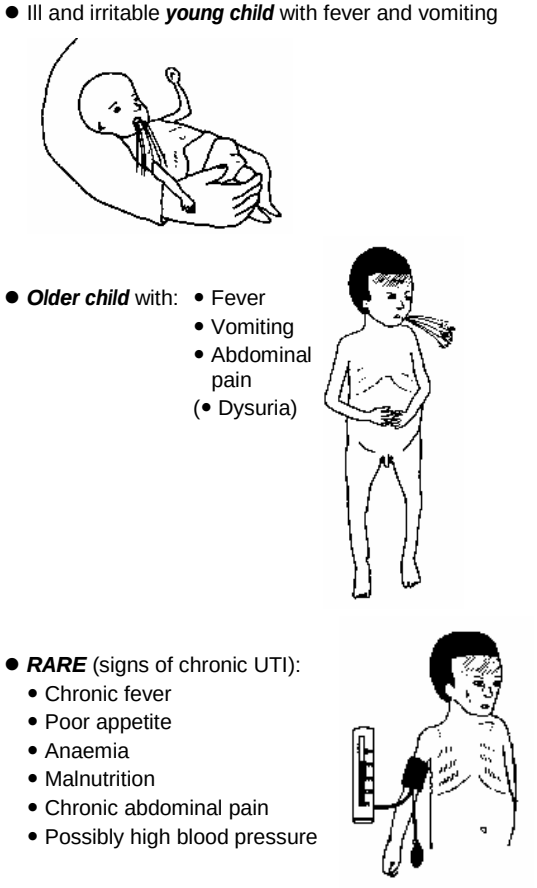


Figure 11–4 ***When to suspect a urinary tract infection***.

Management

1. Give a suitable antibiotics for 5-7 days:
   - *If the child is not very ill*, give cotrimoxazole for 5 days. Alternatives are amoxicillin or nalidixic acid.
   - *If the child is under 1 year or very ill*, give gentamicin IM/IV with or without ampicillin IM/IV.
2. High fluid intake, preferably oral.
3. Replace fluid loss from vomiting.
4. Treat associated problems (for example, high fever or convulsions).

Antibiotics for urinary tract infections

Essential drugs used to treat urinary tract infections

- Co-trimoxazole
- Amoxicillin or ampicillin
- Nalidixic acid
- Nitrofurantoin
- Gentamicin (often combined with ampicillin)
- Cephalosporins are effective but are expensive and usually not indicated

The following drugs are usually not effective in urinary tract infections

- Benzylpenicillin
- Chloramphenicol
- Cloxacillin
- Erythromycin
- Metronidazole
- Penicillin V
- Procaine penicillin

Doses of antibiotics used to treat urinary tract infections

Amoxicillin 25–50 mg/kg/day divided into 3 doses

2–12 months	62.5–125 mg	3 times daily
1–5 years	125–250 mg	3 times daily
6–12 years	250 mg	3 times daily

Ampicillin IM/IV; severe urinary tract infection: 200 mg/kg/day divided into 3-4 doses

2–12 months	250–500 mg	3–4 times daily
1–5 years	500 mg–1 g	3–4 times daily
6–12 years	1 g	3–4 times daily

Co-trimoxazole

2–12 months	120 mg	2 times daily
1–5 years	240 mg	2 times daily
6–12 years	480 mg	2 times daily

Gentamicin 7.5 mg/kg once daily

2–12 months	20–60 mg	once daily
1–5 years	60–100 mg	once daily
6–12 years	100–200 mg	once daily

Nalidixic acid 50 mg/kg/day divided into 4 doses

2–12 months	62.5–125 mg	4 times daily
1–5 years	250 mg	4 times daily
6–12 years	500 mg	4 times daily

Nitrofurantoin 3 mg/kg/day divided into 4 doses

What to do if a proven infection does not respond to treatment?

1. Change the antibiotic if a child has not improved after 48 hours of treatment. Also, reconsider your diagnosis. Drug-resistance in urinary tract infections is common because of the widespread misuse of antibiotics.
2. If a child is not improving with the second antibiotic, think about an underlying urinary tract problem: do a plain abdominal x-ray to look for stones and an ultrasound to exclude obstruction.
3. Although it is rare, in older children over 8 years with antibiotic-resistant urinary infection consider the possibility of renal tuberculosis. Examine also the testis for signs of TB-epididymitis.

Recurrent urinary tract infections

In children with confirmed (!) recurrent urinary tract infections, an underlying urinary tract abnormality is likely. If possible, do an IVP to exclude an outflow obstruction. Common is the so-called vesico-ureteric-reflux (VUR). This is an insufficiency of the valve that should prevent backflow of urine into the ureter and kidney during micturation. Usually VUR improves with age.

Management

- **Prophylactic antibiotics**. To prevent renal scarring due to chronic or recurrent infections, a young child with recurrent infections should take a prophylactic antibiotic until he is 5 years old. Give nitrofurantoin or co-trimoxazole daily at half the usual dose. If infections occur while the child is taking prophylaxis, treat the infection with an alternative antibiotic.
- **Avoid constipation**.
- Advise a **high fluid intake**, especially during the hot season.

URINARY TRACT STONES (urolithiasis)

Urinary tract stones, especially bladder stones are common in Afghan children. They are usually associated with malnutrition and repeated episodes of diarrhoea with dehydration. Complications include recurrent infections and obstruction with resulting renal damage and failure. Encouraging good nutrition and ensuring a good fluid intake, especially during episodes of diarrhoea can prevent stones.

Bladder stones

They occur especially in younger children. Clinical presentations are frequency, dysuria, repeated urinary tract infections and sometimes haematuria. Diagnosis is by plain pelvic x-ray (figure 11–5). Treatment is surgical.

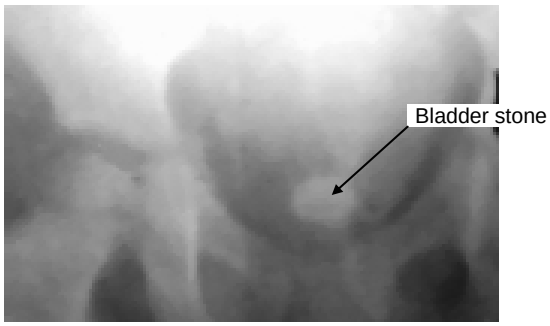
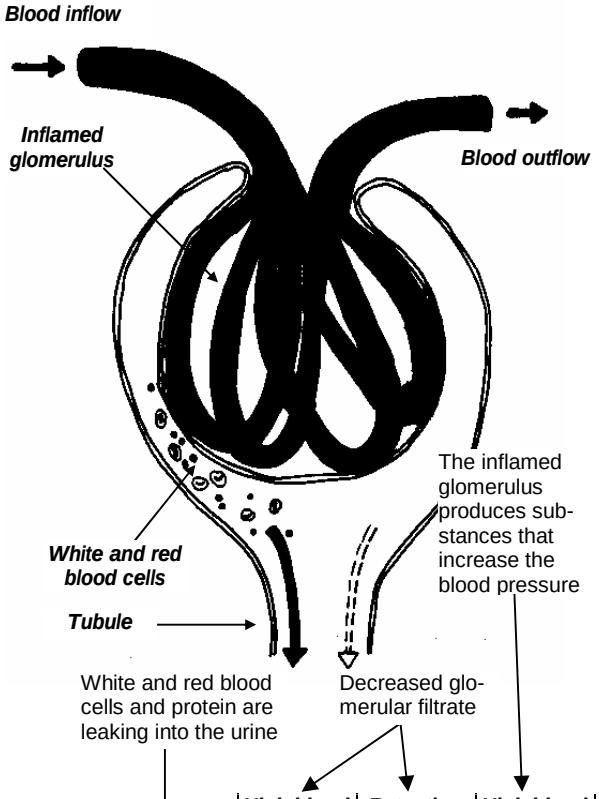


Figure 11–5 ***Bladder stone***.

Renal and ureteric stones

They are rare in children. Presenting symptoms are haematuria, abdominal and loin pain. The pain is often colicky and may radiate into the groin region. Treatment of a renal colic is with an analgesic (for example, ibuprofen). Facilities for removal of stones are often not available and treatment is symptomatic: pain relief, high fluid intake, treating infections and surgical release of obstruction, if it occurs.



		High blood urea	Retention of water and salt	High blood pressure
Symptoms	Haematuria Proteinuria	Nausea Vomiting	Oedema Oliguria	Headache
Complications		Confusion Coma	Heart failure	Convulsion

Figure 11–6 ***Causes of main symptoms and complications in glomerulonephritis***.

ACUTE GLOMERULONEPHRITIS (acute nephritis)

Acute glomerulonephritis occurs about 1-2 weeks after a throat or skin infection with certain streptococcal bacteria. It is not an infection but a specific immune-reaction to the bacteria that causes damage and inflammation of the glomeruli. This reaction affects glomerular function (figure 11–6).

Clinical features

Glomerulonephritis usually occurs in children 5 years and older and almost never in children under 3 years.

The classical symptoms of acute glomerulonephritis are:

- Haematuria
- Oedema, especially of the face
- High blood pressure causing headache
- Acute renal failure with oliguria and nausea or vomiting

Helpful investigations

- Urine examination with dipsticks: blood ++++, protein ++
- Urine microscopy: red blood cells, granular and red blood cell casts
- Serum urea or creatinine: raised

Management

1. Penicillin V for 10 days to eradicate any remaining streptococci in the throat or on the skin
2. Bedrest during the acute stage
3. Treatment of complications as described under "Acute renal failure" on pages 97–98

Prognosis

The prognosis is good in children. If complications are managed well, glomerulonephritis usually resolves spontaneously after a few weeks. The natural course is shown in figure 11–6. Occasionally, chronic glomerulonephritis with progressive worsening of renal function and persistently high blood pressure develops.

The natural course of glomerulonephritis

Urine: Protein	+++	++	+/-	-
Blood	++++	++	+ for several months	
Blood pressure	Very high	High	Normal	

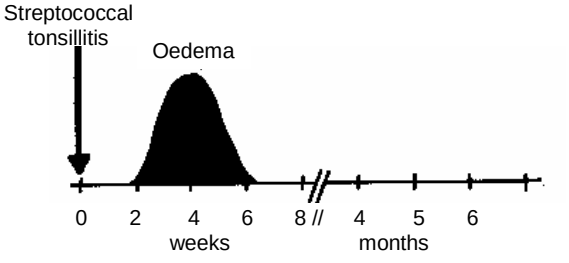


Figure 11–7 ***The natural course of glomerulonephritis***.
Figure adapted with permission from Churchill Livingstone, see page ii.

Prevention

Many cases of glomerulonephritis could be prevented by treating streptococcal throat and skin infections promptly with penicillin for 10 days.

NEPHROTIC SYNDROME

In nephrotic syndrome, large amounts of protein are lost through the glomeruli. This results in oedema, proteinuria and reduced protein-level in the blood. The exact cause of nephrotic syndrome is not known.

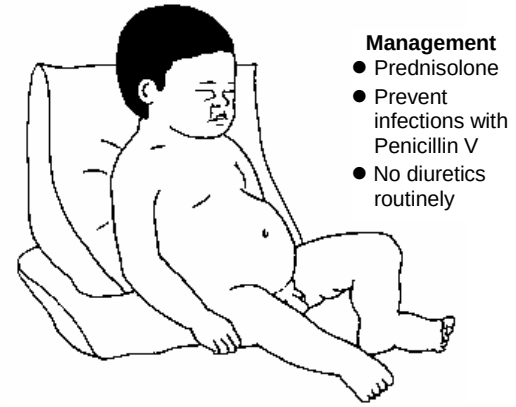


Figure 11–8 ***Nephrotic syndrome***.
Figure adapted with permission from Churchill Livingstone, see page ii.

Clinical features

Nephrotic syndrome is not very common. Typically, a child develops oedema around the eyes, often following an upper respiratory tract infection. Then increasing generalised oedema, including ascites develops. The child may complain about abdominal pain, diarrhoea and vomiting.

Helpful investigations

- Urine examination: proteinuria
- Blood examination: low albumin (less than 2.5 g/dl = 25 g/l; normal value: 3.9–5.2 g/dl)
- ESR is high in the absence of infection

Management

1. ***Prednisolone*** 2 mg/kg/day divided into 3 doses. Do not give more than 80 mg/day. Give this dose daily for 4 weeks. Usually a response occurs within 5-10 days.

2–12 months	2.5–5 mg	3 times daily
1–5 years	5–10 mg	3 times daily
6–12 years	10–20 mg	3 times daily

   - If improved, give the same dose every second day for another 4 weeks (total treatment duration 8 weeks).
   - If no response after 4 weeks, stop prednisolone because then the nephrotic syndrome is so called prednisolone-resistant. Treat symptoms only.

2. ***Penicillin V*** 50 mg/kg/day orally divided into 3 doses as long as the ascites persists to prevent peritonitis from pneumococcus bacteria

2–12 months	125 mg	3 times daily
1–5 years	250 mg	3 times daily
6–12 years	250–500 mg	3 times daily

3. **Diet**: protein-rich food with no added salt

   NOTE: Use **diuretic**s very carefully. As the blood volume is already reduced, diuretics can cause a further decrease in blood volume and shock. Only if the oedema is increasing despite prednisolone treatment or fluid causes severe symptoms such as difficult breathing from pleural effusions, give diuretics: use ***spironolactone*** as "first choice", give 2 mg/kg/day divided into 2 doses. If necessary, carefully add oral frusemide 0.5–1 mg/kg/day once daily. Do not give it IM or IV.

4. **Follow-up**
   - If possible, weigh a child every week and check for protein in the urine. Write the results down to monitor the child's progress.
   - It is likely that a child who has responded to prednisolone will have one or more further attacks (relapses) in the future. Only 30% of children have just one attack. 20% will still suffer relapses 10 years later. Treat relapses in the same way as the first attack.

Complications

- High susceptibility to infections. Peritonitis from pneumococcus bacteria is a feared complication.
- Rare: shock from hypovolaemia. Proteins bind fluid and regulate the blood volume. When proteins are lost, the blood volume becomes less. This can result in acute renal failure or hypovolaemia and shock.

Prognosis

The long-term prognosis for children is generally good because 90% respond to treatment with prednisolone. The other 10% who do not respond to prednisolone will develop progressive renal failure. Children who develop nephrotic syndrome after the age of 8 years, whose blood pressure is high on diagnosis or who also have haematuria often belong to the group with the poorer prognosis.

GENITAL PROBLEMS

Scrotal swelling

In cases of scrotal swelling, do not to miss torsion of the testis because delayed surgical treatment will result in loss of the testis from necrosis. Consider any painful swollen testis as torsion of the testis until proven otherwise.

Causes of the swollen scrotum

- Torsion of the testis
- Inguinal scrotal hernia
- Hydrocele
- Trauma
- Tuberculosis

RARE

- Epididymo-orchitis

How to assess a child with scrotal swelling

Finding the answers to the following three questions gives good guidance towards the correct diagnosis (see figure 11–9):

1. Is the swelling painful or not?
2. Can you get with your fingers above the swelling or not?
3. Does it illuminate or not when you shine a torch through the swelling?

TORSION OF THE TESTIS

Twisting of the testis interrupts the blood supply and will lead to necrosis and loss of the testicle if surgery is not performed immediately. It presents as a sudden painful scrotal swelling. It occurs usually around puberty in boys between 9-12 years but can occur in the newborn. If you suspect torsion of the testis do not observe the patient but send him for surgery immediately.

INGUINAL HERNIA

See page 80.

HYDROCELE

A hydrocele is typically not painful and illuminates. It is not dangerous. It is caused by a fluid filled pouch of peritoneum within the scrotum. If the hydrocele has been present since birth and does not change size, it will usually resolve within 4-6 months. If it appears at later age and varies in size it is unlikely to disappear spontaneously and an operation is indicated.

EPIDIDYMO-ORCHITIS

Epididymo-orchitis is very rare in children. It presents as painful scrotal swelling and differentiation from torsion of the testis can be difficult. Urine microscopy shows many white blood cells. Treatment is with the same antibiotics as for urinary tract infection.

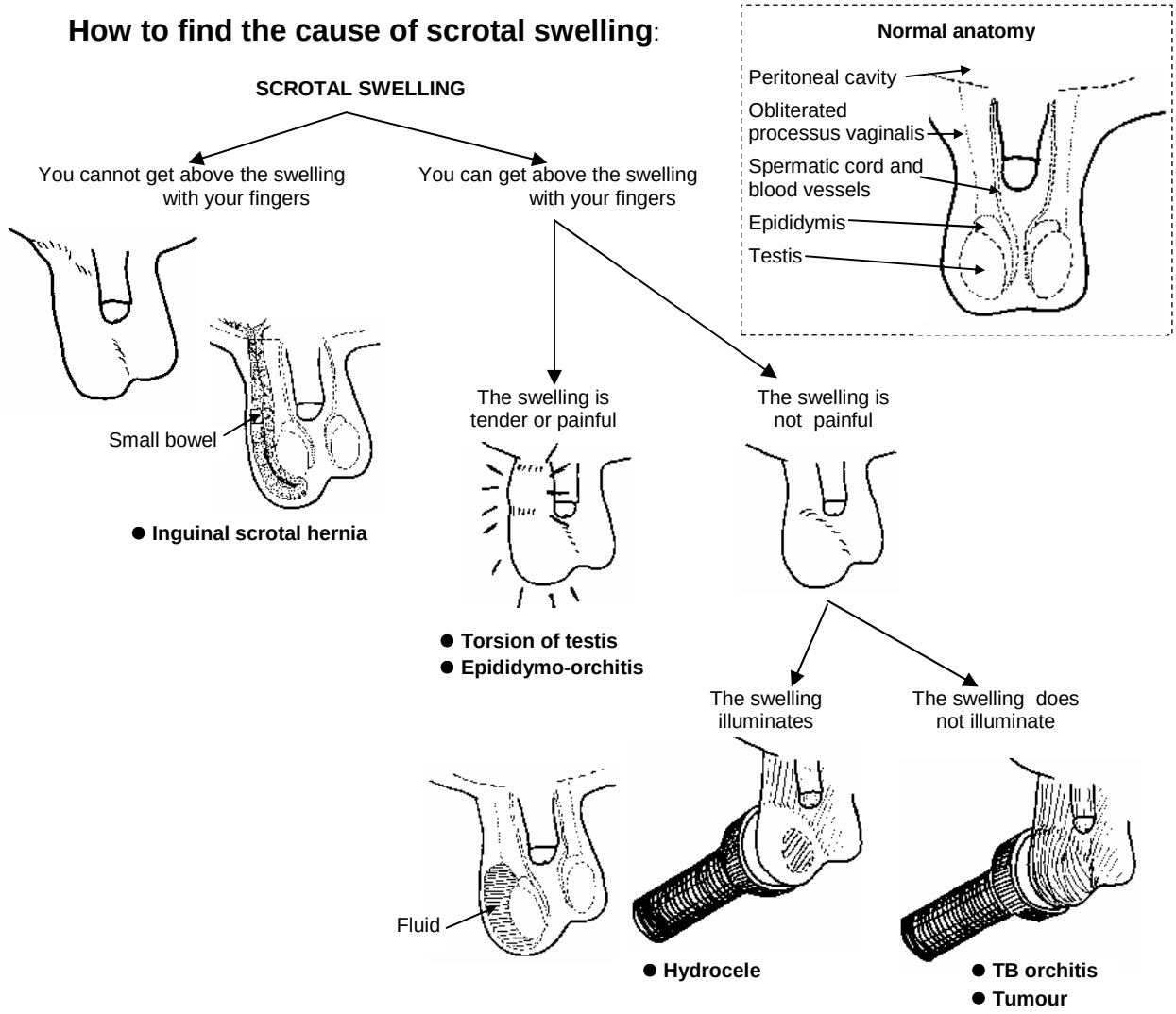


Figure 11–9 ***How to find the cause of scrotal swelling***.

TUBERCULOSIS AND TUMOURS

Tuberculosis of the epididymis is rare. In young boys, it is usually only one of several locations of tuberculosis disease. In older boys, you may feel a non-tender, hard lump just above the testis. The lump sometimes softens and discharges through the skin. Other testicular tumours are very rare in children.

Circumcision

Circumcision is performed for religious reasons in Afghanistan. Medical indication in boys younger than 5 years is narrowing of the foreskin (phimosis) with ballooning when the boy passes urine. In older children the indications are recurrent balanitis (infections of the glans penis) and phimosis.

Sadly, many boys suffer life-long damage from dangerously performed circumcisions. Sepsis, bleeding, deformity or necrosis of the penis are all avoidable complications if the circumcision is done correctly.

NOTE: When you see uncircumcised children or babies, advise the parents strongly to go to a health professional for circumcision and not to the local barber or some other untrained person!

How to perform a safe circumcision

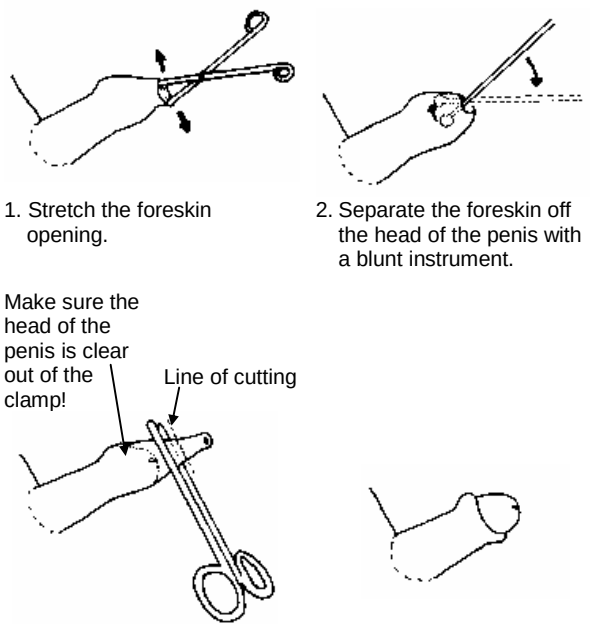
Check whether the child had been immunised against tetanus, if not, use the circumcision as an opportunity to do so and give tetanus toxoid 4 weeks before the operation.

Method of circumcision

The procedure should be done under local anaesthetic (LA). A ring block (infiltration just around the shaft of the penis) is easiest. *Make sure the local anaesthetic does not contain adrenaline (epinephrine) or gangrene*

of the penis may result. Use 4 mg/kg (= 0.4 ml/kg) Lignocaine 1%. Inject the LA circumferentially around the shaft of the penis in the subcutaneous tissue (just under the skin).

Always stretch the foreskin opening (for example with an artery forceps). Then pull the foreskin back over the head of the penis separating it off the head with a probe or other instruments. *Make sure you do not put your instrument into the urethral opening (meatus)!* The separation of the foreskin from the head of the penis then allows the foreskin to be pulled upwards at suitable length to be removed. Use an artery forceps or clamp across the line of cutting, away from the head of the penis. *Always make sure the head of the penis is clear out of the clamp.* Remove the foreskin with a sharp instrument (for example, scissors or scalpel) distal to the forceps. Remove the forceps and gently pull the skin edges over the head. Leaving the clamp for a few minutes will help prevent bleeding. If bleeding occurs, apply firm pressure with gauze and your fingers. Alternatively, suture any bleeding points with 4.0 catgut. Apply antiseptic cream; then wrap a gauze dressing around the wound and leave it for several days. Review the child after 2 days. Only if there is excessive swelling and inflammation co-trimoxazole or amoxicillin should be given.



1. Stretch the foreskin opening.
2. Separate the foreskin off the head of the penis with a blunt instrument.
3. Pull the foreskin upward at a suitable length to be removed. Clamp across the line of cutting. and remove the foreskin with a sharp instrument.
4. Final result: the skin edges are pulled gently back over the head of the penis.

Figure 11–10 *Circumcision*.

References

1. Hull D, Johnston DI. *Essential Paediatrics*. 2nd edition. Edinburgh: Churchill Livingstone, 1987.
2. Hull D, Johnston DI. *Essential Paediatrics*. 3rd edition. Edinburgh: Churchill Livingstone, 1993.
3. Illingworth R S. *Common Symptoms of Disease in Children*. 9th edition. London: Blackwell Scientific Publications 1988.
4. King M (Editor). *Primary Surgery*, Volume 2, Trauma. Oxford: Oxford University Press 1987.
5. Renal Disorders. Part 3 of 3. *Medicine* May 1995; 23:5.
6. Stanfield P. *Child Health*. 2nd edition. Nairobi: African Medical and Research Foundation, 1997.
7. Stanfield P, Brueton M, Chan M, Parkin M, Waterston T. *Diseases of Children in the Subtropics and Tropics*. 4th edition. Kent: Edward Arnold. 1991.

12. Problems of the blood and lymphatic tissues

Anaemia

Anaemia is one of the commonest problems of children in Afghanistan. Anaemia is a Latin word meaning "no blood". In anaemia, red blood cells (RBC) lack either the oxygen-carrying haemoglobin (Hb) or they have been destroyed by haemolysis. Therefore, the capacity of the blood to transport oxygen from the lungs to the tissues is reduced. Consequently, the heart has to work harder to increase the blood circulation to supply the tissues with enough oxygen. If anaemia becomes severe, the blood circulation will fail to adapt and heart failure develops. However, mild anaemia itself has clinical importance because it weakens a child's resistance to infection and causes the child to be more easily tired.

Anaemia is not a disease but a clinical sign. It is therefore not sufficient just to make a diagnosis of anaemia. You must find out why a child has become anaemic.

Understanding the following mechanisms will help to find the cause of anaemia. In many children more than one factor is responsible for causing their anaemia:

- **Lack of nutritients to make haemoglobin and red blood cells**. In most cases anaemia is caused by a lack of iron, sometimes also by a shortage of folic acid or rarely of vitamin B_{12}. Poor nutritional intake, poor absorption in the gut (for example, in persistent diarrhoea), treatment with certain drugs or empty body iron stores are some factors responsible for the lack of essential nutrients.
- **Failure to produce red blood cells in the bone marrow**. The bone marrow is the main blood-forming organ of the body and produces red blood cells, white blood cells (leukocytes or granulocytes) and platelets (thrombocytes). The bone marrow may fail to produce blood cells as a result of infections, chronic inflammation, toxic drug effects or blood cancer.
- **Increased loss of blood, acute or chronic**.
- **Destruction of red blood cells (haemolysis)**. Haemolysis can be caused by infections (for example, malaria) or from defects within the cells (for example, G6PD deficiency). Haemolysis may also be caused by toxins of some venomous snakes or reactions to a blood transfusion.

Causes of anaemia

COMMON

- Iron deficiency
- Infections

LESS COMMON

- Malaria
- Folate deficiency
- Bleeding
- Hookworm and other gastro-intestinal parasites

RARE

- Thalassaemia
- G6PD deficiency
- Drug-induced aplastic anaemia
- Leukaemia
- Chronic renal failure
- Chronic inflammation (for example, chronic childhood arthritis)

How to assess a child with anaemia

Some children come to you because they are always tired and look pale; others have started eating dirt, and some come in breathless in acute heart failure. However, many of the children who are brought to you with different complaints will also suffer from anaemia, which is easily missed unless you specifically look for it.

Assess any child for anaemia that comes to you. Always find the answers to the following questions:

- Is the child anaemic?

  If yes:

  - How severe is his anaemia?
  - Are there any clinical signs that point to a specific cause of anaemia (figure 12–2)?

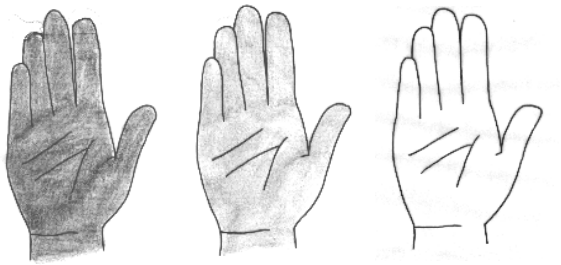
Clinical features

- The child is tired and pale.
- Pallor (paleness) of palms, conjunctiva and inner side of the lips (figure 12–1).
- The child is easily exhausted and breathless on exertion (when walking or running).
- The pulse is fast, and you may hear a systolic heart murmur.
- The child may eat dirt.

Danger signs indicating severe anaemia (haemoglobin less than 5.0 g/dl):

- ◆ Severe pallor of the palms, conjunctiva and inner side of the lips
- ◆ Oedema (different causes of oedema, see page 96)
- ◆ Enlarged heart and later heart failure
- ◆ Breathless at rest

Palmar pallor is a very reliable sign of anaemia:



normal (no anaemia) | pale (anaemia) | very pale (severe anaemia)

Compare the colour of the lips and gums with the colour of your fingernail (nail bed)

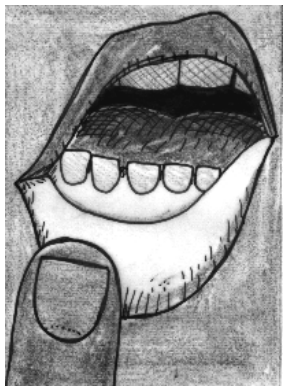


Figure 12–1 ***Clinical examination for anaemia***.

Helpful investigations

- **Haemoglobin (Hb)**. Laboratories report haemoglobin levels in different ways. Some write 9.0 g/dl, which is the same as 90 g/l. Others still report the Hb as % of normal adult value (% of 15.0 g/dl). In the table of normal Hb levels and degrees of anaemia, you find the different ways of reporting Hb results.

  The Hb concentration shows some variation depending on the age. It is high in the newborn (above 14.0 g/dl) but goes down within 2-6 weeks after birth.

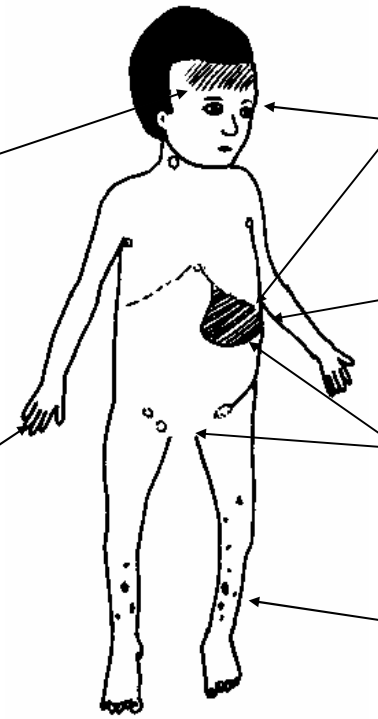
	Haemoglobin values
Normal haemoglobin	***2 months–5 years*** above 11.0 g/dl (110 g/l) (or greater than 70%) ***Over 5 years*** above 12.0 g/dl (120 g/l) (or greater than 80%)
Mild anaemia	7.0–11.0 g/dl (70–110 g/l) (or 45–70 %)
Moderate anaemia	5.0–6.9 g/dl (50–69 g/l) (or 35–44 %)
Severe anaemia	Less than 5.0 g/dl (50 g/l) (or less than 35 %)

Signs of severe malnutrition:
- Malnutrition (often associated with other causes of anaemia)

Fever:
- Acute fever, child is very ill:
  - Septicaemia
  - Malaria
- Chronic fever:
  - Tuberculosis
  - Urinary tract infection

Spoon-shaped finger nails (koilonychia):

- Chronic iron deficiency



Jaundice often with splenomegaly:
- Haemolytic anaemia:
  - Malaria
  - G6PD deficiency

Splenomegaly:
- Thalassaemia
- Malaria

Splenomegaly and/or generalised lymph node enlargement:
- Leukaemia

Purpura (bleeding into the skin):
- Aplastic anaemia
- Leukaemia
- Severe septicaemia

Figure 12–2 ***Clinical findings pointing to specific causes of anaemia***.

- **Red blood cell morphology**. Examining the red blood cell morphology on a thin blood film is a valuable and underused method of determining the cause of anaemia. For example, in iron deficiency anaemia red blood cells are pale (hypochromia), small (microcytosis), of different shape (poikilocytes) and different size (anisocytosis).
- **Malaria blood film**. A single negative result does not exclude malaria (see page 23).
- **White blood cell count (WBC) and differential count**. A WBC count and differential count are important if you suspect infection or leukaemia (for details of how to interpret WBC results, see page 28).
- **Urine examination**. Urine examination is necessary to detect an unrecognised urinary tract infection or chronic blood loss (for example from glomerulonephritis).
- **Stool microscopy**. Look for cysts, eggs and intestinal parasites.
- **Blood culture** if you suspect sepsis.
- **Reticulocyte count**. Reticulocytes are young red blood cells. Normally you find about 0.8–2.0% reticulocytes on a blood film.

  Interpretation
  - A low reticulocyte count is a sign of decreased red blood cell production and inactive bone marrow.
  - A high count has different meanings depending on the clinical situation:
    – It may be a sign of haemolysis.
    – It occurs a few days after starting treatment for anaemia as a sign that the bone marrow is producing red blood cells again.
    – It occurs after bleeding when the bone marrow produces more red blood cells to replace the previous blood loss.

How to manage a child with *mild* or *moderate* anaemia

1. Investigate and treat any specific causes as well as the anaemia itself.
2. If the anaemia is not severe and if there is no indicator for a specific cause, treat the child for iron deficiency anaemia as this is the most common cause found in Afghanistan.

   Ferrous sulphate 10–25 mg/kg/day divided into several doses

2–6 months	50 mg	once daily
7–12 months	50 mg	2 times daily
1–5 years	100 mg	2 times daily
6–12 years	200 mg	2 times daily
Over 12 years	200 mg	2-3 times daily

   Give it 1 hour before a meal and tell the parents to keep the medicines away from the children because an overdose may be fatal.
3. Treat for worm infestation.
4. **Follow-up**: review the child after 3 weeks. If possible, measure a child's haemoglobin (Hb) before you start treatment. Then treat the child for 3 weeks and repeat the Hb. With treatment, the Hb should rise about 1.0 g/dl every week. Therefore after 3 weeks, the Hb should have gone up by at least 2.0 g/dl or more.

   If it is not possible to measure the Hb (not available or the family is poor), treat the child and on review after 3 weeks look for clinical signs of improvement. If treatment is effective, the child will be less tired and more active.

   The child will already feel better after a few weeks but treatment should be continued for at least 3 months to fill the child's body iron stores.

   What to do if a child does not improve

   If the child has not improved check the following:
   1. Has the child really taken the iron? This is the commonest cause of treatment failure. When ferrous sulphate causes gastro-intestinal disturbances with vomiting and diarrhoea parents often stop giving it. If that has been the case, reduce the dose and tell the family to give it with food.
   2. Check that the dose was correct.
   3. Consider a chronic infection (for example tuberculosis or urinary tract infection) and investigate accordingly.
   4. RARE: Consider thalassaemia and look for typical clinical features (see below).

   If the child had taken the tablets in a correct dose and there is no suggestion of any underlying infection or other problem, assume malabsorption and treat as follows:

   1. Measure the child's haemoglobin.
   2. Give iron by deep intra-muscular injection of ***iron dextran*** (Imferon). Calculate the total iron dose that is necessary to increase the child's haemoglobin to normal limits. A simplified rule is to give a total dose of 20 mg/kg (0.4 ml/kg) if the Hb is below 7.0 g/dl and to give 10–20 mg/kg if the total Hb is between 7 and 10 g/dl. This total dose is divided into single daily doses of 1–2 ml. 1 ml Imferon contains 50 mg iron dextran. Give these single doses every day until the total dose has been completed. Never give more than 2 ml daily. The injection is expensive and painful. Be aware of the risk of a serious anaphylactic reaction.
   3. Re-check the child's haemoglobin after 3 weeks, which should by then be almost normal.

How to manage a child with *severe* anaemia

A child with severe anaemia (Hb less than 5.0 g/dl) must be investigated thoroughly to find the cause of anaemia.

The management depends on whether the child has signs of heart failure or not.

Signs of heart failure are:

- Oedema
- Enlarged soft liver
- Fast pulse (in children under 1 year, pulse over 160/minute; in children over 1 year, pulse over 120/minute)
- Dyspnoea (breathlessness) at rest

*Management of severe anaemia **without** heart failure*

If a child is severely anaemic without signs of heart failure, treat with oral iron and worm medicine as described above.

*Management of severe anaemia **with** heart failure*

1. **Treat heart failure with *frusemide* and *digoxin*** as described on page 122.
2. **Consider a blood transfusion**. Give a blood transfusion only on very strict, life-saving indications, because a blood transfusion carries a considerable risk for the child and is expensive. Blood transfusions are sometimes given unnecessarily to children with chronic severe anaemia. A blood transfusion is almost never necessary if the Hb is above 5.0 g/dl. The indications for a blood transfusion are a Hb below 5.0 g/dl **and** heart failure.
   - Give 10 ml/kg packed cells or if not available 15–20 ml/kg whole blood. For elective transfusions with whole blood, you can calculate the amount needed as follows:

     Whole blood needed (in ml) =
     child's weight (in kg) x 5 x the desired rise of Hb (in g/dl).
   - To avoid a sudden fluid overload that would worsen the heart failure, give the infusion slowly at a rate of 3 ml/kg/hour over 4-6 hours and give frusemide 1 mg/kg IM or IV before starting the transfusion. Do not give more than 20 ml blood/kg. Repeat the transfusion the next day if necessary. Only if the child has signs of shock give the blood faster until the radial pulses are palpable again.

     NOTE: If you give whole blood, hang the bag up for 30 minutes to allow the red blood cells to settle at the bottom. Then give only the sedimented cells and not the plasma on top of it.

Problems and dangers of blood transfusion

- There is a considerable risk of mismatched or contaminated blood if laboratory facilities are poor.
- Hepatitis, malaria and other diseases can be transmitted.
- There is a risk of bacterial growth and destruction of the blood cells if the storage facilities are poor. Blood can be stored in a refrigerator at 4–10°C for a maximum of 10 days.
- Blood transfusions are expensive.

About the different causes of anaemia

IRON DEFICIENCY ANAEMIA

Babies are born with body stores of iron. Premature newborns and those babies whose mother was anaemic during pregnancy are born with low iron stores. In these cases the iron stores cannot provide for the increasing demands for growth during the first year of life and are rapidly used up. The child will become anaemic. Other main factors in iron deficiency anaemia are poor nutrition, especially poor weaning foods and intestinal parasites (for example, hookworm).

INFECTIONS

When an infection is severe or prolonged, the production of red blood cells in the bone marrow is depressed. Consider particularly: septicaemia, chronic urinary tract infection, chronic osteomyelitis or tuberculosis.

MALARIA

Malaria causes haemolytic anaemia due to the malaria parasites bursting the red blood cells. Anaemia can rapidly develop during an acute attack of malaria (see page 23).

FOLATE DEFICIENCY ANAEMIA

Folic acid (folate) is necessary for the production of red blood cells. It is found in green vegetables, liver and kidney. Folate deficiency is common in malnourished children due to poor nutritional intake. Recurrent haemolysis (for example, thalassaemia) or prolonged treatment with phenobarbital are other causes.

BLOOD LOSS

Remember, shortly after blood loss the haemoglobin can still be normal. The haemoglobin is not a true indicator of blood loss for the first 1-2 days after bleeding.

HOOKWORM AND OTHER GASTRO-INTESTINAL PARASITES

Hookworm (Ancylostoma) is less common in Afghanistan than in other countries. It causes chronic gastro-intestinal blood loss because the worms live

attached to the duodenal mucosa where they suck blood (see page 88).

Treat with ***albendazole*** or mebendazole for 3 days. Explain to the family that the larvae of the worm entered through the child's skin while he was walking barefoot. Advise on safe faeces disposal and against walking barefoot.

Heavy whipworm infestation or severe amoebic dysentery may also cause anaemia.

G6PD DEFICIENCY (Glucose-6-phosphate-dehydrogenase-deficiency)

G6PD deficiency is a genetic enzyme deficiency affecting only those few children who have inherited the defect. When these children are taking certain drugs they develop haemolytic anaemia with jaundice and splenomegaly after about 3 days. The anaemia resolves spontaneously 3-10 days after stopping the causative drug. A blood transfusion is rarely necessary.

Avoid the following drugs in G6PD deficiency: aspirin in large doses, co-trimoxazole and other sulphonamides, chloramphenicol, sulfadoxine + pyrimethamine (Fansidar), methylene blue, nalidixic acid, nitrofurantoin, vitamin C and vitamin K.

THALASSAEMIA

The thalassaemias are a group of inherited blood diseases causing haemolytic anaemia of different severity. They are more common in Southern Afghanistan. A special laboratory test (haemoglobin electrophoresis) is needed to define the exact type of thalassaemia.

Severe thalassaemia (thalassaemia major)

A child with the severe form (beta-thalassaemia major) develops severe anaemia during the first 2-6 months of his life. If the child is untreated or insufficiently treated, hypertrophy of blood producing tissues in the bone marrow, liver and spleen occurs. This results in typical clinical features: enlargement of the skull (large head), large spleen and liver. The child's life expectancy is reduced, even with treatment. A red blood cell film typically shows severe hypochromia and microcytosis with many poikilocytes and target cells.

Management

1. **Regular blood transfusions** to keep the Hb between 10–12 g/dl. About 15 ml/kg whole blood are usually necessary every 4-5 weeks.
2. Oral ***Vitamin C*** 200 mg every day to help the excretion of iron, because overloading of tissues with iron (haemosiderosis) is the inevitable complication of frequent transfusions and the reason for the reduced life-expectancy. Haemosiderosis may, for example, cause heart failure. Desferoxamine, a special iron-binding drug is not available in Afghanistan and is extremely expensive.
3. ***Folic acid*** 5 mg daily.
4. **Malaria prophylaxis** if the child lives in a malarious area.
5. If the child requires blood transfusions more frequently than every 3-4 weeks and his platelet count is low, a splenectomy should be considered. However, the absence of the spleen will considerably increase the risk of septicaemia. Prophylactic penicillin V 250 mg or, in penicillin allergy, erythromycin, should be given daily.

Mild thalassaemia (beta-thalassaemia minor, alpha-thalassaemia, sickle cell-thalassaemia)

Children with milder forms of thalassaemia show less marked symptoms. Some may develop anaemia with a Hb between 6-8 g/dl and may not or only occasionally need blood transfusions but are also at risk of complications of iron-overload. In others the Hb will be almost normal and the children have a normal life expectancy. Sometimes these children are wrongly treated for iron deficiency anaemia.

If you suspect thalassaemia, do a blood film to look at the morphology of red blood cells (typical are hypochromic, microcytic RBCs, target cells and nucleated RBCs).

Management

1. ***Vitamin C*** 200 mg once daily to increase iron excretion
2. ***Folic acid*** 5 mg once daily

NOTE: Never give iron supplements to children with thalassaemia.

DRUG-INDUCED APLASTIC ANAEMIA

Certain drugs, especially chloramphenicol, sulphonamides (co-trimoxazole) and barbiturates (for example, phenobarbital) can depress the blood production in the bone marrow. This causes so-called aplastic anaemia. Sometimes the production of white blood cells or thrombocytes is also affected. Aplastic anaemia can be fatal, but sometimes there is a spontaneous recovery. Fatal aplastic anaemia occurs in about 1 of 25,000 patients treated with *chloramphenicol* and this is the reason why chloramphenicol should only be used for severe infections and always in the correct dose. Whenever anaemia develops during treatment with chloramphenicol or any of the other drugs, the drug must be stopped immediately. Aplastic anaemia is also a common and feared complication of *metamizol* (Analgin, dipyrone, Novalgin) and one of the reasons why the drug is banned in

several countries. However, the cause of aplastic anaemia often remains unknown.

Leukaemia

Leukaemia is a cancer of the white blood producing cells. It results in abnormal blood cells both in the bone marrow and in the blood. The disease mainly occurs in children less than 3 years old. Children may either have a low or a high WBC count. Important for diagnosing leukaemia is not the number of blood cells but the finding of abnormal cells in a blood film.

The abnormal white blood cells are ineffective in fighting infections and leave the child susceptible to infections. The production of red blood cells and thrombocytes (important for stopping bleeding) in the bone marrow is also affected. A child with leukaemia is anaemic and has a high tendency to bleed spontaneously. Often you find purpura, bleeding into the skin. Abnormal cell production is not restricted to the bone marrow and therefore, lymph nodes, liver or spleen may become involved and enlarge.

Leukaemia is treated with cytotoxic drugs. These are very expensive but can produce high cure rates. It is therefore important to diagnose leukaemia early and to refer a child with leukaemia to a hospital where he can be further investigated and treated.

Lymph node enlargement

Throughout all tissues, lymphatic vessels collect tissue fluid. The lymphatic vessels pass through specialised areas, lymph nodes, before they drain the fluid back into the blood circulation. If there is an infection, the lymph nodes draining tissue fluids from that area (regional lymph nodes) will enlarge and produce defence cells (lymphocytes). If you find a swollen lymph node, always carefully examine for inflammation the area that is drained by that lymph node.

Many children have small lymph nodes in the neck, axilla or groin that reflect a reaction to minor injury, infection or viral illness. Lymphadenopathy (enlargement of lymph nodes) is therefore only important if lymph nodes have become very large (over 1 cm) or are tender, red, numerous or start discharging.

It is important to differentiate whether lymph node enlargement is limited to one body region (localised enlargement) or is found at several sites of the body (generalised enlargement). For different causes, see box.

Causes of lymph node enlargement

LOCALISED ENLARGEMENT

- Reaction to local infection
  - ***Neck nodes***: throat, face or scalp infection
  - ***Axillary nodes***: arm or breast infection
  - ***Inguinal nodes***: leg or perianal or perineal infection, or after immunisation
- Lymphadenitis (infected lymph node, for management see page 50)
- Tuberculosis
- Lymph node tumour (lymphoma)

GENERALISED ENLARGEMENT

- Infections: brucellosis, viral illnesses (for example, glandular fever), tuberculosis
- Eczema with secondary infection
- Leukaemia
- Juvenile chronic arthritis

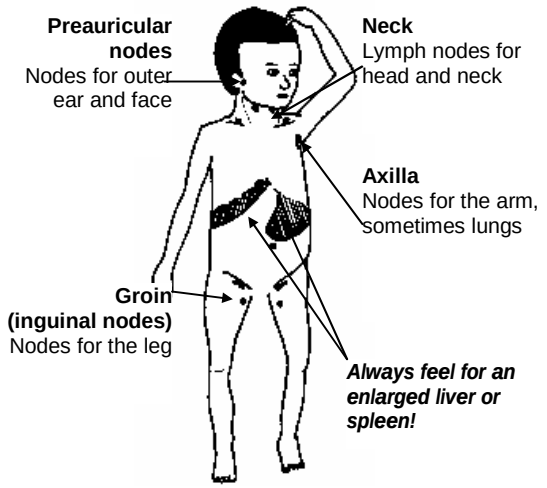


Figure 12–3 ***Where to examine for enlarged lymph nodes***.

Enlarged spleen (splenomegaly)

Splenomegaly is discussed on page 90.

References

1. Buck A, Anderson R, Kawata K, Abrahams I W, Sasaki TT. *Health and Disease in Rural Afghanistan.* The John Hopkins Monographs in International Health. Baltimore: York Press 1972.
2. Carter J. How to... manage anaemia. *Child Health Dialogue* 1997; 6: 10.
3. DeMaeyer E M. *Preventing and controlling iron deficiency anaemia through primary health care.* Geneva: WHO 1989.
4. Ebrahim G J. *Paediatric Practice in Developing Countries.* 2nd edition. London: Macmillan Education Ltd. 1993.
5. Illingworth R S. *Common Symptoms of Disease in Children.* 9th edition. London: Blackwell Scientific Publications 1988.
6. O'Callaghan C, Stephenson T. *Pocket Paediatrics.* Edinburgh: Churchill Livingstone 1992.
7. Stanfield P. *Child Health.* 2nd edition. Nairobi: African Medical and Research Foundation 1997.
8. Stanfield P, Brueton M, Chan M, Parkin M, Waterston T. *Diseases of Children in the Subtropics and Tropics.* 4th edition. Kent: Edward Arnold 1991.

13. Bone and joint problems

The danger of bone or joint problems: life-long disability

The commonest causes of bone or joint problems in children – beside injuries are infections, congenital problems, vitamin D deficiency (rickets) and rheumatic diseases. Bone or joint problems usually present with pain, swelling or deformity. Sometimes a child starts limping or is unwilling to use a limb. Young children do not complain about localised pathology. Therefore, the recognition of a serious bone or joint problem may be delayed unless you always examine all joints and bones in young children with unclear fever or irritability.

It is not enough just to treat the cause of a joint or bone problem. Always take a moment to ask yourself, "How does the problem affect the long-term function of the joint or limb?". Rehabilitation is a main part of the management of bone and joint problems. Consider the long-term function from the beginning of your treatment. Giving advice on positioning or exercises is as important, and often more important, than medicines. If you do not think about it, a child may suffer unnecessary life-long disability.

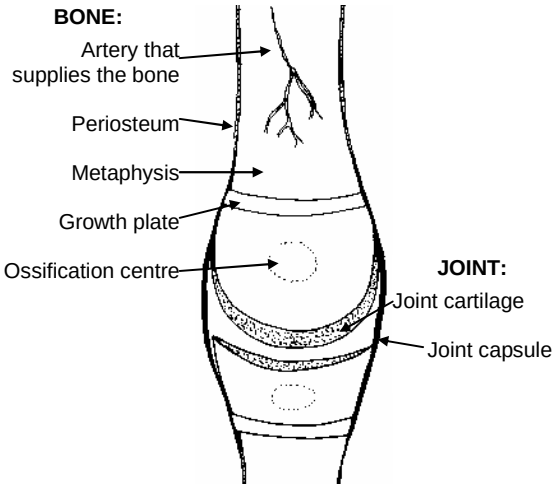


Figure 13–1 ***Basic anatomy of joint and bone in children***.

How to assess a child with a possible joint or bone problem

Take a history

- ○ When and how did the problem start (= acute or chronic problem)? Did it start suddenly or gradually?
- ○ What makes pain worse or relieves it?
- ○ Are one or more joints affected? Is the problem symmetrical or asymmetrical?
- ○ Did the child suffer an injury?

Examine the child

- ○ Fever?
- ○ How is his gait?
- ○ Deformity of limbs, joints or spine?
- ○ Muscle wasting?

Examine the affected area very carefully:

- **Pain or tenderness**? Try to find the point of greatest pain. Ask an older child to point with one finger to where the pain is most severe.
- **Warmth**? Feel the temperature of the affected area with the back of your hand and compare with a healthy side.
- **Swelling**? If the swelling is near a joint, try to define whether it is inside or around a joint.
- **Painful or limited movements**? Ask the child to move his joint and watch for tenderness and limitations of movement. Then move the child's joint into all directions and note pain at certain movements and limitations of movement. Always compare the range of movements with the other leg or arm.

If there is a joint problem, always examine the joint above and below the affected joint as well. In particular, hip problems are sometimes missed because the child complained mainly about knee pain and his hip were not examined.

Muscles are controlled by the nervous system and it is often necessary to assess the nervous system also (see page 126 for how to assess for muscle wasting, muscle strength, muscle tonus and sensation).

Helpful investigations

- **X-rays**. Remember, x-rays are normal in early osteomyelitis and early septic or tuberculous arthritis. However, it can be helpful to take a x-ray early and then after 2 weeks to look for changes that have developed.
- **ESR** to show the degree of inflammation.
- **WBC** to show signs of infection.
- Gram-stain or culture of effusion or pus to identify pathogens.

The painful joint or bone

Joint pain or reluctance to move a limb in children has many causes (see box below). If it is acute, especially with fever, think about septic arthritis or acute osteomyelitis first. Both cause life-long disability if not treated immediately.

How to care for painful joints

Although joint pain can be caused by many different problems that may require specific treatment, the following general principles apply to most patients:

1. **Rest the joints**. The more painful a joint, the more rest it needs. If joints are swollen, it helps to keep them lifted up.
2. **Apply heat or cold** for 10-15 minutes several times daily. It often reduces pain and makes movements easier – try out whether the child finds heat or cold more helpful.

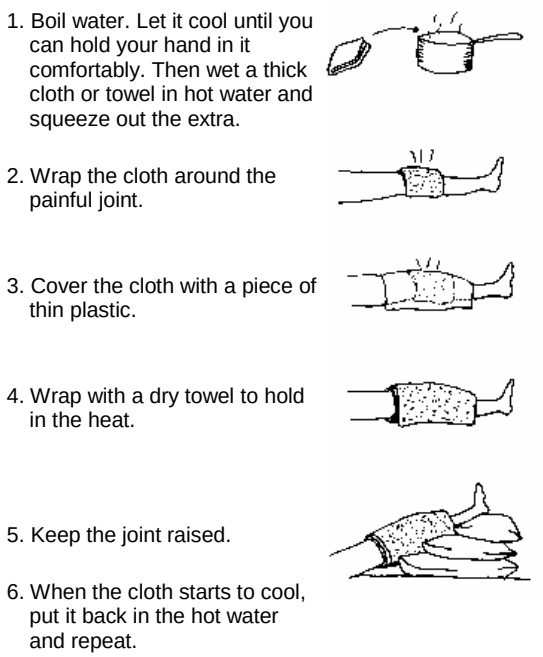


Figure 13–2 ***How to apply heat to painful joints***.

3. **Give pain relief**, especially use those painkillers (analgesics) that also reduce inflammation (for example, acetylsalicylic acid (aspirin) or ibuprofen).

   NOTE: Paracetamol has no anti-inflammatory effect. The use of corticosteroids has very limited indications because long-term treatment is associated with many serious side-effects. Never use indomethacin in children, nor phenylbutazone or metamizol (Analgin, Novalgin) because of dangerous side-effects.

4. **Exercises to prevent stiffness (range-of-movement exercises)**. It is important to move the joints through their full range of possible movements to prevent contractures and stiffness. Tell the parents to move each joint slowly at least 2 times daily.

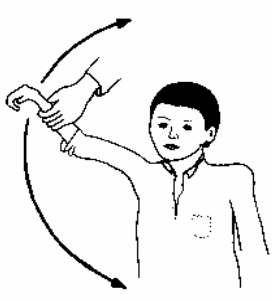


Figure 13–3 ***Range-of-motion exercises to prevent stiffness (for example, shoulder joint).***

5. **Exercises to prevent muscle weakness**. Even without bending a joint, a child can tighten his muscles. During this exercise, he should keep his muscles tight until they get tired or begin to tremble.

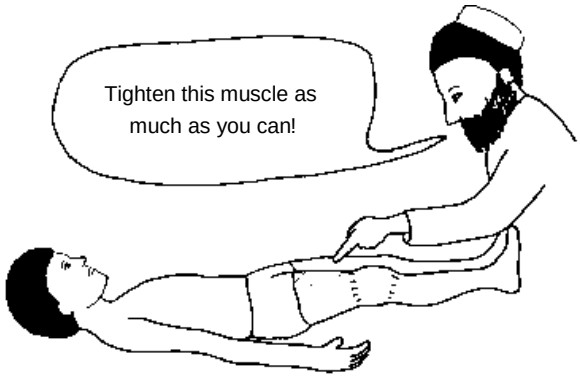


Figure 13–4 ***Exercises without movements to strengthen muscles.***

Causes of painful joints, bones or a limp

- Infection (bacterial, tuberculosis or viral)
- Osteomyelitis near a joint
- Trauma
- Infections with temporary joint pains (for example, many viruses or brucellosis)
- Rheumatic fever
- Rickets

RARE

- Childhood rheumatoid arthritis (juvenile chronic arthritis)
- Psoriatic arthritis
- Tumours, leukaemia
- Allergy

NON-JOINT CAUSES TO CONSIDER

- Cellulitis
- Pyomyositis
- Acute stage of poliomyelitis

Some important differential diagnostic points about diseases not explained in this chapter

Poliomyelitis	The child may be ill and not using his limb but there is no swelling of joints or bony tenderness. The pain is in the muscles.
Cellulitis	The tender areas are over soft tissues.
Pyomyositis	This is an infection of muscles. The muscles are swollen and tender, there is no bone or joint tenderness.
Bone tumour	It is rare. There is a lot of bone swelling but little fever. X-rays are diagnostic.
Rheumatic fever	Pain is moving from one joint to another. There is fever and often a heart murmur.

OSTEOMYELITIS

In osteomyelitis (bone infection), bacteria pass through the blood stream into the bone (figure 13–5).

How to diagnose osteomyelitis

Sometimes you need a high degree of suspicion to diagnose osteomyelitis early. Particularly young children may only present with fever and irritability. Sometimes children present with fever and unwillingness to move a leg or arm. The diagnosis is more obvious if the presenting complaint is bone or joint pain with fever. In 50% of all children, there is a history of a mild injury within the last few days. Therefore, do not always believe a mother who tells you that the fever and bone pain are caused by the injury, always think about osteomyelitis.

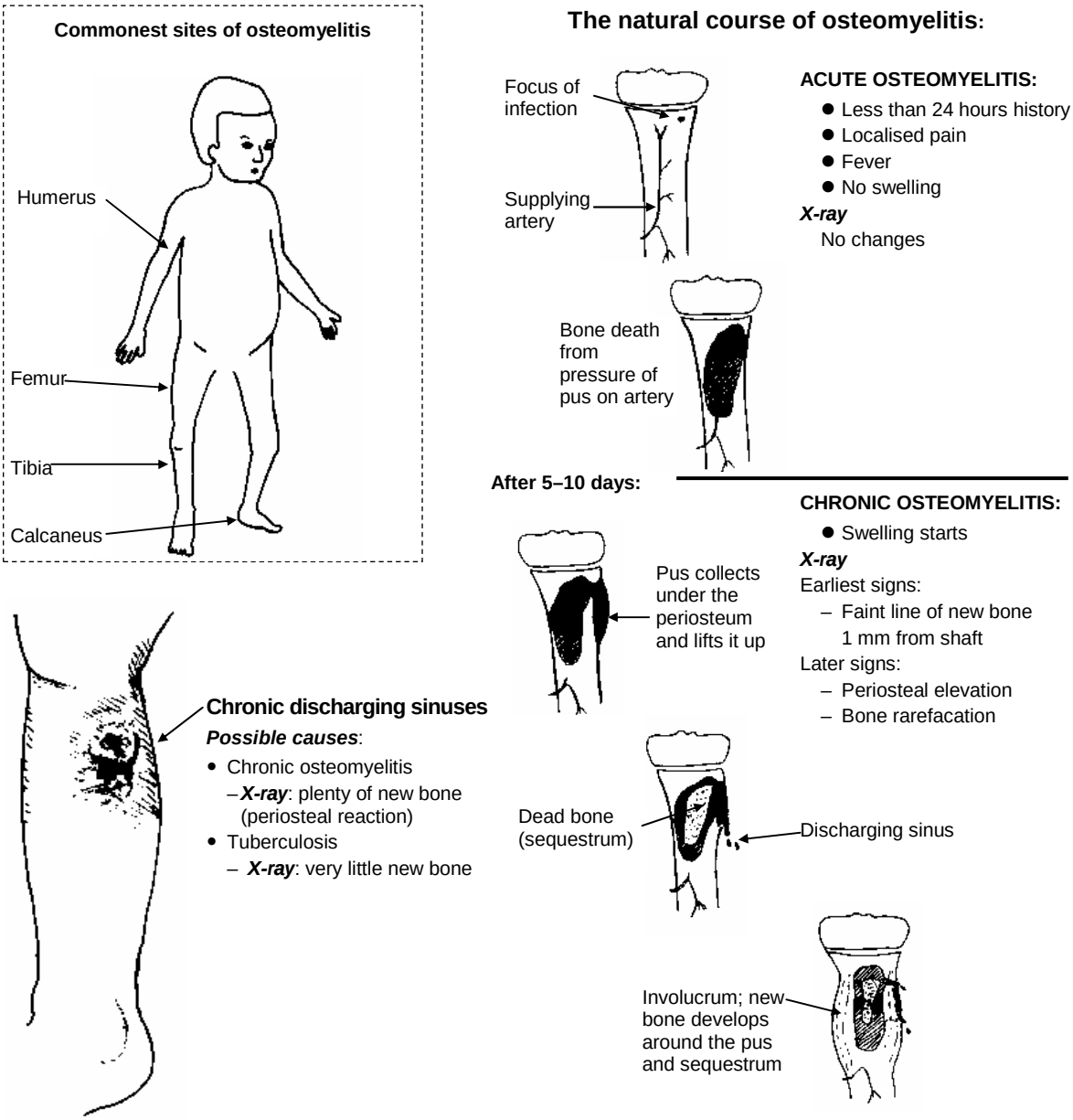


Figure 13–5 ***Osteomyelitis***.

On examination, you find a localised painful area, usually at the metaphysis near a joint. The pain is increased when you press or percuss the place. Swelling and redness is a late sign that the infection has already spread out of the bone.

X-ray changes do not appear earlier than 1-2 weeks after the beginning of the illness. X-rays may be useful in excluding a fracture but are useless to diagnose early osteomyelitis. Once you find x-ray changes and an abscess or discharge through the skin, chronic osteomyelitis has already developed.

Management of acute osteomyelitis

Someone said that osteomyelitis is one of the worst treated diseases because of the unfortunate practice of giving antibiotics to see if the patient improves (Peter Bewes). Antibiotics alone may be effective if the duration of symptoms is less than 24 hours. You will see very rarely patients who come to you that early! Antibiotics are just able to kill bacteria at the edge of pus and can therefore not stop the infection once pus has built up. If pus is not released quickly, its pressure will compress the blood supply of the bone and the bone will die. Once this has happened, healing takes a long time.

1. Immediately drill a hole in the bone over the point of the greatest tenderness to release the pus before bone dies. A hole should also be drilled as a diagnostic procedure whenever you suspect osteomyelitis.
2. Start antibiotics that must cover the staphylococcus bacteria responsible for 90% of bone infections. Give the antibiotics at first IV until fever and acute signs have disappeared, then continue orally.
   - *Under 5 years* ***cloxacillin*** and ***ampicillin*** for 4-6 weeks. Add ***gentamicin*** during the first week.
   - *Over 5 years* ***cloxacillin*** for 4-6 weeks. Add ***gentamicin*** during the first week.
   - *Alternative* for both age groups benzylpenicillin and chloramphenicol (or benzylpenicillin and cloxacillin).
3. Rest the affected limb by splinting until acute signs have disappeared, which usually takes 1-2 weeks, then start mobilisation.
4. Follow-up after 3 months. Take an x-ray to look for signs of sequestration that would indicate that chronic osteomyelitis has developed.

Management of chronic osteomyelitis

Once bone has died and pus drains through sinuses, chronic osteomyelitis has developed. Sadly, this is often the way a child presents. Antibiotics may sometimes reduce the amount of pus for a while but cannot provide a cure. Therefore, they are only indicated when the child is very ill or has a fever. The only effective treatment for chronic osteomyelitis is the removal of the dead bone (sequestrum) that is surrounded by pus. This operation has to wait until enough new bone, called involucrum, has formed. If the operation is done too early, a gap may develop between the two ends of bone. Formation of involucrum can be encouraged by mobilisation of the limb. Important differential diagnosis of drainage from bones is tuberculosis (see figure 13–5).

1. Use antibiotics only when the child has a fever or is ill.
2. Follow up with x-rays to determine the right time for operation.
3. Start antibiotics (as for acute osteomyelitis) 4 days before the operation and continue for at least 2 weeks afterwards. Aim of surgery (sequestrotomy) is to remove the dead bone and release all the pus. Often several operations are necessary, sometimes a cure will not be possible.

SEPTIC ARTHRITIS

Septic arthritis presents similarly to osteomyelitis but the pain is worst in a joint and not over a bone. Septic arthritis is also caused by bacterial spread through the blood stream. It occurs usually in a single joint (monoarthritis) but sometimes several joints can be affected at the same time.

Clinical features

Children are ill with fever. On examination, the affected joint is swollen and hot, sometimes the overlying skin is red. All joint movements are very painful. If you suspect septic arthritis, aspirate the affected joint for two reasons: to confirm the diagnosis by finding pus and to release the pressure that would destroy the joint cartilage causing life-long damage.

Management

1. Aspirate the joint. You may have to repeat the aspiration several times if pus builds up to prevent pressure damage to the cartilage. If possible, determine the pathogen by gram-stain or culture.
2. Give antibiotics as for acute osteomyelitis for 4-6 weeks.
3. Rest the joint by using a splint until the acute signs have resolved, which usually takes 1-2 weeks. Mobilisation as described above, see “How to care for painful joints” is essential to prevent permanent deformity.

CHRONIC CHILDHOOD ARTHRITIS (juvenile chronic arthritis - JCA)

The cause of chronic arthritis in children is unknown. It often begins when a child is between 5-10 years old and keeps getting worse over several years. In the course of the illness, there are times when the pain gets better and times when it gets worse. The pain is typically worst in the morning or after rest and is associated with stiffness. It improves during the day and with activity. The prognosis varies for different

children. In some, the illness is mild, in others it causes severe disability. The outcome depends very much on the management, especially physiotherapy.

There are three types of chronic childhood arthritis. In all three types, the rheumatoid factor is negative and the ESR is high:

1. **Polyarticular type**. Many joints are affected including smaller joints of the hands or the jaw joint. Typically, the distribution is symmetrical. The joints are stiff in the morning.
2. **Pauciarticular type**. Some joints are affected, often the arthritis starts with a swollen knee or ankle.
3. RARE: **Systemic type (Still's disease)**. A child is ill with fever, large spleen and liver, anaemia, weight loss or abdominal pain. In the beginning of the illness, there may not be any joint pain.

Management

1. **Physiotherapy, good joint positioning**. A child with severe arthritis often holds his arms and legs and his fingers in the position that is least painful. Without exercises and good positioning of the joints, contractures may form so that the child will become unable to use his hands, to walk or to stand. Physiotherapy is the basis and the most important part of the treatment. For details see page 112 "How to care for painful joints".
2. **Anti-inflammatory drugs**. Reduce joint inflammation by giving regularly an anti-inflammatory drug such as ibuprofen. Do not give corticosteroids (for example, dexamethasone or prednisolone) unless there is sudden severe worsening of the arthritis. Corticosteroids have too many serious side-effects to be routinely used.
3. **Treat complications**. Some children with chronic arthritis suffer severe eye disease without noticing it. Therefore, refer all children with chronic arthritis routinely for assessment by an ophthalmologist.

NOTE: Chronic arthritis is not an infectious disease. There is no indication for antibiotics, such as penicillin injections.

Causes of symmetrical joint swelling or pain

- One particular type of chronic childhood arthritis
- Rickets
- Psoriatic arthritis

RICKETS

To grow, bone needs certain minerals such as calcium and phosphate. If a child lacks vitamin D, these minerals are not absorbed from the gut and the child's bones soften and become deformed. Those bones that carry much body weight are particularly affected. Sometimes long-term damage has just cosmetic effects, for example bow legs. Sometimes the damage has disastrous long-term consequences, for example, deformity of the pelvis in a girl may later narrow the birth canal, causing obstructive labour and possible death of both mother and child.

Vitamin D is produced in the skin when the skin is exposed to sunlight. There is abundant sunlight in Afghanistan, so why do so many children suffer from rickets? The main reason is the wrong belief that open air with wind and sunlight will worsen a child's illness. Chronically ill children are often kept indoors. If taken outside, they are wrapped in clothing and are not exposed to any sunlight.

Sunlight can prevent and treat rickets!

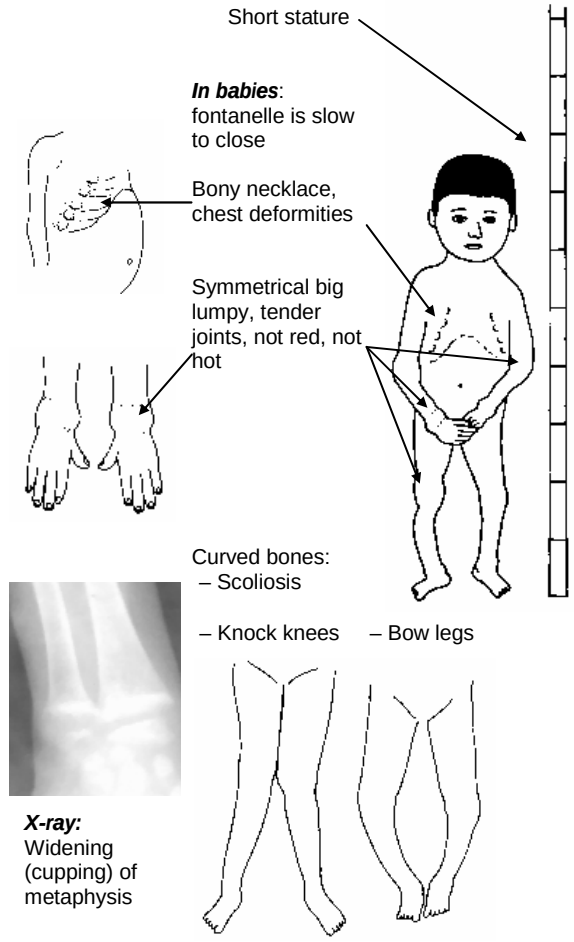


Figure 13–6 ***Clinical features of rickets***.

Management

1. Explain to parents the need for sunlight exposure. 10 minutes per day of sunlight on the arms and face are sufficient to prevent rickets. For treatment, the exposure should be about 30 minutes daily.
2. Severe cases can either be treated with oral vitamin D 5000 units for 4 weeks or by 600,000 units IM. Give a total of 4 injections divided over 4 weeks.

The child will show rapid improvement with treatment.

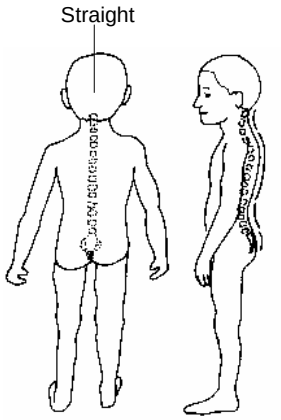
Back problems

Children with back problems present usually with back pain or back deformity. Prolonged back pain in children has to be taken seriously, especially if it occurs at rest and is associated with stiffness, or even weakness. Always consider spinal tuberculosis (see page 36).

Causes of back pain

- Tuberculosis
- Infection
- Strain and injuries
- Psychological

Normal shape of the backbone:



4 curves:
– 2 inwards
– 2 outwards

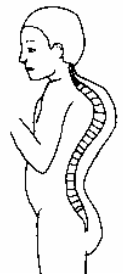
Bones:
– Neck (cervical spine): 7 bones
– Upper back (thoracic spine) 12 bones
– Lower back (lumbar spine) 5 bones
– Sacrum bones are joint together

How to assess a child with a back problem

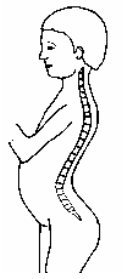
Take a history

- When and how did the problem start? What were the first symptoms?
- When are the symptoms worst?
  - If worst in the morning or after rest and improving during the day with activity: inflammation.
  - If worst with activity and improving after rest: mechanical problem.
- Is there any weakness of the legs?

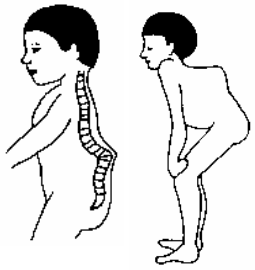
ROUNDED BACK (kyphosis):
Common cause:
– Weak back



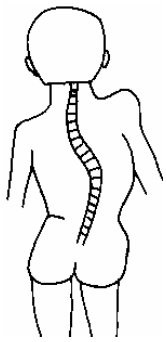
SWAYBACK (lordosis):
Common cause:
– Weak abdominal muscles



SHARP BEND OR BUMP IN SPINE (gibbus):
Cause: destruction of bone by TB (details, see chapter 8. "Tuberculosis")



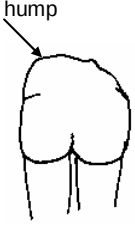
SIDEWAYS CURVE (scoliosis):



S-shaped curve of spine. Look for asymmetry in shoulders, chest and hips

Scoliosis is best recognised when the child bends forward:

Rib hump

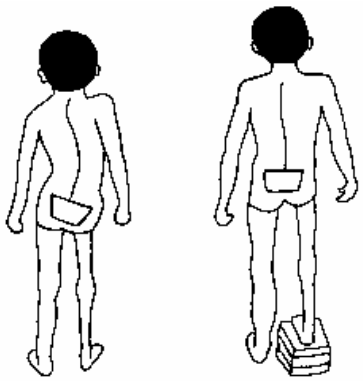


Causes of scoliosis

- Postural – it disappears when the child bends over
- Compensatory –due to unequal leg length
- Poliomyelitis, cerebral palsy - imbalance between nerves and muscles
- Rickets
- Unknown (common)
- Rare inherited diseases
- Hypotonic weak children

Compensatory (non-fixed) scoliosis

With a non-fixed (compensatory, functional) scoliosis, there is no true deformity of the spine. For example, a child with a shorter leg from polio will stand with his hips tilted. For him to stand straight, the spine has a curve:



You can straighten a ***non-fixed scoliosis*** by putting blocks under the foot. He needs a shoe with a thick sole for the shorter leg to balance the shortness and keep his spine straight.

A ***fixed (structural) scoliosis*** is a true deformity in the bones of the back themselves.

Figure 13–7 ***Back deformities***.

Examine the child's back

- Look at the spinal shape.
- Feel for bumps.
- Ask the child to touch his toes (a test for stiffness).
- Test muscle power and sensation (for details see page 127).

Causes of different leg length

- Poliomyelitis
- Cerebral palsy
- Injection injury
- Trauma
- Infections (TB, osteomyelitis)
- Congenital abnormalities

Hip problems

Hip problems can present as reduced hip movement, hip or knee pain, abnormal gait, or limp. It is important to understand that a child often feels pain in the knee or thigh when the problem actually is located in the hip. In all cases with pain, especially with fever, first exclude septic arthritis and osteomyelitis.

Causes of hip pain

- Infection
- Transient synovitis
- Trauma
- Perthes disease
- Referred pain from the spine

RARE

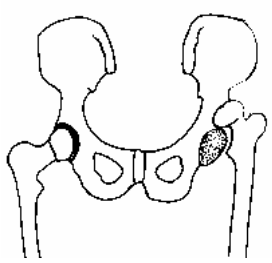
- Slipped epiphysis

DISLOCATION OF THE HIP

A hip is dislocated when the femoral bone is out of its socket at the hip. Some babies are born with this condition, it is important not to miss it. At special risk are breech deliveries. Whenever you see a baby, check his hips because the dislocation is easily corrected within the first weeks of life. If it is missed, the child will become disabled and later walk with a typical waddling gait. Later he will develop osteoarthrosis with destruction of the joint cartilage and chronic pain.

There are no statistics available from Afghanistan but it can be expected that the incidence is higher than in other countries because of the habit of swaddling infants with their hips extended and the legs together. This actually makes dislocation of a hip worse.

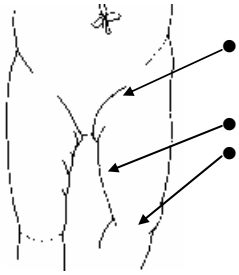
Normal hip:
The round head of the femur is ***inside*** the hip socket



Dislocated hip:
The round head of the femur is ***outside*** the hip socket.

HOW TO ASSESS BABIES FOR DISLOCATED HIPS:

1. Compare both legs.
   If one hip is dislocated it may show the following signs:



- The upper leg partly covers this part of the body
- There are fewer skin folds
- The leg may be shorter or turned at a strange angle

2. Hold both legs with the knees bent like this,

and open them wide, like this

If one leg stops early or makes a jump or click when you open it wide, the hip is dislocated.

3. In a **slightly older child**, bend the knees and compare their height. If one knee is lower, the hip on that sight is probably dislocated

HOW TO TREAT BABIES FOR DISLOCATED HIPS:

Keep the baby with his knees high and wide apart:

1. Use many thicknesses of nappies like this:

2. Carry the baby like this:

Figure 13–8 ***Dislocated hip***.

Dislocation of the hip can also occur later due to injuries, poliomyelitis that weakens the muscles that hold the hip joints or cerebral palsy with contractures and spasticity that pull the femur out of the hip joint. Treatment is usually surgical. In cerebral palsy, treat it by positioning and by prevention of flexion deformities.

TRANSIENT SYNOVITIS

Some children, especially 2-10 year-olds suffer from transient synovitis. This presents with acute limp and pain of varied severity a few days after a viral upper airway infection. ESR and x-rays are normal. Transient synovitis is a self-limiting condition that is treated by bedrest (the child should not bear any weight on the affected leg) and painkiller (for example, ibuprofen or acetylsalicylic acid).

If there is any doubt about the diagnosis start treatment for septic arthritis or osteomyelitis and repeat the x-rays after 12 days to look for changes compared with the early x-rays.

PERTHES DISEASE AND SLIPPED FEMORAL EPIPHYSIS

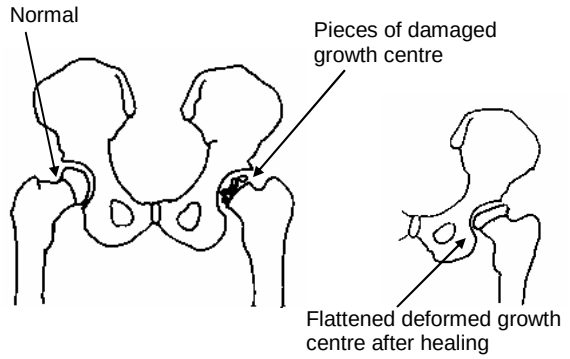


Figure 13–9 *Perthes disease*.

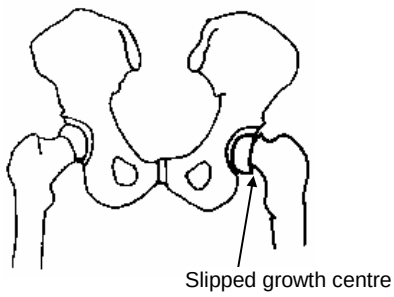


Figure 13–10 *Slipped epiphysis*.

Some children, about 4-8 years old, suffer from Perthes disease. The cause is not known. It is a necrosis of the femoral head. The child will limp but may not always complain about pain. The hip movements are limited. The x-ray appearances are typical. The dead bone will gradually be replaced by new bone over 2-4 years. Permanent deformity of the femoral head can remain. Rarely, some older children between 12-16 years will suffer from slipped femoral epiphysis.

Club foot (talipes)

Sometimes babies are born with a deformity of one or both of their feet. A newborn's feet may be turned inwards because they were in that position in his mother's womb. This positional deformity will correct itself after a few days. Sometimes it may be a true congenital deformity.

Club foot (talipes)- one or both feet can be affected

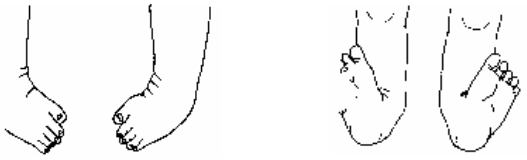


Figure 13–11 *Club feet (talipes) in a newborn*.

To find out which of the two possibilities it is, try to bend the babies' foot in a normal position:

1. *If you can*, it is a simple positional deformity that does not need treatment.
2. *If you cannot*, it is a club foot. If the child has a club foot, examine the back for spina bifida.

Management

If correction of a club foot is not started in the first few days after birth, the child will suffer life-long disability (figure 13–12). An operation in later life will improve the cosmetics but not necessarily the function. Treatment should begin as soon after the child is born as possible because at birth his joints and bones are still soft and flexible. The older a child gets the stiffer his joints and bones become.

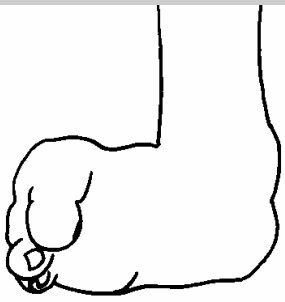


Figure 13–12 *Untreated talipes in an older child*.

HOW TO TREAT TALIPES:

Strapping method

This method works well in a baby with mild or moderate clubbing, especially when the foot can be put in a nearly normal position. Severe club foot needs correction by plaster cast.

You need:

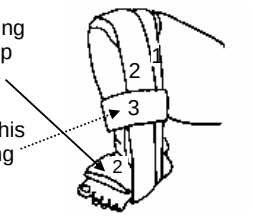
- Tincture of benzoin (to paint on the skin to help the adhesive stick firmly)
- Cotton wool
- Adhesive tape (sticking plaster) or zinc oxide strapping about 2.5 cm wide

1. Paint tincture benzoin on the skin areas to be covered by the tape.
2. Put pieces of cotton wool over his knee, behind his toes and on his outer ankle (malleolus).
3. Hold the babies foot like this and gently straighten it to a normal position as far as you can without forcing.

4. With the knee bent as far as possible, put a first long piece of strapping from under his heel up over the cotton wool outside his ankle. Bring it up outside his leg and over the cotton wool on the top of the knee. When the strapping is on, the foot must be in normal shape.

5. Put a second piece of strapping round his foot near his toes up the outside of his leg and his knee.

   Then put a third piece round his leg. This will keep the two long pieces in place.



6. Count all the toes and make sure they are pink and warm! If they are blue and cold you have stopped the blood flowing. This is very dangerous and his foot may die (become necrotic). Take the strapping off and put it on looser.
7. Change the strapping 2 times a week for one month, then once a week until the baby is 4 months old. If the talipes is not corrected by that time, the child needs an operation.

Exercises during strapping

While the baby's foot is strapped, someone in the family should do stretching exercises on his foot at least 8 times a day: hold the baby's leg like this and turn his whole foot UP and OUT. Hold and count to 10. Repeat 10 times.

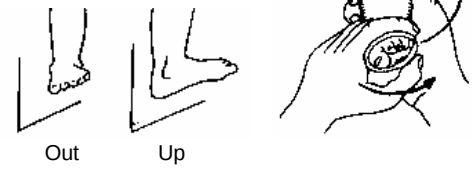


Figure 13–13 ***Treatment of club foot (talipes).***

Congenital bone diseases

There are many different congenital bone diseases, some of them are very rare. They present for example with abnormal growth with very short stature (dwarfism) or deformities of the limbs. The important message to communicate clearly to the family is that a child who may be small or looks distorted is usually not mentally impaired. Often he is rather clever. He should be accepted and valued as he is and receive the same education and care as his siblings.

References

1. Bewes, Peter. *Osteomyelitis of long bones and its management*. Script (ca. 1996).
2. Hull D, Johnston DI. *Essential Paediatrics*. 3rd edition. Edinburgh: Churchill Livingstone 1993.
3. Illingworth RS. *Common Symptoms of Disease in Children*. 9th edition. London: Blackwell Scientific Publications 1988.
4. King M, King F, Martodipoero S. *Primary Child Care. Book One*. Oxford: Oxford University Press 1978.
5. Stanfield P. *Child Health*. 2nd edition. Nairobi: African Medical and Research Foundation 1997.
6. Werner D. *Disabled Village Children*. 2nd edition. Palo Alto, CA: The Hesperian Foundation 1996.

14. Heart problems

The understanding of heart problems in children becomes simple if we divide children with heart problems into two groups according to their age:

1. **Young children** in whom most heart problems are *congenital*. The cause is rarely known and, because of a lack of specialised surgical facilities, the prognosis is often poor.
2. **Older children** whose heart problems are more likely to be *acquired*, especially from rheumatic fever, anaemia or infections. If the underlying problem is treated well, the prognosis for many children is good.

How children with heart problems present

Children with a heart problem present in the following ways:

- **MURMUR**. Sometimes a heart murmur is accidentally found on routine examination. Therefore, always listen to the heart of children who come to you.

  On auscultation of the heart, you usually only hear the normal two heart sounds (the first heart sound represents closure of mitral and tricuspid valves, the second heart sound closure of aortic and pulmonary valves). The blood flow through the heart is usually silent. However, blood flowing through an abnormally narrow or dilated part of the heart causes a turbulence, which can be heard as a **murmur**. A murmur is found in many heart diseases. The place where it can be heard loudest, its character, timing within the heart cycle (systolic or diastolic) and radiation is characteristic for the different heart diseases. If you can feel the murmur as a vibration over the heart, this is called a **thrill**.

  It is important to differentiate a murmur indicating an abnormal heart from a so-called **innocent murmur** that does not indicate any heart disease. You often find an innocent murmur in children with fever or anaemia, probably due to increased blood flow through the heart.

  Characteristics of an innocent murmur:
  - No thrill palpable
  - Soft, short
  - Not transmitted to other areas (neck, axilla, apex)
  - Often changing character

- **HEART FAILURE**. Signs of heart failure are:
  - Fast pulse (normal values see box)
  - Fast breathing (normal values see box)
  - Dyspnoea (difficult breathing). In babies, a mother sometimes notices that her child becomes breathless and is sweating while he is feeding
  - Enlarged soft liver
  - Sometimes swelling of the face or legs, rarely ascites
  - Displaced apex beat (see figure 14–2).
  - In chronic heart failure, poor weight gain

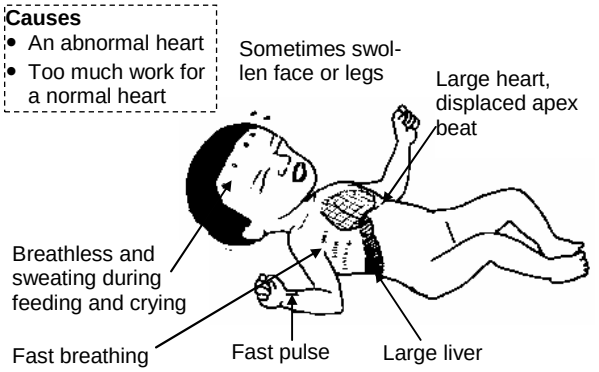


Figure 14–1 *Heart failure*.

Normal pulse rates in children

Under 1 year	80–160/minute
Over 1 year	70–120/minute

(Add 10 more for every degree of fever over 37°C.)

Normal respiratory rates in children

Under 2 months	less than 60/minute
2–12 months	less than 50/minute
1–5 years	less than 40/minute
6–12 years	less than 30/minute

- **CENTRAL CYANOSIS**. **Central cyanosis**, that is blue discoloration of mucous membranes, is a sign of hypoxia (low oxygen in the blood). You best see it when you look at the tongue or at the inside of the lips. These look blue as a sign that the arteries carry blood with less oxygen. Be aware that severely anaemic children (haemoglobin lower than 5 g/dl) do not show signs of cyanosis even when they are hypoxic.

  Blueness of fingers, lips or feet are called **peripheral cyanosis**. In peripheral cyanosis, the inside of the lips and the tongue are not blue. Peripheral cyanosis may occur in shocked patients or when a child is exposed to cold. It does not indicate hypoxia.

Causes of central cyanosis

- Heart defect (In some heart defects, oxygen-poor blood mixes with oxygen-rich blood)
- Lung problem (the lung is not able to deliver oxygen into the blood)

How to differentiate whether central cyanosis is caused by a heart or by a lung disease

If the cyanosis has been caused by a lung problem, the cyanosis will become less or disappear when you give oxygen to the child. In cyanosis due to a heart defect, the cyanosis will remain the same even if you give oxygen.

- **POOR FEEDING AND GROWTH FAILURE**. This is a common presentation of children with congenital heart disease.
- **RECURRENT RESPIRATORY TRACT INFECTIONS**. In certain congenital heart defects, the blood flow through the lungs is increased. These children suffer from frequent respiratory infections.

How to assess a child with a heart problem

It is beyond the purpose of this book to discuss the diagnosis of the different heart defects because specialised investigations are required and treatment is not widely available. Therefore, this section "How to examine a child with a heart problem", concentrates only on some basic points. The aim is to enable you to examine the cardiovascular system in a systematic manner and to identify children with heart problems.

Take a history

- How old is the child?
- When did the family first notice the problem? How did it start?
- Any recent throat infection? Any joint pains (indicating rheumatic fever)?
- Any fever?
- Did the child receive already any treatment? Which drugs?
- How does the problem affect the child's life? Is he breathless and sweating during feeding? Is the child able to play and run like other children of the same age?

Examine the child

General inspection

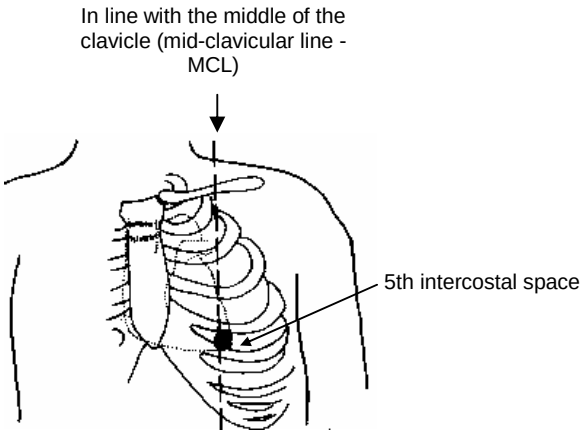
- Ill or well?
- Breathless (dyspnoea)?
- Central cyanosis?
- Swelling around the eyes or legs?
- Anaemia?

Examination of lungs and heart

- Fast breathing (count the respiratory rate)?
- Chest indrawing?
- Normal pulse? Count the heart rate. Feel the radial or brachial pulse. Note whether the pulse is strong or weak.
- Palpation:
  - Thrill?
  - Position of the apex beat (see figure 14–2).
  - Enlarged liver?

NORMAL APEX BEAT:

Put your flat hand on the chest and feel the place furthest down and laterally where you can feel the heart beat. This so-called apex beat is displaced when you feel it further laterally or further down than normal.



DISPLACED APEX BEAT:

Causes: The heart is enlarged or pushed to the left by lung pathology, for example pneumothorax (rare)

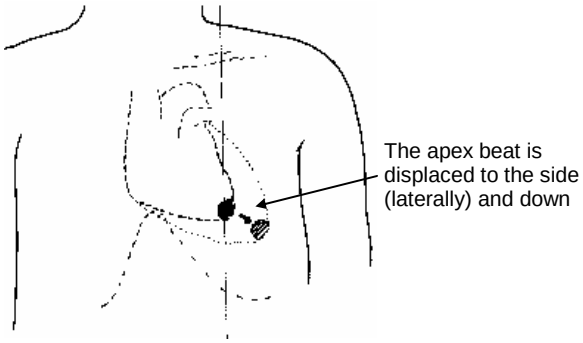
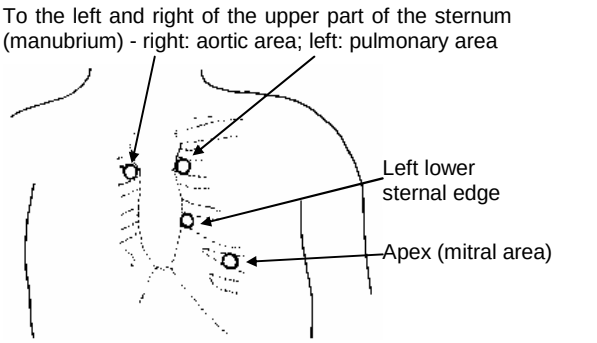


Figure 14–2 ***The apex beat***:

- Auscultation:
  - Listen with a stethoscope for a heart murmur at all the areas shown in figure 14–3.
  - Listen to the lungs for crepitations.
- Blood pressure: take it especially if there are signs of heart failure.



Depending on findings, also listen to the left axilla, back and neck (carotid area) and while the child is in sitting and lying position. For details refer to a cardiology or general medical textbook.

Figure 14–3 ***Important sites to listen for heart murmurs*****.**

Blood pressure (BP)

How to take the BP in children - palpation method

It is possible to take the BP in all except very small children with an adult cuff, which is folded over to the correct size. This may give slightly incorrect results but is sufficient to get a good idea.

1. Fold the cuff (it should cover more than 1/2 of the arm circumference) and wrap it tightly around the upper arm.
2. Feel the radial pulse and inflate the cuff until the pulse disappears.
3. Release the air from the cuff slowly and note when the radial pulse reappears. This gives you the systolic blood pressure. Measuring the diastolic pressure is not possible with this method.

Normal BP values in children older than 1 year

The following provides a rough guide:

Systolic blood pressure

90 + the age of the child in years

Diastolic blood pressure

55 + the age of the child in years

For example, normal BP in a 9 year old child:

Systolic BP = 90 + 9 = 99

Diastolic BP = 55 + 9 = 64

Therefore, normal BP in a 9 year old child is about 100/65.

Helpful investigations

- Chest x-ray

Management of heart failure

The management of heart failure consists of two parts:

1. Treatment of the underlying condition.
2. Treatment of the symptoms of heart failure.

Causes of heart failure

ABNORMAL HEART

- Rheumatic fever
- Congenital heart disease

NORMAL HEART, BUT TOO MUCH WORK FOR IT

- Severe pneumonia
- Severe anaemia
- High blood pressure, usually caused by chronic renal disease
- Fluid overload after incorrect infusion treatment

1. Management of the condition causing heart failure

- **Congenital heart disease** and **rheumatic fever**, see below.
- **Severe anaemia**, see pages 107–108.
- **Severe pneumonia**, see pages 55–57.
- **Fluid overload**. If the heart failure is caused by fluid overload, stop infusions and give frusemide 0.5–1 mg/kg one single dose IV/IM. Digitalisation may not be necessary.
- **High blood pressure**. If the heart failure is caused by high blood pressure, assess renal function (blood urea or creatinine) and examine the urine for infection or signs of renal tissue damage (casts).

  For the treatment of high blood pressure, several drugs are available, chose one of the following:

  Oral medicines:
  - ***Diuretics***
    - Frusemide 1 mg/kg divided into 2 daily doses, maximum 4 mg/kg/day.
  - ***Beta-blockers***
    - Atenolol 1 mg/kg once daily, maximum 4 mg/kg/day.
    - Propranolol 1 mg/kg divided into 3 doses, maximum 5 mg/kg/day
  - ***Vasodilators***
    - Hydralazine 1 mg/kg/day divided into 3 doses, maximum 8 mg/kg/day.

  IV/IM for **emergency** treatment of severe high blood pressure with symptoms (hypertensive crisis):
  - Hydralazine 0.2 mg/kg slowly IV or IM, maximum 0.8 mg/kg. If necessary, repeat after 1 hour. Hydralazine takes about 10-30 minutes to show an effect that lasts for 2-6 hours.

2. Symptomatic treatment of heart failure

1. **Bed rest**
2. **Sedation** if the child is very restless (use diazepam or chloral hydrate)

3. **Oxygen**
4. **Diuretics**
   - Emergency treatment: ***frusemide*** 0.5–1 mg/kg IV or IM one single dose, repeat if necessary.
   - Continue with oral frusemide.
   - For long-term treatment, a thiazide diuretic (for example, hydrochlorothiazide) may be sufficient.

   NOTE: It is not necessary to routinely give potassium supplements.
5. ***Digoxin*** (for details how to use it, see box)

How to give digoxin to children (Digitalisation)

When you give digoxin, remember:

1. The dose of digoxin must be adjusted to the individual child.
2. The therapeutic dose is very close to the toxic dose.
3. The risk of toxicity is increased in hypokalaemia (low potassium).
4. Look out for signs of overdose. Stop digoxin if signs of toxicity occur.

   Early toxic signs:

   Nausea, vomiting, loss of appetite

   Late toxic signs:

   Visual problems, confusion, arrhythmia or a heart block with a low pulse rate (AV-block)

Digitalisation

Digoxin is usually available as tablets 0.25 mg (= 250 micrograms) but also as tablets 0.0625 mg (= 62.5 microgram) or tablets 0.125 mg (= 125 microgram).

- **Normal digitalisation**

  Give digoxin 0.01 mg/kg/day (= 10 microgram/kg/day) divided into 2 doses. Maximum paediatric dose 0.25 mg/day (= 250 microgram/day).

- **Fast digitalisation**

  If faster response is necessary and the child has not taken digoxin during the last week:

  For one day only: 0.04 mg/kg/day (= 40 microgram/kg/day) divided into 4 doses, then continue as for "Normal digitalisation".

- **Very rapid digitalisation** with IV injections is almost never indicated.

CONGENITAL HEART DISEASE

The reason why some children are born with an abnormal heart is usually not known. Generally, the following defects are found:

1. An abnormal communication within the heart (for example, a hole in the septum that separates the left from the right ventricle: ventricular septal defect) or between the heart and the large blood vessels. Both result in abnormal flow from the left to the right heart, causing an increased blood load in the lungs.
2. Obstruction (narrowing) of the blood flow from the heart (for example, narrowing of the aortic valve or the aorta: aortic stenosis). The heart has to work harder to overcome the obstruction.
3. A combination of abnormal communications and obstruction.

Clinical features

Children with congenital heart disease will often fail to grow, some of them suffer from repeated attacks of respiratory infections, a loud murmur is usually present. Some children present with cyanosis. Children with coarctation of the aorta typically have a heart murmur, high blood pressure and weak or absent femoral pulses.

Management

1. Treat heart failure if present.
2. Prevent and treat any condition that will increase the work of the heart and therefore increases the risk of heart failure:
   - Anaemia
   - High fever
   - Malaria
   - High blood pressure
3. Make sure the child is fully immunised.
4. Give prophylaxis against subacute bacterial endocarditis as explained below.

An operation is usually not possible because of lack of facilities. Therefore at present, the prognosis for children with congenital heart disease in Afghanistan is poor and many will die in early childhood.

Complications

Dangers of congenital heart abnormalities are heart failure and endocarditis.

RHEUMATIC FEVER

Rheumatic fever is not an infectious disease but a specific immune-reaction following 2-6 weeks after a throat or skin infection with streptococcus bacteria (Group A streptococcus). This immune reaction causes inflammation, especially of the heart and joint tissues. It can also affect the skin or brain. It occurs most commonly in children between the age of 5-15 years.

Clinical features

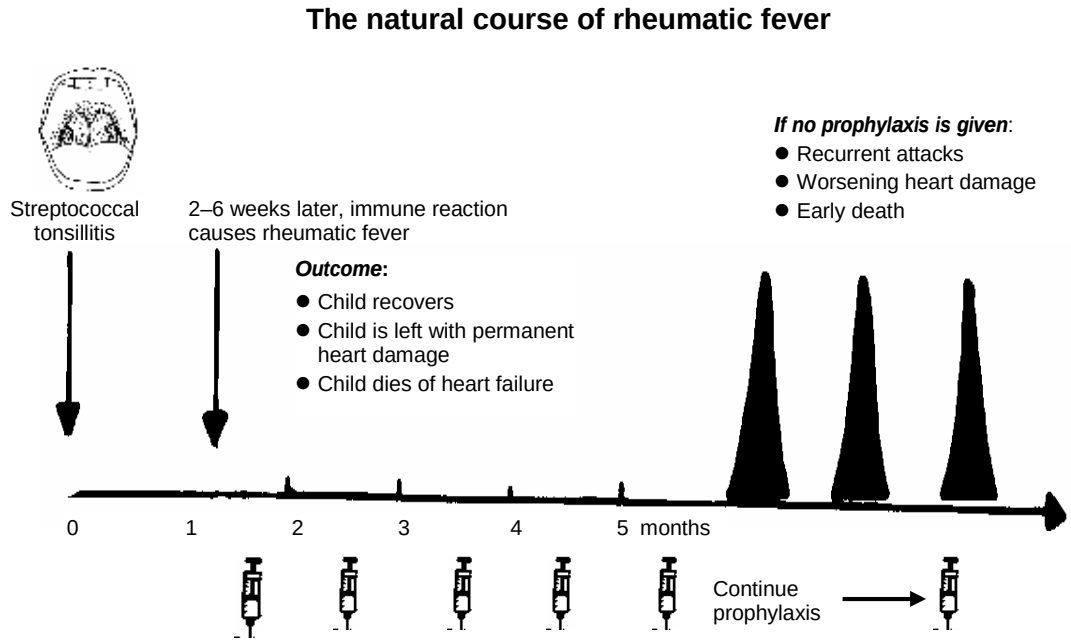
- **Recent throat infection** (2-6 weeks ago)
- **Fever and weakness**
- **Joint symptoms - migratory arthritis**. About 80% of children with rheumatic fever suffer from arthritis. The following large joints are most commonly affected: knee, ankle, wrist, elbow, hip and shoulder. A joint becomes suddenly very tender and swollen. The pain goes away gradually over one week. Typically, while the pain is becoming less in one joint, another large joint becomes affected. This typical pattern of joint pain is called migratory arthritis (moving arthritis). It continues for several weeks. Permanent joint damage does not occur.

The pain responds rapidly to acetylsalicylic acid (aspirin).

- **Heart murmur**. The heart is affected in 40% of children with rheumatic fever. All three layers of the heart can become involved in the inflammatory process. This may result in endocarditis (commonest), myocarditis or pericarditis. Generally, the heart enlarges, a heart murmur develops and the child may show signs of heart failure. The inflammation of the heart may lead to acute fatal heart failure or it may cause permanent damage to the heart valves. This damage often results in an obstruction of blood flow through the heart (commonest mitral stenosis). Symptoms may not develop until a child has become an adult. The damage will worsen if a child suffers repeated attacks of rheumatic fever.
- **Chorea**. So called chorea occurs only in about 10% of children, most commonly prepubertal girls. It is characterised by involuntary irregular movements or emotional lability. Chorea may return during pregnancy or when taking an oestrogen-containing contraceptive pill.
- **Erythema marginatum** and **subcutaneous nodules**. In severe cases, erythema marginatum, a reddish rash with rounded and raised borders appears, usually on the trunk. Subcutaneous nodules near the joints (for example at the elbow) are another specific sign of rheumatic fever.

Helpful investigations

- **ESR** is usually very high as a sign of the inflammation (over 50 mm after first hour, normal below 10 mm). Measure the ESR repeatedly during treat



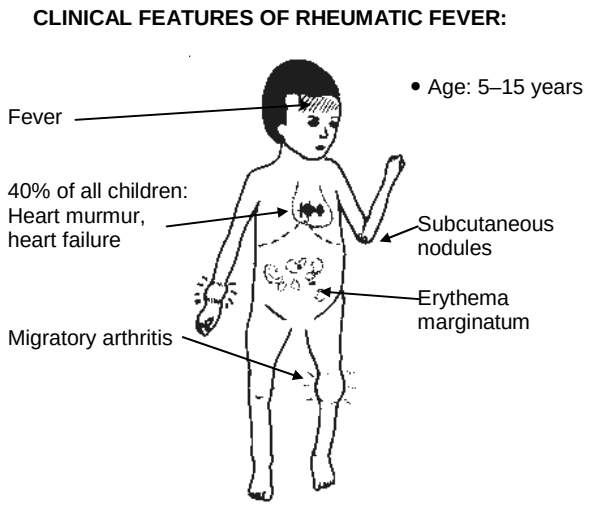


Figure 14–4 ***Rheumatic fever***.

ment. The results provide you with some guidance for how long to continue anti-inflammatory treatment with acetylsalicylic acid (aspirin).

- Chest x-ray and ECG if heart involvement
- Anti-streptolysin-titre (ASO-titre) to confirm a previous streptococcus infection by finding a titre higher than 200 units

Management

1. **Bed rest**, especially in children with heart symptoms. Ideally, a child should rest until all signs of active disease (fever, joint pains) have disappeared.
2. ***Acetylsalicylic acid*** (aspirin) 90–120 mg/kg/day divided into 4 doses until the ESR is normal, which is usually after 4-6 weeks

5–8 years	300–500 mg	4 times daily
9–12 years	500 mg–1 g	4 times daily

   NOTE: These are high dosages and you must watch out for signs of aspirin toxicity: dizziness and ringing in the ears. Reduce the dosage if these signs occur!
3. ***Penicillin V*** for 2 weeks to kill any remaining streptococcus bacteria, then prophylaxis as explained below
4. **Treatment of heart failure** as described above
5. In chorea, sedate the child with ***phenobarbital*** 5 mg/kg once daily at night.

6–12 years	50–150 mg	once daily at night
Over 12 years	150–300 mg	once daily at night

How to prevent further attacks

Immediately after the 2 weeks treatment with penicillin are completed, start prophylaxis. Failure to start prophylaxis is the reason why many children suffer recurrent attacks of rheumatic fever. Recurrent attacks cause the child's heart function to worsen rapidly and will finally result in early death. It is very important to explain the need for prophylaxis to the parents.

1. Give ***benzathine benzylpenicillin*** IM every 4 weeks.

1–5 years	600,000 IU	(= 0.36 g)
6–12 years	1.2 million IU	(= 0.72 g)
Over 12 years	2.4 million IU	(= 1.44 g)

2. Continue prophylaxis for 5 years after the last attack, or when the child reaches the age of 18 years, whatever is later.
3. *In case of penicillin allergy* give oral erythromycin daily.

Under 5 years	125 mg	2 times daily
Over 5 years	250 mg	2 times daily

4. Advise girls with rheumatic heart disease that they are at risk of heart failure during pregnancy and during the first days after delivery.

SUBACUTE BACTERIAL ENDOCARDITIS (SBE)

Bacterial endocarditis is rare in children. It is an infection of an already damaged heart valve. The infection is usually acquired when a child with a damaged heart undergoes a surgical procedure without receiving appropriate endocarditis prophylaxis.

Clinical features

Typical patient is a child with a history of previous heart disease who underwent a surgical procedure or had a recent infection. On examination, you find signs of septicaemia and signs of heart disease (loud murmur, heart failure). Endocarditis is one of the rarer causes of persistent fever.

Management

If you suspect bacterial endocarditis, take blood cultures if possible. Give benzylpenicillin and gentamicin IV for 2 weeks, then amoxicillin oral for 2-4 weeks.

Prevention - endocarditis prophylaxis

Any child with known heart disease must be given ***procaine benzylpenicillin*** and ***gentamicin*** IM 1 hour before and 1 day after any surgical procedure, including dental treatment. Girls will later be at risk during delivery. It is important to educate the family about the life-long need of endocarditis prophylaxis.

Alternatives to procaine benzylpenicillin and gentamicin are:

For procedures with local anaesthesia:

Give amoxicillin:

1 hour before the procedure:

1–5 years	750 mg
6–12 years	1.5 g
Over 12 years	3 g

6 hours after the procedure:

1–5 years	125 mg
6–12 years	250 mg
Over 12 years	500 mg

For procedures under general anaesthesia*:*

Give ampicillin IV/IM just before the procedure and IV/IM 6 hours afterwards.

1 hour before the procedure:

1–5 years	250 mg
6–12 years	500 mg
Over 12 years	1 g

6 hours after the procedure:

1–5 years	125 mg
6–12 years	250 mg
Over 12 years	500 mg

References

1. Ebrahim GJ. *Paediatric Practice in Developing Countries.* 2nd edition. London: Macmillan Education Ltd. 1993.
2. Hull D, Johnston DI. *Essential Paediatrics.* 3rd edition. Edinburgh: Churchill Livingstone 1993.
3. Majeed HD. Acute Rheumatic Fever. *Medicine* 1997; 25: 12, 100-105.
4. Stanfield P. *Child Health*. 2nd edition. Nairobi: African Medical and Research Foundation 1997.

15. Problems of the nervous system (brain, spinal cord, nerves) and muscles

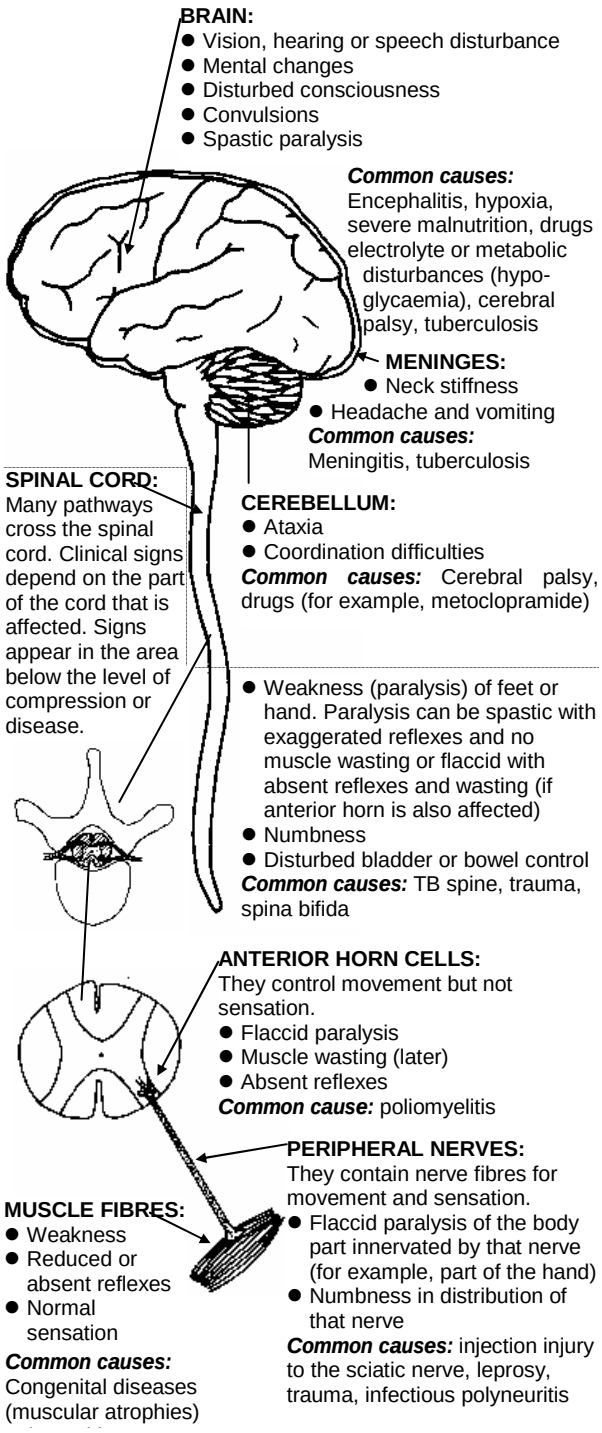


Figure 15–1 ***Clinical features of diseases of the nervous system, depending on which part is affected. This figure is very simplified, refer to a neurology textbook for more details. NOTE: Spastic paralysis is also called upper motor neurone lesion (UMN); flaccid paralysis lower motor neurone lesion (LMN).***

Damage to the nervous system can leave life-long damage

When we think about problems of the nervous system we are not only concerned with treating a specific disease. A major worry is the consequences the disease may have on the child's future. Damage to the nervous system can result in intellectual problems (slow learning = mental handicap) or physical handicap (for example, cerebral palsy, paralysis or hearing defects). The nervous system and its control of body functions, such as muscle movements, are very complex. Therefore, depending on which part of the nervous system is affected, clinical presentation and resulting damage have many different patterns, see figure 15–1.

Most commonly damage to the nervous system occurs during childhood (for example after convulsions with fever, meningitis or poliomyelitis). Brain damage is frequently caused by traumatic delivery or severe newborn infection. Some children were harmed before they were born (for example by maternal illnesses or dangerous drugs given to the mother during pregnancy).

It would be possible to reduce the risk of brain damage simply by improving care for pregnant women (see chapter 22. "The importance of maternal health"), improving newborn care (see chapter 21. "Care and problems of the newborn") and correct and early treatment of dangerous childhood diseases.

Sadly, in addition to suffering from physical or mental handicap, many children become further handicapped by wrong beliefs and wrong attitudes towards their disabilities. They become isolated by exclusion from social life, refusal of education or by negligence. A lot could be done to support these children and to prepare a future for them. Therefore, the whole of chapter 19. "The handicapped child" is dedicated to explain some basic principles how you and the family can help disabled children in simple and cheap ways.

How to assess the nervous system

Physical examination of the nervous system has to cover many different aspects. How completely you examine the nervous system and which questions you ask during history taking, depend on the child's presenting problem.

However, always ask about convulsions and concerns about hearing, vision, speech and development. To inquire about developmental concerns, you may use the "Ten Questions" screen (see page 173).

Look at the child

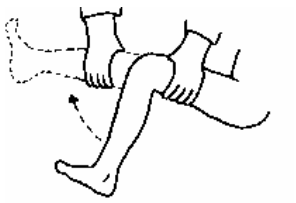
- ○ Very ill or well?
- ○ Fever?
- ○ Any abnormal posture or abnormal movements? Is he moving all his limbs? Describe exactly, what you see.

Examine the child

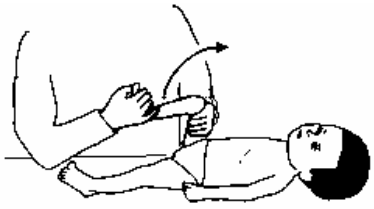
- ○ Assess his consciousness level:
  - Is the child fully alert?
  - Is the child confused?
  - Is the child sleepy but responding to your voice? (Drowsiness)
  - Is the child only responding to pain? (Semicoma, stupor)
  - Is the child unresponsive to stimulation? (Coma)
- ○ Examine arms and legs:
  - Any deformities or swellings?
  - Muscle wasting? (Are both his legs the same?)

Thin

  - Muscle tonus (move elbow or knee):
    - Normal?
    - Very floppy?
    - Resistance to movements (spasticity)?

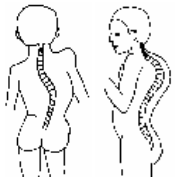


  - Test muscle power: ask the child to move his feet by himself, then against your resistance.



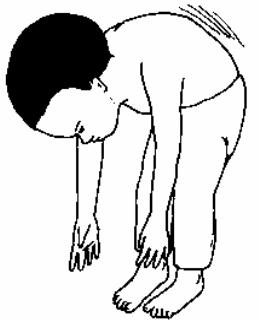
Are the child's legs equally strong on both sides? Ask him to straighten his leg against your resistance.

- ○ Test sensation: does the child feel light touch and pain? Compare the sensation of both legs with each other (see figure 16–16).
- ○ Test tendon reflexes (normal, absent or exaggerated?).
- ○ Examine for signs of meningitis (see figure 15–4).
- ○ Examine the spine (see also figure 13–7)):
  - Deformity? (details see figure 13–7)



  - Tenderness or a bump? (details see figure 6–4 and 13–7)

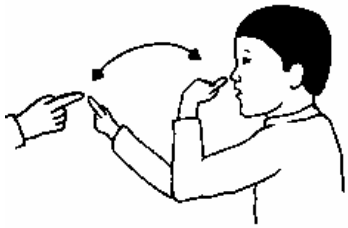
  - Is the child able to touch his toes?



If a child cannot touch his toes, he has some disease of his back or legs.

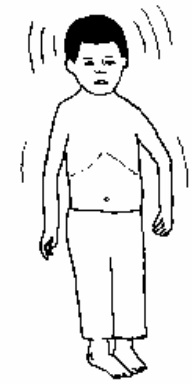
- ○ Test co-ordination:

  Can the child move his finger fast from his nose to your finger and back again almost without error?



- ○ Test balance:

  Have the child stand with his feet together.



- ○ Watch how the child walks.
- ○ Check the physical and mental development (see page 173).
- ○ If indicated, take the blood pressure and measure the head size.

Figure 15–2 ***Examination of the nervous system***.

Convulsions

Convulsions are one of the commonest emergencies in children. During convulsions, a child becomes unconscious and his arms and legs make jerking movements. His eyes move uncontrollably and he may pass urine or faeces, or bite his tongue. Sometimes a convulsion is more difficult to recognise in young children or babies.

A convulsion is not a specific disease, it is a symptom and you have to find out what has caused it. High fever causes most convulsions but a convulsion may be a sign of a very serious disease or it may be epilepsy. A short convulsion will not cause any harm to the brain. If a convulsion is prolonged or comes back repeatedly, lasting brain damage may occur.

Management of a convulsion can be summarised in three points (details see below):

1. Emergency treatment to **stop the convulsion**
2. **Finding and treating the cause of a convulsion**
3. **Preventing recurrence** of a convulsion (see below under "Epilepsy")

Emergency treatment of convulsions

1. Turn the child on his side to prevent aspiration of secretions into his lungs. Do not put anything in his mouth.
2. *If the convulsions last for more than 5 minutes, g*ive oxygen if available and start drug treatment with ***diazepam*** 0.25–0.5 mg/kg rectally or very slowly IV.

2–12 months	2.5–5mg
1–3 years	5 mg
4–12 years	10 mg

   Rectal administration is as fast acting as IV. Give diazepam with a syringe without needle into the rectum.
3. Wait for 10 minutes; if convulsions continue, repeat diazepam.
4. *If convulsions still continue or diazepam is not available*, give ***phenobarbital*** 15 mg/kg IV. Wait 30 minutes then give 10 mg/kg IV.
5. Do not forget to **consider hypoglycaemia**. If you cannot test for it, give a bolus of glucose with the second dose of diazepam or phenobarbital.
6. **Reduce fever**.

NOTE: Repeated doses of diazepam and phenobarbital can lead to respiratory depression but prolonged convulsions also cause harm.

How to find the cause of convulsions?

1. Do an urgent assessment

Take a brief history

- How long did the convulsion last?
- Did the child have any convulsions before?
- Is the child suffering from another illness at the moment (for example, diarrhoea or fever)?
- Did the convulsion start generalised or with focal signs (for example, in an arm or leg first)?

Look at the child

- Well or ill?
- Physical abnormalities?

Examine the child

- Fever?
- Dehydration?
- Signs of injury?
- Meningeal signs (neck stiffness or bulging fontanelle)?
- High blood pressure?

Examine briefly all systems, including throat and ears.

Helpful investigations

- Blood sugar
- Malaria blood film
- WBC and differential count
- Urine examination

2. Consider a cause of the convulsion according to clinical features

If the convulsion is focal (not generalised from the beginning), there may be focal pathology.

For practical reasons, divide children with convulsions into two groups:

1. Convulsions **with** fever
2. Convulsions **without** fever

Drugs and poisons that can cause convulsions

- Aminophylline – overdose IV
- Amphetamines
- Atropine
- Chloroquine – after IM injection
- Iron
- Salicylates (aspirin)
- Insecticides such as DDT
- Kerosine
- Lead
- Plant poisons

FEBRILE CONVULSIONS

Around 10% of all children suffer a convulsion with fever during their childhood. Fever with convulsions occurs most commonly during the first 6 months–2 years of life, but children can be up to 6 years old.

Causes of convulsions

Convulsions *with* fever	Convulsions, usually *without* fever
• Febrile convulsion due to fever from any infection; often caused by simple ear or throat infections, early measles (look for Koplik's spots) or unspecific viruses • Meningitis • Typhoid fever • Fever in a child with epilepsy • Cerebral malaria • Miliary tuberculosis or tuberculous meningitis • Pneumonia (due to hypoxia or fever) • Septicaemia • Gastro-enteritis (due to dehydration or electrolyte disturbances) • Heat stroke • Side-effect of drugs that were used in a child with fever	***COMMON*** • Epilepsy (children are often mentally entirely normal, some are mentally handicapped) ***LESS COMMON*** • Head injury • Poisoning or drug overdose • Hypoglycaemia (low blood glucose), especially in children who are severely malnourished or have a severe illness • Hypoxia (after drowning or pneumonia) • Other metabolic disturbances NOTE: Sometimes the muscle spasms of tetanus are mistaken for convulsions

The convulsions are usually occurring during the onset of an illness while the fever is rapidly rising. Any disease with a fever can cause a convulsion, simple upper airway infections are a common cause. Young children react to fever by having convulsions because their brain is still developing and responds to fever easily with fits.

About 1/3 of children who have had one febrile convulsion will suffer another one during future febrile illnesses. These convulsions are usually short and do not cause harm to the brain. However, always exclude meningitis or other serious conditions before you diagnose a so-called simple febrile convulsion.

Danger signs of convulsions with fever

Children with the following features are at great risk of suffering brain damage from a convulsion with fever:

- ◆ The convulsion lasts for more than 20 minutes
- ◆ The child has not completely recovered one hour after the convulsion

Many of these children will suffer from meningitis or another serious condition. About 20% of these children will die and about 10-20% will be left with permanent brain damage or epilepsy.

Management

1. Stop the convulsion.
2. Reduce the fever with paracetamol.
3. Exclude a serious cause, especially meningitis.
4. Prevent further simple febrile convulsions in the future:
   - Tell the family to give paracetamol as soon as they notice that their child is developing a fever.
   - Long term prophylaxis with anti-epileptic drugs is not routinely indicated. Most children will have grown out of the tendency of febrile convulsions by the age of 6 years.

     Prophylactic phenobarbital as described under epilepsy is indicated in the following situations:
     – The child had 3 or more febrile fits during 6 months.
     – The child has another clear neurological problem (for example, cerebral palsy).

EPILEPSY

Epilepsy is defined as "recurrent convulsions that are brief and not provoked by any illness". It is a disorder of the brain cells in which normal activity is suddenly interrupted by abnormal brain activity. Sometimes the cause of epilepsy is not known, in other children, there may be a history, for example of meningitis, difficult delivery or severe pneumonia with hypoxia.

Clinical features

Typically a child falls down suddenly, is stiff for a very short while, turns blue and then starts violent rapid muscle movements of arms and legs **(tonic-clonic** convulsion). His eyes move uncontrollably and he may spontaneously pass urine or faeces or bite his tongue. After some time, or sometimes only after treatment, the jerking stops. A phase of deep sleep follows. The child does not remember the fit.

There are several other types of epilepsy beside the above described tonic-clonic generalised convulsion. These other types may not be recognised as epilepsy. They may be seen as an effect of evil forces and traditional healing is sought. They may be mistaken as a behaviour problem or not recognised at all.

A child may stop what he is doing for about 5-20 seconds and then continue what he was doing as though nothing had happened. There is no abnormal muscle movement **(simple absence seizures ="petit mal"**). Sometimes these attacks may last 1-2 minutes and are associated with involuntary muscle movements such as chewing (**complex absence seizures**). In both cases, the child will not remember what happened.

Other children will suddenly be thrown down to the floor by a sudden shock-like muscle jerk (**myoclonic seizures**). In **partial seizures**, one side of the face, one arm or leg will twitch and jerk for a few minutes. The child is awake but cannot stop the jerking. Sometimes the jerking will spread to other parts of the body, sometimes the child's consciousness may be disturbed or the attack may result in a generalised convulsion.

How to diagnose epilepsy

Diagnosis is usually based on history and clinical features.

1. Take a detailed history from someone who has observed the convulsion.
2. Find out how many times a child has had convulsions in the past. There have to be at least 2 convulsions before you can diagnose epilepsy because the majority of children who had one convulsion will never have one again.
3. Ask whether other family members suffer convulsions because often there is a tendency to convulsions in the same family.
4. Try to find out what caused the epilepsy in the first place (for example, a previous head injury or meningitis). When you examine a child, also assess his development. Many children with epilepsy are mentally entirely normal. However, convulsions are a common complication in mentally handicapped children or children with cerebral palsy.

Management

Education and drugs are equally important in the treatment of epilepsy. When treatment fails or is interrupted, it is usually because the family did not understand the nature of epilepsy.

1. **Education**. Make sure that the family understands the following points:
   - Epilepsy is an ordinary disease like pneumonia or other illnesses. It is not caused by evil influences, but by things like a scar on the brain following for example an injury or meningitis. Epilepsy is nothing to be ashamed of.
   - Epilepsy is treatable with oral drugs. Treatment will take a long time, at least 2 years.
   - Each patient needs a different dose of medicines. Explain that you will try to find the right dose for this individual child. It is not a sign of treatment failure if a patient suffers another convulsion after he started the treatment.
   - Teach the family what to do if a child has another convulsion, see box.
   - Warn them that if they stop the medicines suddenly without your advice, the patient may suffer more convulsions than before.

Teach the family what to do if the child has another convulsion:

- They should turn the child on his side so that he will not choke. They should not put anything in his mouth.
- They should not try to restrain the child but make sure of his not harming himself: for example, they should remove cooking stoves or hot pots from near him. If he is near fire or water, they should move him away.
- If the convulsion does not stop within 5 minutes, they should take him to the nearest health facility.

2. **Drug treatment**

   General principles of drug treatment for epilepsy:

   - Try to give one drug only. 75% of all epileptic patients can be controlled by one drug (monotherapy).
   - Adjust the dose for each patient. Always start with a low dose and increase it every 2 weeks, either until the convulsions are controlled or until the child cannot tolerate a higher dose because of side-effects.
   - Once the drug has been started, it must to be taken continuously. If the patient stops it suddenly, he may suffer several severe attacks as a rebound effect.
   - Gradually stop the drug when the child did not have any convulsions for 2 years. Do not stop the drug suddenly but reduce the drug dose gradually every 2-4 weeks.

   Specific drug treatment:

   - Start with phenobarbital and increase it every 2 weeks by 1 mg/kg until control is achieved or the child cannot tolerate a higher dose because of side-effects. The child may be drowsy for the first few days of treatment.
   - Only if control is not achieved, add a second anti-epileptic drug such as phenytoin. Start with a low dose. Increase it every 1-2 weeks by 25–50 mg until the convulsions are controlled or the maximum dose that a patient can tolerate is reached. Once control is achieved, reduce phenobarbital.

   NOTE: There are other anti-epileptic drugs available that are more expensive (for example, carbamazepine or sodium valproate). Do not use them as "first choice" because you need to consider that a family has to be able to buy the medicine for at least 2 years.

3. **Follow-up - without it, epilepsy treatment will never succeed**. Follow up the child at first every 2 weeks and later every month.

   Give your long-term treatment plan in writing to the family. They should bring this record card with them whenever they come to see you. On the same paper, keep a written record of the number and duration of convulsions. If you fail to keep a good record, you will not be able to adjust the dose correctly nor to complete the treatment in time.

Oral doses and side-effects of phenobarbital and phenytoin

Phenobarbital 5 mg/kg once daily at night

2–12 months	15–45 mg
1–5 years	30–100 mg
6–12 years	50–150 mg

Side-effects: drowsiness, lethargy, behaviour changes, learning difficulties, restlessness, folate anaemia

Phenytoin 3–8 mg/kg/day divided into 2 doses

2–12 months	12.5–50 mg
1–5 years	25–100 mg
6–12 years	50–150 mg

Side-effects: drowsiness, mental confusion, dizziness, ataxia, vomiting, folate anaemia, acne, swelling of the gums, lymph node swellings, fever

TETANUS

For neonatal tetanus, see page 189.

Tetanus is caused by a toxin (neurotoxin) produced by Clostridium tetanus bacteria. These bacteria are very widespread in the soil and enter a child's body through wounds. Any wound can serve as an entry for this devastating disease. Of particular danger are puncture wounds due to thorns or rusty nails, animal bites, burns, wounds contaminated with soil and those wounds that have been treated with herbs by a traditional healer. Tetanus can follow ear piercing, unclean IM injections, circumcision or any other surgical procedure that is not performed under clean, sterile conditions. Not all patients with tetanus can recall a history of injury.

Clinical features

Tetanus is characterised by muscle stiffness (rigidity) and muscle spasms, which are caused by the effect of the toxin on the central nervous system. The mean incubation period is about 7-14 days (but can be shorter) or several weeks. The first symptoms are pain on opening the mouth and difficulty to do so due to stiffness of the jaw muscles (trismus). Muscle stiffness also occurs near the site of the wound. The stiffness then spreads to muscles of the abdominal wall, neck, back and limbs. The typical opisthotonus develops (see figure 15–3). On top of the stiffness the muscle spasms develop. These spasms are painful and a child suffers them being fully conscious. The spasms are triggered (started off) by movements, sound, touch and even light. In addition to stiffness and muscle spasm, excessive sweating, fever and breathing problems occur several days after the onset of the illness.

Diagnosis is based on the typical clinical findings in a child unable to open his mouth who suffers muscle spasms.

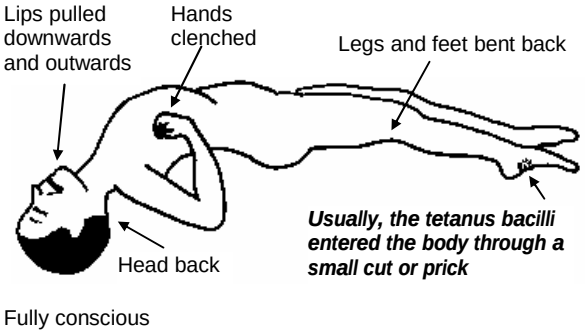


Figure 15–3 *Tetanus*.

Management

Treatment is urgent! Management aims are sedation and relaxation.

1. At first give ***diazepam*** 2.5 mg (in children over 5 years 5 mg) slowly IV every 10-15 minutes until the spasms have been controlled and muscle relaxation and regular breathing has been established. Then continue with diazepam 0.25–0.5 mg/kg orally, IM or IV every 4-6 hours and phenobarbital 5 mg/kg/day divided into several doses.

   Alternative in older children: diazepam 0.25–0.5 mg/kg orally or IM and chlorpromazine 2–4 mg/kg IM every 4-6 hours. Increase the dose or give an extra diazepam injection if spasms occur.

   Continue diazepam for about 2-6 weeks, then reduce it slowly.
2. ***Anti-tetanus serum*** (ATS) 50,000–100,000 units. Give half of the dose IM, the other half IV. Give a test dose first and keep adrenaline ready in the rare case of an allergic reaction. If human immunoglobulin is available, give 30–300 units/kg IM. This will be about 3000–6000 units and a test dose is not necessary.
3. Give ***dexamethasone*** 4–8 mg 6 hourly IV/IM.
4. Give ***benzylpenicillin*** or procaine benzylpenicillin or metronidazole for 5 days.
5. Clean and debride any wound.
6. Nurse the child in a dark, quiet room and avoid any unnecessary handling that may trigger spasms.

NOTE: Give the child a full vaccination course against tetanus after recovery, because suffering tetanus does not provide life-long immunity.

Prognosis

The shorter the incubation period, the time between acquiring the infection to the development of symptoms, or the shorter the time between first symptoms to the occurrence of spasms, the more severe the illness and the risk of dying. Mortality is about 50%. If a child survives, the spasms become less frequent over about 1-3 weeks and the stiffness very gradually improves.

Prevention

Two kinds of vaccine are available:

1. ***Tetanus toxoid***. This vaccine contains inactivated tetanus toxin that stimulates the body to produce immunity against tetanus. The vaccine is part of the immunisation schedules. In order for the body to produce enough immunity, the immunisation must be repeated 1 month after the first dose and then after 6-12 months, then at intervals not greater than 10 years. It takes about 10 days after the first injection until the body has produced sufficient protection (anti-toxins) against tetanus and tetanus toxoid may therefore not be able to prevent tetanus in time after an acute injury.
2. ***Anti-tetanus serum (ATS)*** *or* ***tetanus immunoglobulin*** (human, usually not available). These contain anti-bodies against the tetanus toxins and provide immediate protection against tetanus. However, they do not stimulate the body to produce its own immunity and provide no long-term protection.

How to prevent tetanus:

1. Immunise all women in childbearing age, or during pregnancy with tetanus toxoid. The protecting maternal anti-toxin is passed on through the placenta to the foetus (see page 195).
2. Make sure that children get all their regular immunisations (see page 200).
3. Repeat a booster of tetanus toxoid every 7-10 years, or earlier if the child has acquired a tetanus-prone injury.
4. Immunise all children with injuries (even small ones): if you are not absolutely sure whether a child had been immunised, give ATS immediately and start a full course of tetanus toxoid immunisation.
5. Protect children who undergo operations:
   - If routine surgery is planned and adequate sterility cannot be assured, give tetanus toxoid 6-8 weeks before the operation.
   - For any other operation, if adequate sterility cannot be assured, give ATS.

Brain infections

BACTERIAL MENINGITIS

Meningitis means inflammation of the membranes (meninges) that cover the brain. There are two different types of meningitis – viral and bacterial. Viral meningitis is usually a mild illness. Bacterial meningitis is a very serious disease. As it is often not recognised early and not treated aggressively, about 30-40% of all children with meningitis will die. Many children who survive bacterial meningitis have lifelong disabilities such as deafness, cerebral palsy, mental handicap or epilepsy.

How children with bacterial meningitis present

Always suspect the possibility of meningitis in a child who is very ill. Consider it in any young child with fever and convulsions.

Young children under 18 months show signs of a severe general illness such as vomiting, irritability, abnormal high-pitched crying, abnormal sleepiness, poor sucking or refusal to feed, and fever. Sometimes in a very young child, the temperature is below normal (hypothermia) or he presents with convulsions. On examination, you may find a full bulging fontanelle. Remember, neck stiffness is usually absent in children under 18 months!

Older children show the classical signs of meningitis: a sudden onset of fever, headache, vomiting, increasing drowsiness, sensitivity to bright light (photophobia) and neck stiffness.

If the meningitis is caused by meningococcus bacteria, you may find a petechial rash. These are small red or purple spots that do not blanch when you press on the skin over them (see page 147).

How to assess a child with suspected meningitis

○ **Neck stiffness**?
A healthy child can touch his chest with his chin. A child with meningitis cannot.

○ **Kernig's sign**?
You can straighten a healthy child's leg without hurting him. You cannot do this if he has meningitis.

○ **Head between knees sign**?
You can easily put a healthy child's head between his knees. You cannot do this if he has meningitis.

○ *Children under 1 year*: signs in the fontanelle?
(Only interpret these signs if the child is not crying because the fontanelle bulges when he cries.)

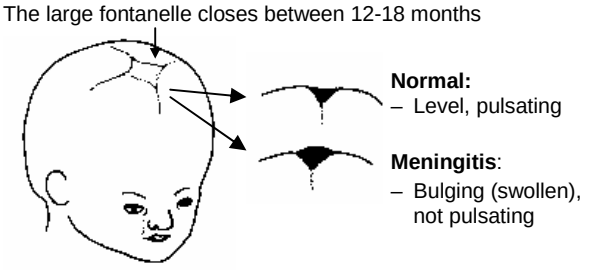


Figure 15–4 ***Meningitis***.

Helpful investigation - the examination of cerebrospinal fluid (CSF)

The only reliable way to diagnose meningitis is by the examination of CSF obtained by lumbar puncture (see figure 15–5). However, if this is not possible, do not delay the treatment of children in whom you suspect bacterial meningitis. Meningitis is not a disease in which you can wait to observe a child's progress.

Management

Hospital referral. The sooner antibiotic treatment is started for meningitis, the better the chances of success. Therefore, give one dose of ***benzylpenicillin*** IV or IM to any child in whom you suspect meningitis, before you send him to hospital.

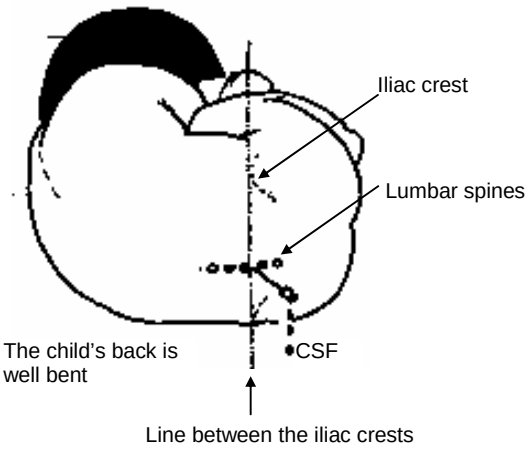
HOW TO DO A LUMBAR PUNCTURE

1. Perform it as a sterile procedure with sterile equipment.
2. The way the child is held is very important. His back must be well curved and you need a helper to achieve that. Your helper should put one hand behind the child's head, and the other behind his knees and then bend the child's back as much as possible. This opens the spaces between the vertebrae (spinal bodies).
3. Wash your hands and wear sterile gloves. Clean the lower part of the child's back with a swab soaked in an antiseptic 3 times.
4. Define the place where to inject the needle: feel the iliac crests and follow a line across the child's back.
5. Put a needle used for intramuscular injections in any space between the lumbar spines below this line. If you put your needle in a higher space you may injure the spinal cord.

   Do not touch the point of the needle with your finger or let the needle touch anything that is not sterile! Use a new needle if it happens.

   Push the needle in straight and point in the direction of the umbilicus. It will suddenly go in more easily when it gets into the space that contains the CSF. CSF will come out as soon as the needle is in this space. Let about 2 ml drop in a clean bottle. ***Never use a syringe to draw the CSF***.
6. Look at the colour of the CSF. If possible, send it for microscopy, measurement of protein and glucose and culture.

   Sometimes the needle cuts a small blood vessel so that there is some blood in the CSF. This does not harm the child but spoils your examination.



INTERPRETATION OF CSF RESULTS

	Colour	Cells	Protein	Sugar
Normal	Clear	0-5/mm^3 lymphocytes	Below 40 mg%	Above 40 mg%
Bacterial meningitis	Cloudy	Hundreds to thousands, mainly polymorphs	High	Low
TB meningitis	Clear or opalescent	A few hundred, mainly lymphocytes	Moderately raised	Low or absent
Viral meningitis	Clear or opalescent	A few hundred, mainly lymphocytes	Moderately raised	Normal

Figure 15–5 ***Lumbar puncture and CSF (cerebrospinal fluid).***

Pre-hospital dosages of ***benzylpenicillin***:

Under 1 year	300 mg
1–9 years	600 mg
Over 10 years	1.2 g

1. **Antibiotics**. It is essential to choose the correct antibiotic in the correct dose. A common cause of treatment failure is a wrong choice of antibiotics or a dose that is too low. If the dose is too low, the symptoms will improve but the damaging infection may not completely stop, see box on page 134.
2. **Fluid balance**. Be very careful when you give IV fluids because certain hormonal mechanisms as a consequence of the meningitis (inappropriate secretion of ADH) cause fluid retention. There is the risk to give too much fluid and to cause brain oedema and heart failure. Reduce the amount of IV fluid in the first 2-3 days of the illness to no more than 70% of the usual recommended daily needs.

Age	Usual needs	70% of the usual fluid needs
2–12 months	80 ml/kg/day	55 ml/kg/day
1–5 years	60 ml/kg/day	40 ml/kg/day

3. **Fever control**. Give paracetamol to reduce the fever.
4. **Positioning of the child**. If a child is unconscious, lie him on his side to prevent aspiration of stomach contents into his lungs, see figure 15–6. Turn him from one side onto the other every 3 hours.
5. **Convulsions**. Treat with phenobarbital (diazepam is not the "first choice") and check for low blood sugar, a common complication of meningitis.

NOTE: Do not use corticosteroids, for example dexamethasone. They are very likely to cause more harm than good because in countries like Afghanistan children with meningitis usually present late and the availability of antibiotics is different to those in Western countries. Recommendations for the use of steroids in meningitis drawn from Western textbooks and research do not apply to Afghanistan.

What to do if a child with meningitis does not improve

After 3 days of full treatment, the fever should be down and the consciousness of the child should have improved. If fever persists and the child is still drowsy, consider the following possibilities:

- Wrong choice of drugs or wrong dosage
- Subdural effusion
- Tuberculous meningitis
- RARE: brain abscess

Antibiotics for bacterial meningitis

Recommended antibiotics

Children under 2 months

Ampicillin + gentamicin

Alternative: benzylpenicillin + gentamicin

Duration: 14-21 days

Children over 2 months

Benzylpenicillin + chloramphenicol

Alternative: ampicillin + chloramphenicol

or chloramphenicol alone

Duration: 10 days

Give at first IV or IM for 3-5 days until the child shows improvement, then orally.

If it is not possible to give injections, give chloramphenicol orally. It is well absorbed and reaches a good concentration in the CSF.

Recommended doses

Ampicillin 200 mg/kg/day divided into 4 doses

Benzylpenicillin 300,000-400,000 IU/kg/day divided into 4 doses

Chloramphenicol 100 mg/kg/day divided into 4 doses. Reduce to 50 mg/kg/day after 3 days

Gentamicin 7.5 mg/kg as one single daily dose. (Newborn under 7 days 5 mg/kg)

Early complications

- **Subdural effusion**. A subdural effusion is a collection of fluid that presses onto the brain. Because it is a possible complication of meningitis, measure the child's head circumference when you first assess a child with meningitis and write your measurement down. If subdural effusion occurs, the head circumference of young children will increase. A subdural effusion often resolves spontaneously. Occasionally it is necessary to draw some fluid through the fontanelle (subdural tap); refer to a specialist. The procedure must be performed under absolute sterile conditions.
- **Brain abscess** (see box "Other causes that may present like bacterial meningitis...")

Late complications

- Deafness
- Epilepsy
- Hydrocephalus, which is caused by adhesions from the inflammation that result in blockage of the communication system of the cerebrospinal fluid, see under "Large head" on page 143.

Other causes that may present like bacterial meningitis and their characteristics

Viral meningitis. The onset is slower than in bacterial meningitis and the symptoms are milder. However, if you are not sure and cannot examine the cerebrospinal fluid (CSF), treat for bacterial meningitis.

Meningism. Irritation of the meninges accompanies many infections such as pneumonia, tonsillitis or malaria. Neck stiffness is mild and the child is not very ill. CSF is normal.

Cerebral malaria. Malaria caused by plasmodium falciparum can affect the brain. A child presents with fever, becomes drowsy and has convulsions, often many times. Soon he will become comatose and can die within a few hours. Neck stiffness is usually only slight. The CSF is clear. There are often other signs of malaria. Blood film shows many plasmodium falciparum malaria parasites. However, in malarious areas many children have parasites in their blood film and this may not necessarily prove that their symptoms are caused by malaria. If you have any doubt about the diagnosis, better treat the child for severe malaria and meningitis at the same time.

Tuberculous meningitis. The onset is gradual over several days or weeks. At first a child will complain about a headache, then he may start vomiting and become increasingly drowsy while neck stiffness develops. Finally he becomes spastic, comatose, develops convulsions and dies. BCG vaccine can prevent tuberculous meningitis (for treatment see chapter 6. "Tuberculosis").

Brain abscess. It is very rare. Often the infection has spread to the brain from mastoiditis. Symptoms are fever, headache and localised neurological signs, sometimes convulsions. Treatment is with antibiotics and surgical drainage of the abscess.

ENCEPHALITIS and ENCEPHALOPATHY

Several different viruses can directly invade the brain and cause **encephalitis**. Sometimes, the illness is mild with fever, headache, vomiting and some drowsiness. Sometimes it is severe with fever, confusion, convulsions and coma. The onset can be very sudden. There is no neck stiffness unless the meninges are also involved in the inflammatory process (meningo-encephalitis).

The brain is affected similarly in **encephalopathy**. Encephalopathy is not caused by infection but by toxins produced by bacteria (for example, shigella dysentery or typhoid fever), by drugs (for example, aspirin), toxins (for example, lead) or metabolic diseases. Beside the disturbance of brain function, other symptoms may be found (for example, acute liver failure) depending on the specific cause. Often there is no fever.

Treatment is symptomatic by paying attention to hypoglycaemia, convulsions, fever control, positioning the child as described under meningitis and ensuring a sufficient fluid intake. Antibiotics are not effective. If children with severe encephalitis or encephalopathy recover, they are often left with disabilities.

The unconscious child

Coma is a state of unconsciousness from which a child cannot be roused by any stimulation (voice or pain). The same causes that lead to coma can also lead to altered consciousness like drowsiness or semicoma (stupor) in which a child will show some reaction when you talk to him or to pain. Often a child goes through different stages of altered consciousness before he becomes comatose. There are many possible

causes, see box. It is important to be familiar with the emergency care and assessment of the unconscious child. Many comatous children will recover completely with good management.

Causes of altered consciousness and coma

- Recent convulsion (deep sleep is common for about 1 hour following a convulsion)
- Infections of the cerebral nervous system: meningitis, encephalitis, severe malaria, TB meningitis
- Coma caused by bacterial toxins in typhoid fever or sepsis
- Head injury
- Shock, including severe dehydration
- Hypoglycaemia (low blood sugar), especially in malnourished children and in those with a severe illness
- Poisoning (drugs, lead)
- Liver or renal failure
- Rare: congenital metabolic disorders or brain tumour

Emergency care of the unconscious child

1. **Turn the child on his side** (coma position, see figure 15–6) to reduce the risk of aspirating secretions or vomit into his lungs. If you suspect a serious neck injury, move the head in line with the body.
2. **Clear his airway**:
   - Gently lift his jaw forward and extend his head backward to prevent the tongue from falling back and blocking the airway.
   - Wipe out his mouth with a cloth to remove secretions.
3. If the child is cyanosed, give **oxygen**.
4. Immediately **treat any obvious complications** (for example, shock).

Child lying on his side with neck extended

Figure 15–6 ***Coma position.***

Assess the child to find a cause for the unconsciousness

Take a history

- ○ How and when did the problem start?
- ○ Has there been a preceding febrile illness?
- ○ Any convulsion?
- ○ Any injury?
- ○ Is it possible that the child could have ingested any drug or poison?

Examine the child especially for

- ○ Fever?
- ○ Signs of meningitis?
- ○ Dehydration?
- ○ Shock?
- ○ Injury of tongue or spontaneously passed urine (signs of recent convulsion)?
- ○ Bruises (signs of injury)?
- ○ Splenomegaly (malaria, sepsis)?
- ○ Malnutrition?

Helpful investigations

Investigations depend on your suspected diagnoses. A WBC and differential count, blood glucose, malaria blood film or a skull x-ray may be useful. Do not wait for the results of your investigations but start treating the most likely cause or causes.

Management following emergency care

1. Treat for hypoglycaemia (see page 9).
2. If the child has a high fever and is unwell, treat with chloramphenicol for typhoid fever and sepsis.

2–12 months	62.5–125 mg	3 times daily
1–15 years	125–250 mg	3 times daily
6–12 years	500 mg	3 times daily

3. If the child lives in an area with severe malaria, treat also for malaria (see page 23).
4. Treat any complications (for example, shock, dehydration or anaemia).
5. Keep the child in the coma position and turn him every 2 hours from one side onto the other.
6. Check the child's level of consciousness at regular intervals to monitor his progress. Write it down with the help of a "coma scale". There are different ones in use. The following is simple and helpful for children over 1 year; the higher the number, the worse the coma:

   0 = Is the child fully alert? (normal consciousness)
   1 = Is the child sleepy but responding to your voice? (drowsiness)
   2 = Is the child only responding to pain? (semicoma, stupor)
   3 = Is the child unresponsive to stimulation? (coma)

Paralysis

Paralysis is the inability to move certain muscles because of a disease of the nervous system**.** We can differentiate two main types:

1. **Flaccid paralysis** that occurs if the problem is in the nerves or in certain nerve cells of the spinal cord (anterior horn cells), commonest example is poliomyelitis.
2. **Spastic paralysis** develops if the problem is higher up in the spinal cord or in the brain, commonest example is cerebral palsy.

There are many different ways in which muscle weakness can present:

- Sometimes weakness appears after an acute febrile illness.
- Sometimes a child who used to stand and walk cannot do it any longer.
- Sometimes a young child will not start to walk or use his hands, for other causes of late walking, see box on page 173.
- Sometimes a child starts limping.
- Sometimes there is a history of back pain or trauma.

The general management of a child with paralysis

The general management aims are the same for all children with paralysis whatever the cause:

1. Prevention of contractures

2. Improving and strengthening the muscle function

These aims can only be achieved by correct positioning, exercises and certain appliances. Drugs are useless. Except in poliomyelitis when strict rest is indicated during the acute painful phase, exercises should be started immediately after paralysis has been diagnosed. How to help a paralysed child with flaccid paralysis is explained in detail below under "Poliomyelitis". For spastic paralysis, see below under "Cerebral palsy".

Causes of paralysis and their characteristics

COMMON	
• Poliomyelitis	The paralysis is flaccid, occurs with a febrile illness, is asymmetrical and the sensation is not affected (see text below**)**
• Cerebral palsy	The paralysis is spastic, the posture is typical (see text below)
LESS COMMON	
• Injection injury to sciatic nerve	It occurs immediately after an injection into the buttock (see text below)
• Infectious polyneuritis (Guillain-Barre-syndrome)	The paralysis starts suddenly without muscle pains, often after an unspecific viral illness. It is symmetrical and flaccid and involves the legs but often also arms and trunk. It is rapidly progressing and may paralyse the whole body within a few days. Breathing can become affected. There may be some loss of sensation. It slowly resolves over several months. Treatment and complications are the same as for polio.
• Paralysis to a newborn after difficult delivery	See page 183 "Birth trauma".
• Paralysis from a lesion or damage of the spinal cord (commonest: spinal tuberculosis, rare: injury or tumour; if from birth: spina bifida	Except in trauma, paralysis of the legs does not develop suddenly but gradually over several weeks or months. Often there is back pain and a child may not be able to touch his toes (due to back stiffness). You may feel a lump of the spine (gibbus), see pages 36 and 127.
• Leprosy	Only older children are affected. Paralysis of foot or hand occurs and often there are skin patches and loss of sensation, see page 154.

Non-neurological problems that can present like paralysis

• Osteomyelitis • Joint diseases (for example of the hip joint) • A missed fracture	A child is unwilling to use a leg or arm because of pain. Muscle wasting may develop because the child is not moving his limb. There is localised pain and possibly swelling over a bone or joint (see chapter 13. "Joint and bone problems").
RARE	
• Inherited muscle diseases	These may present in early life or when the child, often a boy, is getting older. The weakness is gradually increasing and there may be muscle wasting. The weakness may become so severe that a child cannot walk anymore. There is no specific treatment beside the general advice given for management of paralysis (see below).

POLIOMYELITIS

Poliomyelitis is a viral infection of the pharynx and gastro-intestinal tract that causes a mild unspecific illness. Only in 1% of all cases the virus reaches the nervous system and settles in nerve cells of the spinal cord (anterior motor horn cells) that control muscle movement. This results in paralysis, most often of the legs. Intelligence is not affected.

Poliomyelitis is transmitted by droplet infection from coughing or sneezing, or by infected faeces. The incubation period is 1-3 weeks. An affected child is infectious during the first 2 weeks of the illness but mostly the virus is transmitted by non-paralytic children. Most children exposed to the virus will not develop any illness. (Figure 15–7)

Acute poliomyelitis

Clinical features

Poliomyelitis most commonly occurs in young children between the age of 8 months–4 years. The disease, like many other viral diseases, classically goes through two stages. A child may complain about an unspecific illness like a common cold or mild gastro-enteritis with fever, cough, headache, sore throat, body pain or diarrhoea and vomiting. In the majority of children, the disease does not progress any further. Only in 1% of cases the first stage is followed by a second stage a few days later: the headache becomes more severe, muscle pain and tenderness develops. Meningeal irritation is common and you have to consider meningitis as a possible differential diagnosis. (In poliomyelitis the child is fully alert, while he is drowsy and ill in meningitis.) Then weakness and paralysis develop rapidly.

The paralysis has three characteristics:

1. It is **flaccid**.
2. It is **asymmetrical**.
3. **Sensation is normal**.

However, the typical clinical course of polio is usually not recognised. Many children will come to you with a history of weakness in one limb that started during an illness like a bad cold with fever and sometimes diarrhoea. Sometimes they are brought to you years after the initial illness with the complications and disabilities of poliomyelitis.

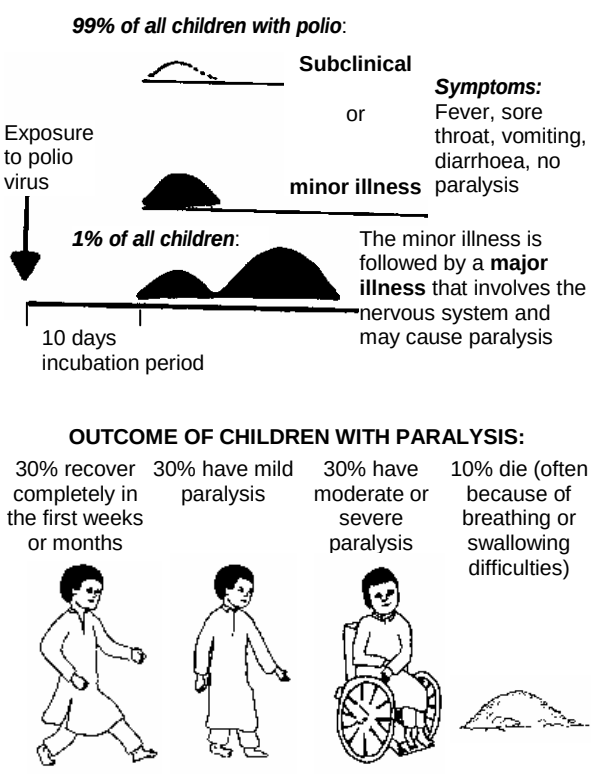


Figure 15–7 ***The natural course of poliomyelitis***.

Management during the acute illness

The acute stage of the illness during which the child becomes paralysed is characterised by very painful muscles.

1. **Complete bedrest**. Affected and painful limbs should be immobilised by splinting.
2. **No forceful exercises**. They may increase the paralysis!
3. **Good positioning**. Put the child in a comfortable position to prevent contractures (see figure 15–8).
4. **Good nutrition**.

NOTE: Do not routinely give any medicines; they do not help. Vitamin B-complex is useless. Never give any IM injections because they will increase the paralysis.

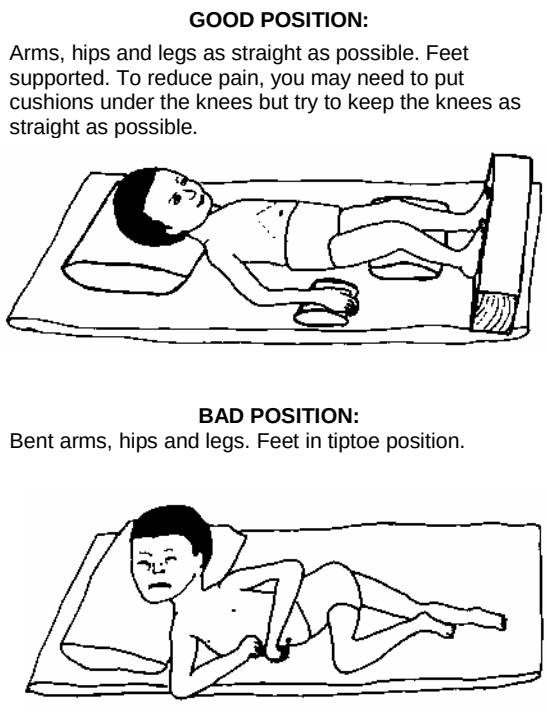


Figure 15–8 ***How to position a child with acute polio.***

Management after the acute illness

As soon as fever and pain are gone, the acute stage of the illness is over. Now start with rehabilitation. Generally, rehabilitation consists of the following points:

1. **Exercises to prevent contractures** and to help the return of muscles strength. The child should do full range-of-movement exercises, see figure 13–3. He should move and use his limb as much as possible.
2. **Continuing normal life**. The child should be encouraged to take part in daily life, work and school as much as possible. The family should not do everything for the child but help him to take care of himself as before the illness.
3. **Walking aids**. Crutches, splints or other aids should help the child to move around.

Figure 15–9 shows the changing needs for aids and help in the rehabilitation of a child with polio. It just gives some examples but most steps are necessary for many children. Some children will need only normal exercise and play.

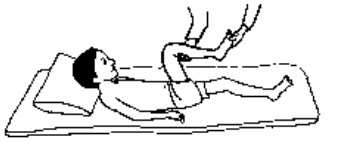
What a family should know about polio

Without the cooperation of the family, rehabilitation will not be successful. Make sure the family understands the following points:

1. Medicines do not help.
2. The family can help the child to regain his strength and mobility. Tell them that you do not know yet whether his weakness will go away completely. However, they can help the child to lead a normal life despite the weakness.
3. The child's intelligence is normal.
4. The child can marry and his children will not be affected.

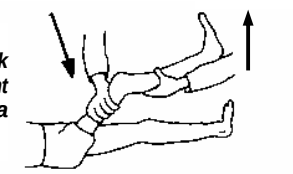
THE FOLLOWING FIGURES GIVE SOME EXAMPLES, MOST STEPS ARE NECESSARY FOR MANY CHILDREN:

1. Exercises to keep full range of movements (motion). These exercises should start within days after the paralysis appears, as soon as the pain has subsided. Continue them throughout rehabilitation.

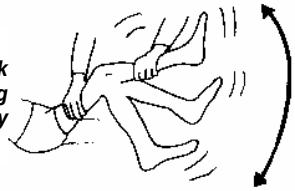


CORRECT:
Stretching exercises work better if you stretch the joint firmly and continuously for a few moments.

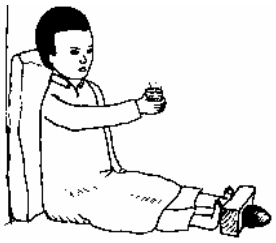
Steady lift



WRONG:
Do not "pump" the limb back and forth. This "pumping method" is not doing any good!

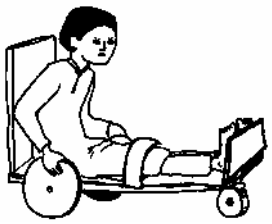


2. Supported sitting in positions that help prevent contractures.



3. Active exercises with the limbs supported to gain strength and maintain full motion

4. Wheelboard or wheelchair with supports to prevent or correct early contractures



5. Parallel bars for beginning to balance and walk

6. Walking machine or "walker"

7. Under arm crutches

8. A stick or no arm support at all

Figure 15–9 ***Rehabilitation of a child with poliomyelitis.***

Prognosis

The outcome of children with paralysis is different (see figure 15–7). A paralysis that remains after 7 months will not go away but exercises have to continue to prevent complications and further muscle weakening.

How polio can be prevented – in 30% of cases, paralysis is a doctor's fault

1. Encourage breastfeeding because it provides some protection against polio.
2. Make sure children are immunised against polio. Discuss with those who provide the vaccine in your area the need to keep it cool while it is transported or stored (cold chain), otherwise the vaccine will become ineffective.
3. Never give IM injections in polio. About 30% or more paralytic cases of polio are caused by IM injection. Giving an injection in the muscle, not just during the paralytic stage, but also during the time of the initial unspecific illness, will cause this muscle to be paralysed or an existing paralysis to worsen. The wrong habit of giving unnecessary injections for illnesses like diarrhoea or fever with cough disables many children for life.

DANGER!

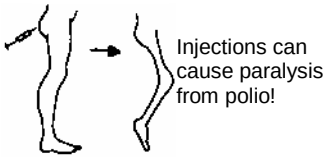


Figure 15–10 ***IM-injections in polio***.

Old poliomyelitis cases - how to help children who already have complications of polio

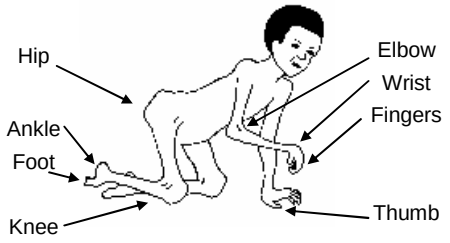
Many children have been paralysed for a long time and already have severe deformities or joint contractures. Contractures are shortenings of muscles and tendons so that the limb cannot be moved fully. Often, these need to be corrected before a child can do exercises, use braces or begin to walk.

Management of contractures

1. When contractures are just beginning to develop, stretching exercises (see figure 15–9) and correct positioning are all that is needed.
2. When contractures are more advanced, do stretching steadily over a long time. Use fixed positions, casts or braces that keep a continuous pull on the affected joint (see figure 15–11).
3. When contractures are very long-standing and severe, surgery may be needed.

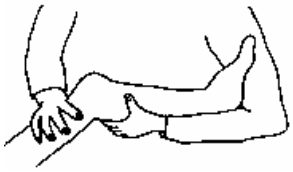
Common contractures in polio:

A child with paralysis who crawls around like this and never straighten his legs will gradually develop contractures so that his hips, knees and ankles can no longer be straightened.



EXERCISES TO CORRECT MILD CONTRACTURES:

These exercises are similar to the range-of-motion exercises to prevent contractures, see figure 13–3.



1. Hold the limb in a steady, stretched position while you count slowly to 25.
2. Then gradually stretch the joint a little more, and again count slowly to 25.
3. Continue increasing the stretch in this way steadily for 5 or 10 minutes. Repeat several times a day.

MANAGEMENT OF ADVANCED CONTRACTURES:

Correct the contracture as far as you can with stretching exercises and positioning.

Then correct it as much as possible with a series of casts or special braces.

If more correction is still needed, consider surgery that often consists of lengthening the tight cords

Figure 15–11 ***Management of contractures***.

INJECTION INJURY TO THE SCIATIC NERVE

Many children suffer paralysis of a leg from damage to the sciatic nerve from a wrongly given IM injection (see figure A–2 on page 203). Often the injection was not only given incorrectly but was also not necessary in the first place. Paralysis follows immediately after the injection. Typically, both sensation and muscle movements are affected (in poliomyelitis, sensation is normal). Sometimes the function of the leg recovers after several months. Treatment consists of exercises and the prevention of contractures.

CEREBRAL PALSY

Cerebral palsy is one very common cause of physical disability. It may affect as many as 1 in every 500 children. Cerebral palsy means "brain paralysis". It is a disability that affects the part of the brain that controls the movement and body position. The part that controls thinking and learning is very often not affected. Cerebral palsy is caused by damage to the developing brain, either before the baby was born, during birth or during the first years of life. We do not always know what has caused it. Once damaged, the affected parts of the brain do not recover, but they also do not get worse. However, the movement and position problems will either improve or be made worse. This depends on how you treat a child. The earlier treatment starts, the more improvements can be made.

The three types of cerebral palsy

Children with any type of cerebral palsy are floppy as babies. Stiffness and other abnormal movements develop gradually. Which limbs are involved differs from child to child: sometimes the arm and leg on one side (hemiplegia), sometimes both legs, sometimes both legs and both arms (quadriplegia).

1. **Spastic cerebral palsy**. This is the commonest form. A child has muscle stiffness that causes part of the body to be stiff. The stiffness increases when a child is in certain positions:

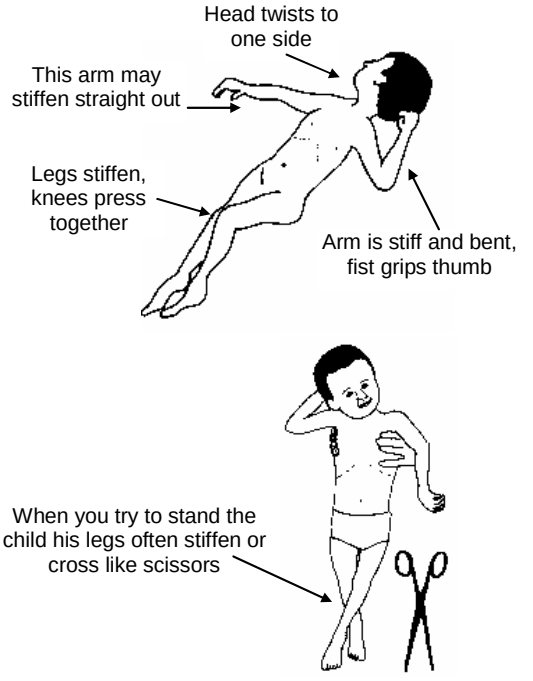


Figure 15–12 ***Spastic cerebral palsy***.

2. **Athetotic cerebral palsy**. It is characterised by uncontrolled movements:

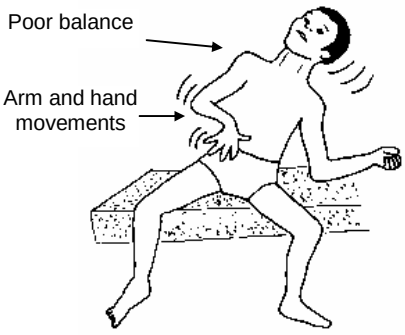
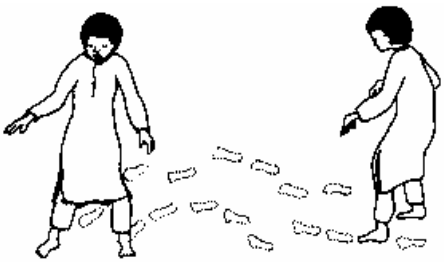


Figure 15–13 ***Athetosis***.

3. **Ataxic cerebral palsy**. It is characterised by poor balance (ataxia).

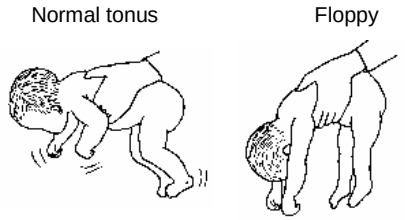


To keep his balance, a child with ataxia walks bent forward with feet wide apart

Figure 15–14 ***Ataxia***.

How to recognise cerebral palsy early

- At birth, a baby is often floppy:



- The baby is slow to develop, especially slow to hold up his head, sit alone, crawl or walk.

- A child may not use his hands or has difficulties suckling or swallowing.
- A child's body may suddenly stiffen like a board when he is handled, tries to move, or when he is frightened.

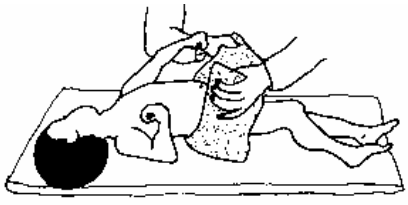


Figure 15–15 ***How to recognise cerebral palsy early***.

How to assess a child with cerebral palsy

Carefully examine the child to define his problems:

- Observe what a child can do. Observe whether he is able to use his hands. How much can he help himself with feeding, washing or dressing?
- Observe what he looks like when he moves and when he is in different positions. Which limbs are mainly affected?
- Find out what he cannot do, and what prevents him from doing it.
- Children with cerebral palsy will be slow in motor development, therefore decide which of the following stages the child has reached:

  Head control – trunk control/sitting – balance – walking

Assess the child for other associated problems:

Often cerebral palsy children have associated problems. Find out whether the child is suffering from any of the following:

- **Mental retardation**. Some children appear dull because they are moving slowly and may not be able to speak clearly because of coordination problems of the oral muscles. However, behind this curtain of physical disability, the child may have a normal or above normal intelligence. Imagine the awful frustration if everyone treats him as if he were mad! Only half of all cerebral palsy children are mentally handicapped, the other half are mentally normal!
- **Gastro-oesophageal reflux or oesophagitis**. These are causing irritability, malnutrition and aspiration pneumonia and are common in spastic cerebral palsy when all four limbs are affected (quadriplegia).
- **Speech problem**.
- **Hearing problem**.
- **Vision problem** (for example, squint).
- **Convulsions**.
- **Restless behaviour**. It may come partly from a child's frustration that he is not able to do what he wants with his body. The brain damage itself may also affect behaviour.
- **Complications** (for example, contractures).

Management

- **Explain the child's condition to the family**:

  Education of the family is most important. Make sure that the family understands all of the following points. Do not raise any unrealistic expectations; progress is a slow and hard process.

  What a family should know:

  1. Part of the child's brain has been paralysed. This damage cannot be repaired but will also not get worse. Often a child can learn to use the undamaged parts to do what he wants to do. The help of the family is important for the child to achieve this.
  2. A child with cerebral palsy will become an adult with cerebral palsy. Searching for a cure will only bring disappointment and may use up the family's money. Instead, the family can help the child to live with his disability and to become as independent as possible.
  3. Although a child may appear mentally handicapped, that may not be the case. He may just have more difficulty in developing his skills because of the physical disability. Help him and give him enough opportunities to learn.
  4. A child with cerebral palsy can get married and the children will not have the condition.

- **Show the family how to support the child**. The aim is to help the child with development of movement, communication, self-care and relationships with others.

  After assessing the child you have found out which developmental stage the child has reached: head control – trunk control/sitting– balance – walking.

  Aim is to try to help the child to reach the next stage. A child who can control his head but cannot sit should not be expected to learn walking as the next step. Help him to get trunk control and to learn sitting first (see figure 15–16 "A common misbelief").

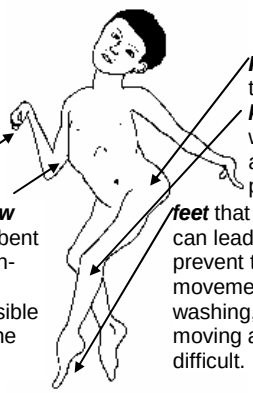
The legs stiffen and the feet go into a rigid tiptoe position.

This child is **not** almost ready to walk

Figure 15–16 ***A common misbelief. Many parents believe their child is "almost ready to walk" when they hold him as shown above. However, the position of the child is only a reflex. Do not hold a child like that; it will only increase his disability.***

  - **The family should learn not to do everything for the child**. They should help him just enough that he can learn to do more for himself. For example, when a child is able to drink from a cup, he should always do it himself without help even if it may take longer.
  - **The family should help the child to achieve good body positions**. Due to the abnormal pull of muscles, children often spend a lot of time in abnormal positions. These positions can cause deformities, for example contractures. They also prevent the child from doing things. Always encourage those positions that are appropriate to the child's development. Change the positions frequently (see figure 15–17).

Problems from bad positions:



A ***wrist*** or ***elbow*** that is always bent can lead to contractures that make it impossible to straighten the arm or hand.

Hips that are continually bent, or ***knees*** that are always held together and never completely straighten or ***feet*** that are always "tiptoe", can lead to contractures that prevent the normal range of movements. This can make washing, toileting and moving about much more difficult.

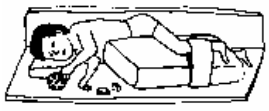
Examples of good positions:

Try to find ways for the child to be in positions that correct or are opposite to his abnormal ones.

● *LYING AND SLEEPING*

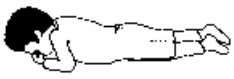
If the baby's knees usually press together or his legs cross like scissors, the legs can be held apart by using many thicknesses of nappies like this:

If the child's body often arches backward, try positioning him to lie and play on his side.

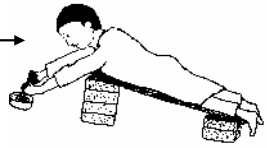


Put the child in positions where he can do things:

If he cannot do anything in this position:

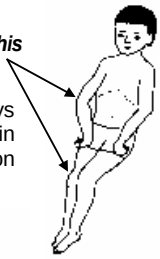


Lie him like that



● *SITTING*

If his legs push together and turn in and his shoulders press down and his arms turn in:



Sit him with his legs apart and turned outwards.

Look for simple ways to help him to stay in the improved position without your help.

● *STANDING*

Many children with cerebral palsy stand and walk in strange positions. A child's unsure balance often increases the uncontrolled tightening of certain muscles and makes balance even more difficult.

Bent wrists, hips and knees

Tiptoeing

When you help a child keep his balance, he is less tense and can stand straighter.

A child who can sit but not stand yet, can be placed in a standing frame for 1-2 hours each day (not longer).

● *CARRYING A CHILD*

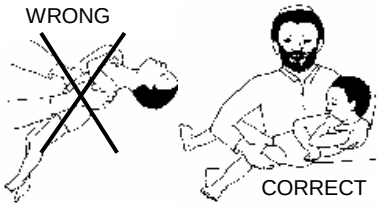
If the child usually lies with arms bent and legs straight:

WRONG
Do not carry him like this:

CORRECT
Always carry him in ways that straighten his arms and bend his knees and hips.

● *PICKING UP A CHILD*

Whenever you handle a child, look for ways to stretch and relax tight muscles.

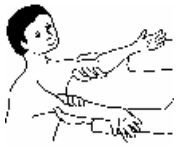


● *DRESSING*

When you want to help a child dress, if his arms press against his chest:

Do not try to pull the arms straight. They will stiffen more:

Hold the arms above the elbows and gently turn the arms out and straighten them at the same time.



● *FEEDING*

If head and shoulders stiffen backward, do not try to pull the head forward. The head relaxes more if you put your arm across the back of the neck and push the shoulders forward:

WRONG

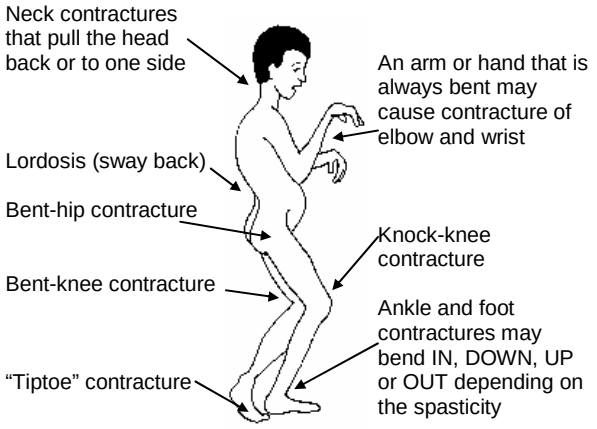
CORRECT

Figure 15–17 ***Good positioning in cerebral palsy***.

- **The family should help the child to use his hands**. They should give him many opportunities to touch, feel and handle different shapes and surfaces such as round, big, small, hot, cold, sticky, thin, soft or hard. This helps the child to use his hands and to learn because the sense of touch, pain, heat or cold is normal in cerebral palsy.
- **The family can help to prevent deformities**. The correct positioning will help to reduce stiffness and contractures. The family should also move the affected joints in their full range of movements. (Figures 13–3 and 15–18)
- **The family should avoid the two common mistakes:**
  Mistake 1: they should **not massage** spastic muscles. Massage relaxes muscle spasms but it increases the muscles tightness of spastic muscles in cerebral palsy.
  Mistake 2: they should **not pull or push directly against spastic muscles**. This will cause the muscles to tighten more. Instead, they should change the child to a position that will relax the spasticity, for example, by bending head and back forward.

NOTE: How about drugs for cerebral palsy? Drugs should not routinely be given but only be used for certain associated problems, for example, to control convulsions.

PREVENT CONTRACTURES LIKE THESE:



STRETCHING EXERCISE TO PREVENT CONTRACTURES:

Slowly twist or help the child to twist his body from side to side. This reduces spasticity throughout the body and is a good first stretching exercise. Make it into a game. Do the full range of movements for each affected joint. Do it very slowly. Stretch the joint firmly for a few moments. Do no not "pump" the joint, see figure 15–9.

Figure 15–18 ***How to move spastic muscles to prevent contractures.***

Headache

Headache is a common complaint in illnesses with fever and usually there are other clinical signs and symptoms depending on the origin of the disease. It is important to exclude meningitis in children with acute headache.

Management if the cause of the headache is not obvious

1. Check for anaemia.
2. Measure the blood pressure.
3. Remember that headache may be a way in which a child expresses stresses or fear of the future.
4. Consider **migraine** if the headache is recurrent, throbbing and sudden. Migraine headache is often accompanied by vomiting or abdominal pain and the child is very sensitive to light or noise. Treat the acute attack with ***paracetamol*** and ***metoclopramide***. Start these drugs at the onset of the pain. If the child suffers more than three severe attacks per month, try prophylactic treatment with propranolol 10 mg 2 times daily for one month and see whether it reduces the number and severity of attacks. If it does, continue propranolol for several months. The child should avoid tea.

Causes of headache

COMMON

- Fever

LESS COMMON

- Meningitis
- Typhoid fever
- Sinusitis (children over 7 years)
- Toothache
- Earache
- Anaemia
- High blood pressure
- Poor vision or other eye diseases
- Unrelieved stress or fear
- Migraine

RARE

- Brain tumour or other causes of increased intracranial pressure

Large head

How to measure the head circumference, see figure 15–19.

A large head may not be serious. In some families, many members have a large head. In thalassaemia and rickets, the head is large. If the head size increases after meningitis, a subdural fluid collection is likely.

Causes of large head

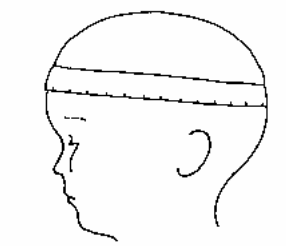
- Normal in some families
- Thalassaemia
- Rickets
- Subdural effusion following meningitis
- Hydrocephalus

HYDROCEPHALUS

An important differential diagnosis of a large head is hydrocephalus. Hydrocephalus is caused by a blockage inside the brain that prevents the fluid produced in the inner chambers of the brain from reaching the surface of the brain where it gets absorbed. The blockage can be congenital: a baby is born with it and it is often associated with spina bifida and meningocele. It can also be the result of meningitis.

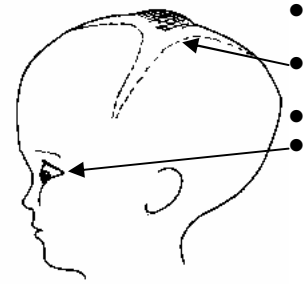
Successful drug treatment does not exist. Treatment is by shunt-operation: a tube is inserted that drains the fluid from the brain either into heart or abdomen. The operation does not always give good results.

How to measure the head circumference:



Measure with a tape around the widest part of the head.

HYDROCEPHALUS:



- Very large head, head circumference increases
- Young children: wide sutures, bulging fontanelle
- Dilated scalp veins
- The eyes may turn downwards ("sun setting sign")

Figure 15–19 *Hydrocephalus*.

Spina bifida (meningocele, myelomeningocele)

Spina bifida is a defect that comes from a problem in the very early development of the unborn child (first 3 months of pregnancy). The backbones (vertebra) have not closed over the centre, leaving an area that is not covered by bones. Sometimes the nerves of the spinal cord will bulge through this area (figure 15–20). Without early surgery, the meningocele will almost always become infected and the child will die of meningitis. Common associated problems are paralysis of the legs, poor urine and bowel control, hydrocephalus, congenital dislocated hips or club feet.

How to reduce the risk of recurrence in the next pregnancy

Spina bifida is common, about 1 in every 500 babies is born with spina bifida. The cause is unknown but it has been shown that giving the mother ***folic acid*** can reduce the risk of the next child being born with the same deformity. It is recommended to start folic acid (0.4 mg once daily) 1 month before conception until the first 3 months of the pregnancy are completed. However, this recommendation is impractical for Afghanistan. It is best to advise the mother to take ½ tablet folic acid (= 2.5 mg) every day, even if she is not pregnant and continue it, together with one ferrous sulphate tablet every day throughout pregnancy.

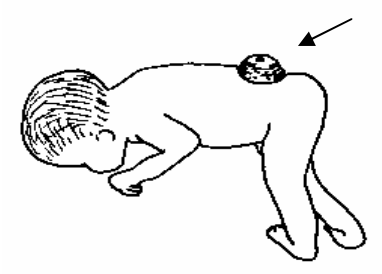


Figure 15–20 *Spina bifida*.

How drugs and poisons affect the nervous system

Many drugs have side-effects that affect the brain or movement. You need to know about the risks of those drugs and only prescribe them when strictly indicated, especially in young children. It is also important to know the symptoms of some poisonous substances that are found in many households. Management of poisoning, see page 171.

Drugs

Aminophylline

Overdose IV causes convulsions (for early signs of toxicity, see box on page 62).

Amitriptyline

It may produce unsteadiness, coma or convulsions as well as restlessness or hallucinations.

Aspirin (acetylsalicylic acid)

Overdose can easily occur if a too high dose is given to a child with fever and dehydration. Clinical signs are deep breathing, irritability and excitement that is then followed by coma and convulsions.

Chloroquine

Intramuscular (IM) injection may be followed by convulsions and sudden death. Do not give chloroquine IM to children.

Chlorpromazine

It is often given for vomiting. A high dose can cause severe behaviour problems, movement disorders or drowsiness and coma.

Clioquinol

Never use it. It has no indication and may cause nerve damage.

Diphenoxylate (Lomotil)

Never use it in children. It may cause coma, respiratory depression or convulsions.

Ferrous sulphate

Overdose will first cause vomiting and diarrhoea with blood and collapse before coma and convulsions appear.

Isoniazid

It can cause neuritis that presents as "pins and needles" or burning in the hands or feet. Do not stop isoniazid but add pyridoxine (vitamin B_6) 25–50 mg once daily.

Metoclopramide

It should be avoided in young children. It can cause severe movement problems (extrapyramidal symptoms): tremor, abnormal body and face movements (dystonia), restlessness and drowsiness.

Piperazine

It is no longer recommended as "first choice" in worm infections. Several days after the first dose, a child may become dizzy, drowsy, disorientated and may show muscle weakness, co-ordination and balance problems.

Poisons

Kerosene (paraffine)

The commonest complication of accidental kerosene poisoning is severe chemical pneumonia. The absorption of kerosene from the gut can cause drowsiness, convulsions and coma. Management see page 171.

Lead

Two sources of lead poisoning are the lead-containing eye shadow (surma) and cosmetics. Lead poisoning is usually a chronic process and the diagnosis is often missed. Mild cases present with weakness, irritability, headache or anaemia. More severe cases can present acutely with convulsions and papilloedema from swelling of the brain. You should consider the diagnosis of lead poisoning on the base of clinical symptoms, anaemia, proteinuria, papilloedema. So-called "lead lines" in bones are a late sign. The mortality of symptomatic lead poisoning is high.

References

1. Bewes P. Epilepsy – Diagnosis and Management. Script for Continuing Medical Education ca. 1995.
2. Ebrahim GJ. *Paediatric Practice in Developing Countries.* 2nd edition. London: Macmillan Education Ltd. 1993.
3. Eley B, Levin M. Reducing the threat of meningitis. *ARI News* 1994: 28; 6-7.
4. Hull D, Johnston DI. *Essential Paediatrics.* 3rd edition. Edinburgh: Churchill Livingstone 1993.
5. Illingworth RS. *Common Symptoms of Disease in Children.* 9th edition. London: Blackwell Scientific Publications 1988.
6. King M, King F, Martodipoero S. *Primary Child Care*. Book One. Oxford: Oxford University Press 1978.
7. Molyneux E. Managing meningitis and severe malaria. *Child Health Dialogue* 1996: 3-4; 6-8.
8. Reed K. Health education on convulsions. *Child Health Dialogue* 1995: 1, 11.
9. Sanders RKM. The management of tetanus 1996. *Tropical doctor* 1996; 26: 107-115.
10. Stanfield P, Brueton M, Chan M, Parkin M, Waterston T. *Diseases of Children in the Subtropics and Tropics*. 4th edition. Kent: Edward Arnold 1991.
11. Stanfield P. *Child Health*. 2nd edition. Nairobi: African Medical and Research Foundation 1997.
12. Tamburlini G. Fast action saves lives. *Child Health Dialogue* 1996: 3+4; 3-4.
13. Vince JD. Bacterial meningitis in developing countries. Letter. *Tropical Doctor* 1996: 2; 91-92.
14. Wright JP, Ford HL. Bacterial meningitis in developing countries. *Tropical Doctor* 1995: 1; 5-8.

16. Skin problems

An easy way to diagnose skin diseases

The skin protects the body, for example from the entry of bacteria. Some diseases, such as scabies, harm the skin only. Others, such as measles or leprosy, affect the skin and other systems of the body.

The diagnosis of skin diseases becomes easy if you look carefully at the lesions and describe them in detail. Using the check-list below will help you to identify the characteristic features of each skin disease and to identify those that could be dangerous. With the help of the check-list you will be able to correctly diagnose most skin diseases.

How to assess a child with a skin problem

Try to answer all of the following questions. Practise answering these questions whenever a child comes to you with a skin problem so that you develop a routine for examining skin lesions. If you look at skin lesions only briefly, you are likely to miss important clues towards the diagnosis.

Take a history

- How and where did the lesion start?
- Has the child any general symptoms, such as fever?
- Does someone else in the family suffer from the same condition?

Examination-check-list – always answer all questions

- **Where are the lesions?** Each skin disease has its own special places where you find most of the lesions.
- **How many lesions are there?** If there are many lesions, covering a whole area or the whole body, it is a **rash**.
- **Are the lesions symmetrical?** Symmetrical means they are similar on each side of the body (for example, in eczema).
- **What colour are the lesions?** For example, pale (hypopigmented) or red (erythema). It is important to recognise lesions that are caused by bleeding into the skin (**petechia**), see figure 16–2.
- **When you rub the lesion, can you find scales?**
- **Do the lesions itch?**
- **What type of lesions can you see?** Use the names in figure 16–1 to describe the types of lesion.

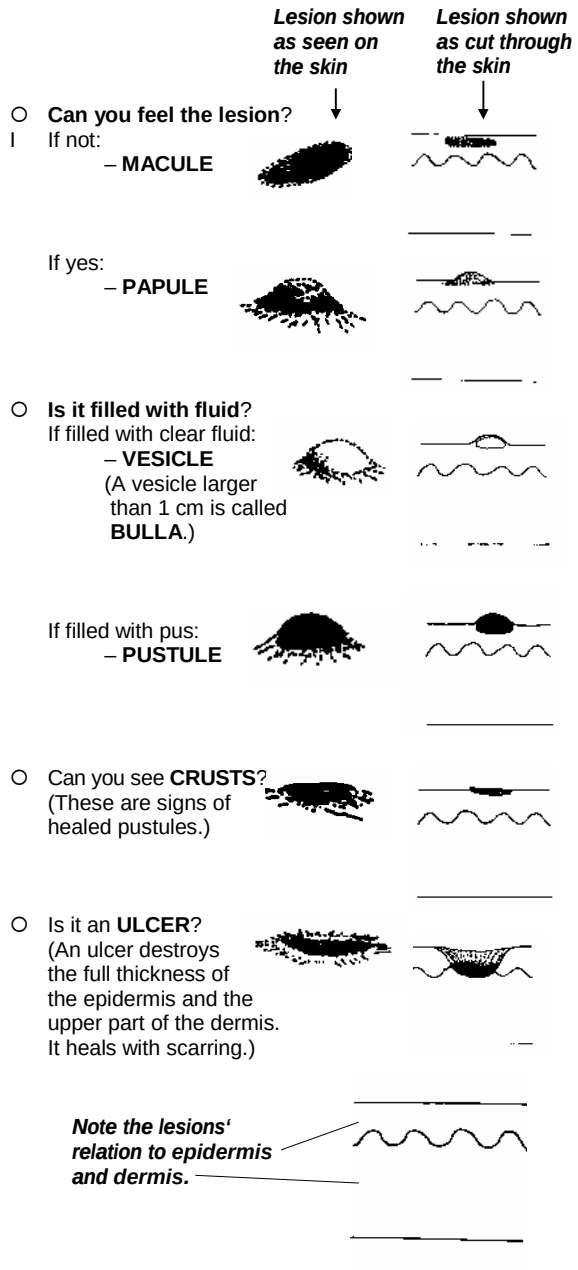
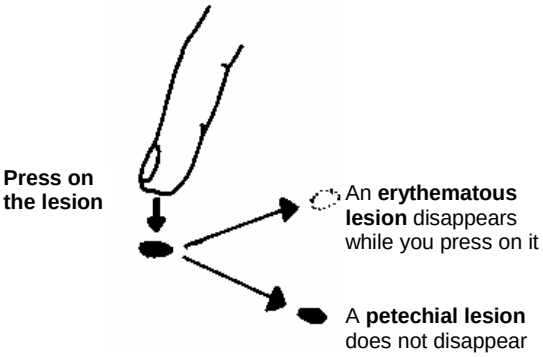


Figure 16–1 ***How to decide which type of lesion you see***.

- Are there danger signs that may indicate a serious illness?
  - Signs of inflammation:
    - Redness
    - Warmth
    - Tenderness
    - Swollen regional lymph nodes
    - Fever
  - Is there any bleeding into the skin (petechia?)

○ **Signs of a general, systemic illness?** Do a full examination of the other body systems to find out whether the skin problem could be a sign of a systemic disease (for example, malnutrition or measles).



Most lesions are erythematous (red), caused by increased blood flow. Few lesions are caused by bleeding into the skin. These petechial lesions may indicate a serious illness.

Figure 16–2 ***How to identify petechial lesions***.

Causes of petechia

- Serious infection (meningococcal sepsis)
- Low thrombocytes
- Leukaemia
- Viral infections
- Allergic vasculitis

General information about skin medicines

The form in which a skin medicine is applied is important because each base substance has its own effect:

- **Ointments** are greasy and are useful for dry scaling skin (for example, chronic dry skin conditions). Apply usually 2 times daily.
- **Creams** tend to make the skin moist, use them for crusted weeping lesions. Apply usually 3 times daily.
- **Lotions** are suspensions that soothe inflamed or weeping skin lesions. Apply usually 2 times daily.
- **Pastes** are very thick and may protect and dry the skin. Apply usually once daily.

Anti-infective drugs

Whenever there are signs of spread of an infection, systemic antibiotics should be used. Topical antibiotics (antibiotic creams or ointments) should generally be avoided because they can cause allergy to the drug and make it dangerous to use the same drug later orally or by injection. Especially never use penicillin ointment, also gentamicin ointment must be avoided.

List of basic essential skin medicines

Drug	Indications
Benzoic acid 6% + salicylic acid 3% (Whitfield's ointment)	Fungal infections (ringworm)
Benzyl benzoate lotion	Scabies, lice infestation
Calamine lotion	Pruritus (itching), eczema, psoriasis, heat rash
Clotrimazole 1% cream	Fungal infections (ringworm)
Gentian violet solution	It is anti-septic and drying: Fungal infections, mouth ulcers, skin infections, burns and superficial wounds, wet skin lesions
Hydrocortisone 0,5%, 1% cream or ointment	Inflammatory and itching skin disorders
Polyvidone-iodine solution 7.5%, 10%	Anti-septic
Salicylic acid 3–5% in vaseline	Scaling skin lesions
Zinc oxide paste	Sun blocker, superficial wounds, pressure sores

Topical steroids

Topical steroids are helpful in inflammatory and itching skin disorders. However, they can have dangerous side-effects because about 35% of the steroid may be absorbed and can cause systemic toxicity. Topical steroids may also cause thinning of the skin (atrophy) and telangiectasis. These changes are irreversible and therefore strong steroids must never be used in the face. Often steroids are prescribed as a "blind treatment" when the diagnosis is unclear. This is dangerous because steroids reduce immunity and in case of an infection, the infection can spread further and be more difficult to diagnose correctly. Steroid applications that are combined with antibiotics and antifungal agents are of doubtful value and cannot be recommended.

Reduce the risk of topical steroids by observing the following rules:

1. Only use topical steroids when you are sure they are indicated.
2. Do not use them for longer than 1 week.
3. Do not use them on large areas or in open wounds.
4. Do not use preparations stronger than hydrocortisone 0.5% on the face.

The different strength of steroids

Mildly potent
- Hydrocortisone

Potent
- Betnovate

Very potent
- Dermovate

Skin infections caused by bacteria

Bacterial skin infections are very common. Many families do not have enough water and not enough money to buy soap. Therefore, they cannot wash their children regularly to clean the skin from harmful bacteria.

Pyogenic (pus-making) bacteria (usually streptococcus or staphylococcus bacteria) can infect the skin directly. They can also infect skin that has already been harmed (for example by insect bites or eczema). This is called a secondary infection. Bacterial infections are dangerous because they can spread and cause septicaemia. In a child with a bacterial skin infection, always look whether the infection is spreading (see figure 16–3). An infection that is spreading is an indication to give antibiotics orally or by injection.

Management of a skin infection that is spreading

1. Drain any abscess (see below).
2. If the infection affects parts of the arm or leg, immobilise the limb.
3. Give appropriate antibiotics:
   - *If not severe*: oral ***penicillin V***
   - *If severe*: ***procaine benzylpenicillin*** IM
   - *If very severe or not responding to treatment*: add ***cloxacillin***
   - *If penicillin allergy*: erythromycin
4. After the infection has improved, treat any underlying problem such as scabies.

IMPETIGO

Clinical features

Impetigo is a common skin infection, usually on a child's face. It is very infectious and often several children in one family are affected. Flies can transmit the disease. It starts as a red macule that soon turns into vesicles that break easily and form red, very wet lesions with typical yellow crusts. These wet lesions with yellow crusts are the presentation of impetigo that you will most commonly see.

- Wet
- Yellow crusts
- Very contagious
- Sometimes bullae

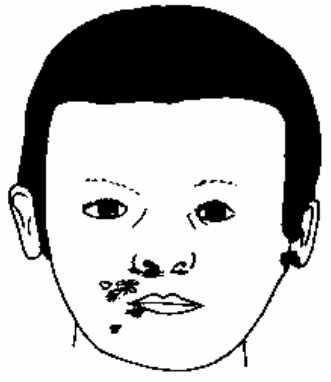


Figure 16–4 ***Impetigo***.

Management

1. Remove the crusts with soap water.
2. Cut hair away from scalp lesions.
3. Apply gentian violet 1% 2 times daily.
4. If the lesions are widespread, the child shows

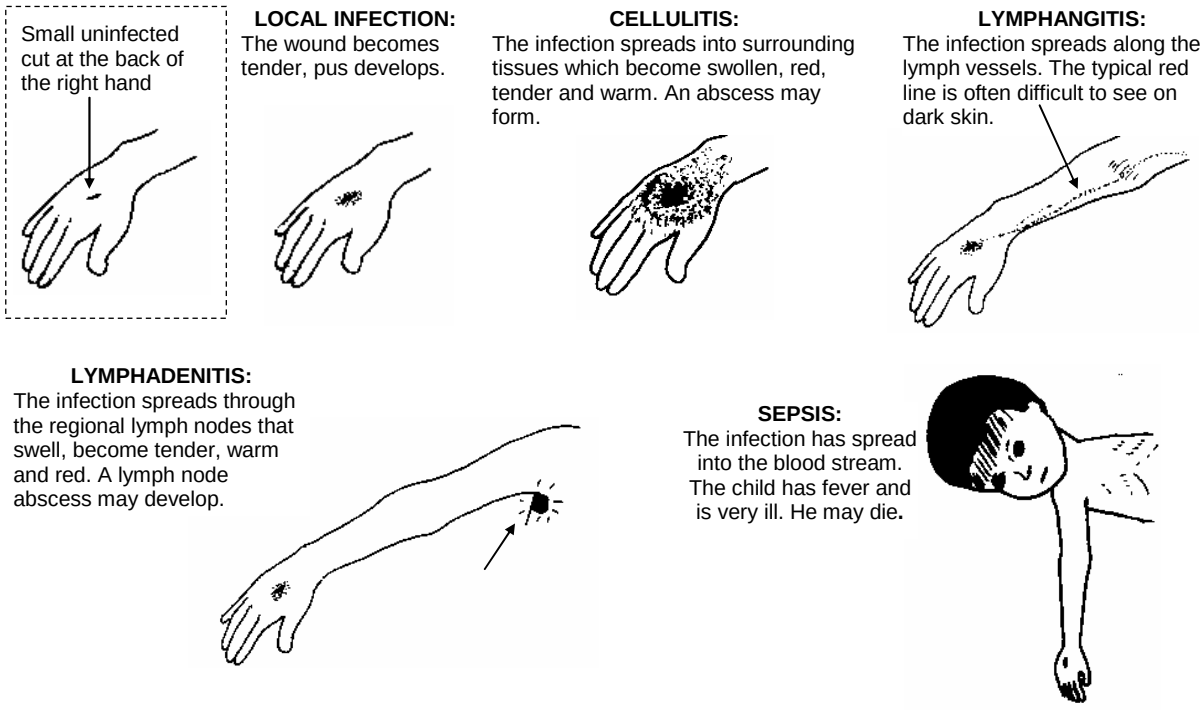


Figure 16–3 ***How a skin infection can spread - shown on the example of a small cut at the back of the hand***.

systemic signs (for example, fever) or the patient is a newborn: give oral or IV/IM antibiotics (see above "Management of a skin infection that is spreading ").

Complications

Impetigo can result in sepsis when bacteria reach the bloodstream. Impetigo is especially dangerous for babies. Streptococcus bacteria causing impetigo can sometimes cause rheumatic fever or acute glomerulonephritis, staphylococcus bacteria may spread to bones and cause osteomyelitis.

BOILS AND ABSCESSES

Clinical features

A pustule is a small vesicle filled with pus. It is superficial. Boils are a collection of pus deeper in the skin and are often at a place where a hair grows. If the collection of pus is very large, it is called an abscess. In abscesses, always consider the possibility of a foreign body.

Management

Small boils without signs of spread usually do not need any treatment. Advise the family to wash the whole child with soap. NEVER squeeze a boil to get pus out because your squeezing may cause spread of the bacteria into the surrounding tissues and blood-stream.

1. Apply ***gentian violet***.
2. Give ***penicillin V*** or erythromycin if there are signs that an infection is spreading or if a child has many boils.

How to drain an abscess

An abscess will not heal unless you drain the pus. If abscesses are deep under the skin: it is preferable to drain them under anaesthesia (regional anaesthesia or general anaesthesia, for example with ketamine).

1. Tell an older child what you are going to do. Say that it will be over quickly. Ask a helper to hold the child.
2. Take a sterile scalpel and quickly cut into the top of the abscess where the pus is closest to the skin.
3. Put a pair of forceps in the wound and open them. This will make a way for the pus to come out. Never put the end of the scalpel into a wound because of the risk of cutting an artery or nerve.
4. Put a piece of wet sterile gauze into the hole of the abscess. This will ensure that if pus builds up again, it can drain easily. Take out a little more gauze every day while the abscess is healing.
5. Antibiotics are often not necessary once an abscess has been drained.

PYODERMA

Children often have infected lesions on their skin or scalp. We call these infected lesions for which there is no special name pyoderma. The lesions may have been secondary infected ringworm, eczema or scabies.

Management

1. Wash the child.
2. Apply gentian violet 1% to the lesions 2 times daily.
3. If many lesions or signs that the infection spreads, treat as described above "Management of a skin lesion that is spreading".
4. Once the infection has healed, examine the child again and treat any underlying skin disease.

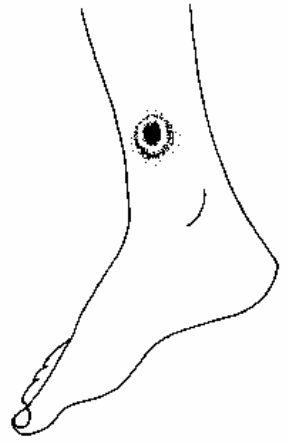
Skin ulcers

Causes of chronic skin ulcers

- Cutaneous leishmaniasis
- Severe malnutrition
- Skin tuberculosis

CUTANEOUS LEISHMANIASIS

Cutaneous leishmaniasis is a parasitic skin disease that is transmitted by the bite of the sandfly. A red, itchy papule appears some weeks or months after the bite of a sandfly. The papule enlarges to 1 cm or more in diameter and then develops into an ulcer with sharp indurated margins. There is often some tenderness. The ulcer heals by itself after 3-18 months. The healed ulcer leaves a typical scar. Most children are affected on exposed skin (face, hands, feet) and about half of all cases have multiple lesions. The parasites can be detected by microscopic examination of tissue from the non-necrotic wall of the ulcer.



- Deep ulcer
- Chronic, painful
- Raised edges
- On exposed parts of body
- Heals with typical scarring over 6-18 months

Figure 16–5 *Cutaneous leishmaniasis*.

Management

Specific treatment with the drug pentavalent antimony (Glucantamine or Pentostam) is available. However, the correct use of this drug requires special training. Sadly, it is often used incorrectly. The common practice just to give one or a few injections subcutaneously near a lesion does not provide any treatment benefit. Instead, it is painful, wastes resources and may encourage drug resistance. Generally, early and mild lesions are treated with a course of intra-dermal intralesional injections while late, widespread and more severe lesions are treated with IM injections. When resources are limited sometimes only lesions near vital structures are treated. Specialist clinics for the treatment of cutaneous leishmaniasis exist at different locations and all patients should be referred to there for treatment.

SKIN ULCERS IN SEVERE MALNUTRITION

They are usually on the lower parts of the legs and are accompanied by signs of kwashiorkor (oedema and flake painting rash). Treat any secondary infection and treat the underlying malnutrition. Apply zinc oxide cream.

ULCER FROM SKIN TUBERCULOSIS

An ulcer is just one of the ways in which skin tuberculosis can present. It is rare and can be missed for many months. The ulcer is usually shallow. Often you find enlarged and softened regional lymph nodes (for treatment, see chapter 6. “Tuberculosis”).

Skin infections caused by fungus and pityriasis versicolor

RINGWORM

Body ringworm (tinea corporis)

Several kinds of fungi can grow in a child’s skin or scalp and can cause a mild chronic infection. The edges of the lesions look like curved lines or rings and remind of a worm. This is, why the lesions are called ringworm. However, they are not a sign, as many people believe, of a worm infection. These ringworm lesions will heal by themselves when a child is growing older, but it can take several months or years. To wash a child with soap and water is the best way to prevent ringworm infections.

Clinical features

The lesion starts as a small papule. The papule is slowly getting larger. It is growing from its edges that become thicker and redder than the middle. The edges are clearly visible and sharply defined. They are raised and may have some small vesicles or papules on it. The middle of the lesion is flatter and covered with dry white scales. The lesions may itch mildly. You can often find several lesions that are distributed asymmetrically. Sometimes the lesions can become secondarily infected (for example with impetigo).

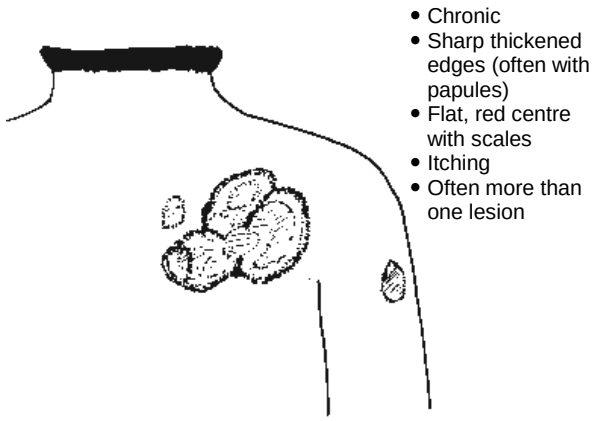


Figure 16–6 ***Body ringworm***.

Management

1. Wash the child’s body with soap and water.
2. Treat any secondary septic infection.
3. Apply benzoic acid/salicylic acid ointment (Whitfield’s ointment) or gentian violet 2 times daily. Continue for at least 2 weeks after the lesion has healed, which may take several weeks.
4. *If not improving*, add griseofulvin (see below under “Scalp ringworm”).

Scalp ringworm (tinea capitis)

Ringworm of the scalp is often transmitted when a barber uses unclean blades to shave a child’s head. Scalp ringworm presents in two forms, which are caused by different types of ringworm:

1. Round and pale lesions with small scales. It is typical for the hair to break off a few mm above the skin.
2. Soft swelling of the skin of the scalp.

Management

1. Wash the head and cut off the hair around the lesion.
2. Treat any secondary septic infection.
3. Apply benzoic acid/salicylic acid ointment (Whitfield’s ointment) or gentian violet 2 times daily and continue treatment for 2 weeks after the lesion has healed.

4. If affordable or if not responding to local treatment, give griseofulvin for 4 or more weeks. The absorption of griseofulvin is increased by fatty food; it is therefore best taken with the main meal.

Griseofulvin 10 mg/kg once daily

2–12 months	62.5 mg	once daily
1–5 years	125–190 mg	once daily
6–12 years	250–375 mg	once daily

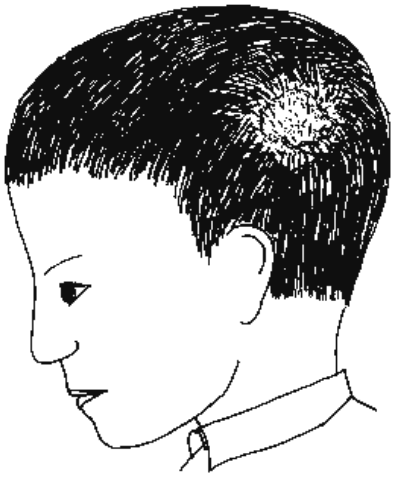


Figure 16–7 *Scalp ringworm*.

Causes of scalp lesions

- Ringworm
- Head lice (if infected)
- Impetigo (usually secondary infection)
- Seborrhoeic dermatitis (children age 2–6 months)
- Psoriasis

CANDIDIASIS (THRUSH)

Candidiasis is commonly found in the bottom area of babies. It presents as erythema with scaling and typically a few papules near the border of the rash.

Management

1. Apply gentian violet or Whitfield's ointment to the lesions.
2. Look also for oral thrush and treat accordingly.

NOTE: griseofulvin is not effective in candidiasis.

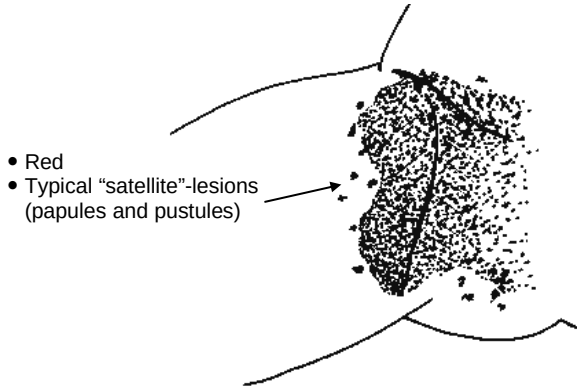


Figure 16–8 *Candidiasis (thrush)*.

PITYRIASIS VERSICOLOR

Pityriasis versicolor is very common in warm and humid climates. It is not caused by a fungus but by a yeast. The rash is made of many oval yellow-brown macules of about 1-4 cm in diameter. They very rarely itch. If you scratch the lesions, some fine scales come off. The rash is most commonly located on the chest.

Management

The disease is harmless and there is no need to treat it.

Figure 16–9 *Pityriasis versicolor*.

Skin infections caused by viruses

HERPES SIMPLEX

Herpes simplex is a common infection that presents as small crops of clear, tense blisters. They are usually around the lips, nose or genitalia but can be anywhere on the body. They burn and on healing they itch. The child may have a mild fever and the regional lymph nodes may be swollen. The blisters heal by themselves within a few days but tend to return at the same place. They often return when the child is having a cold or another systemic illness. This is why they are also called "cold sore". In children younger than 4 years, the first infection with the herpes virus may present as acute gingivostomatitis with mouth ulcers (see page 48).

Management

1. Prevent secondary infection by applying gentian violet 2 times daily.
2. Keep the child away from newborn babies because for them the infection may be dangerous.

CHICKENPOX

Chickenpox is an infectious disease with a skin rash. The child usually presents with mild fever and a widespread skin rash that started on the same day as the fever. First, there are red macules that quickly turn

into papules and then vesicles. The vesicles soon dry and crust. The rash can first be seen on the body and later on the arms, legs and face. Typically, you find all the different stages at the same time. Complications are rare in children.

Management

1. Treat septic lesions (pustules with surrounding redness) with gentian violet.
2. Apply calamine solution to the lesions to relief the itching.
3. Give an anti-histamine (for example, promethazine) if itching is severe.
4. Antibiotics are not routinely indicated unless the child appears to be very ill, then give, for example, ampicillin IM/IV.

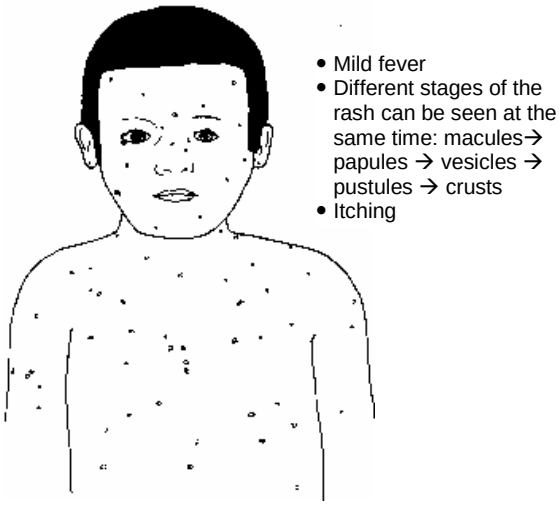


Figure 16–10 *Chickenpox*.

HERPES ZOSTER

Herpes zoster is caused by the same virus as chickenpox but it is less common. The lesions pass through the same stages as chickenpox. While the chickenpox lesions are all over the body, herpes zoster follows the distribution of one nerve. Usually they follow a line that goes half way around the body.

First, the child complains about pain at a certain area before the lesions appear. The lesions will resolve spontaneously after about 10 days.

Causes of vesicles

- Burns
- Insect bites
- Impetigo
- Herpes simplex or zoster
- Molluscum contagiosum
- Chickenpox
- Frostbite

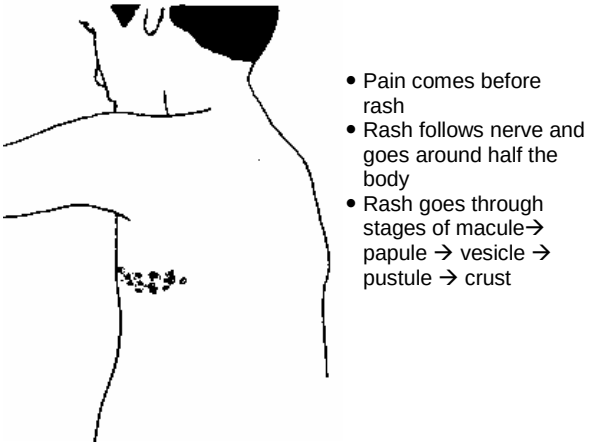


Figure 16–11 *Herpes zoster*.

Management

1. Treat herpes zoster as described for chickenpox.
2. Dangerous are lesions on the face that include the area of the eye. Refer the child to an ophthalmologist because corneal lesions can cause permanent scarring and vision impairment.

WARTS

The warts virus causes chronic thickening of the skin, usually at the hand or feet. Often you find several warts. They can last for a year or longer but usually go away by themselves. There is no easy treatment for them.

MOLLUSCUM CONTAGIOSUM

The molluscum contagiosum virus causes round papules of about 1-5 mm diameter on the skin. When you examine the papules carefully, you find in the middle of each papule a typical small depression. The papules may be filled with whitish material. They will go away by themselves but may stay for more than a year.

Management

If the family wants you to treat this harmless viral infection: scrape the papules with a sterile needle and

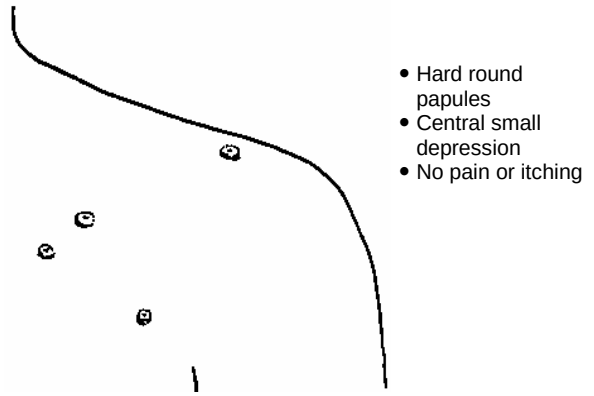


Figure 16–12 *Molluscum contagiousum.*

put a drop of an anti-septic (for example pyodine) on them afterwards.

Causes of itching

SEVERE ITCHING

- Scabies
- Eczema
- Insect bites or stings
- Allergy (urticaria), for example drug reactions
- Heat rash
- Lice infestation
- Rare: creeping eruption

MILD ITCHING

- Psoriasis
- Ringworm (tinea)
- Chickenpox
- Psychological
- Rare: systemic diseases: diabetes mellitus, leukaemia, renal failure

Skin infestations

SCABIES

Scabies is caused by small insects (scabies mites) that live in holes and burrows in the skin. They are not visible to the naked eye. The scabies mites cause sensitisation (allergy). This results in severe itching, worse at night. On examination, you can find a very itchy rash, consisting of papules and some vesicles and scratch marks and often signs of secondary bacterial infection. The typical sites of the lesions are different in young and in older children.

Look also for scabies lesions between the fingers of the family member who brought the child and ask whether other household members area affected.

Management

Scabies is a family disease and you need to treat all household members, even those without symptoms, otherwise the child will get re-infected soon.

1. In the evening, wash the child's whole body with soap and water.
2. Apply benzyl benzoate solution (BBE) to the whole body except face and mucous membranes:
   - If you use a BBE 25% solution, mix one part solution with the same amount of clean water.
   - If you use a BBE 90% solution, mix one part solution with 7 equal parts clean water (= dilution 1:8).
3. Leave the solution for 24 hours (12 hours, if the child is under 2 years).
4. Wash the solution off.
5. Repeat the procedure the next day.

NOTE: Tell the family that itching may continue for some weeks after the treatment.

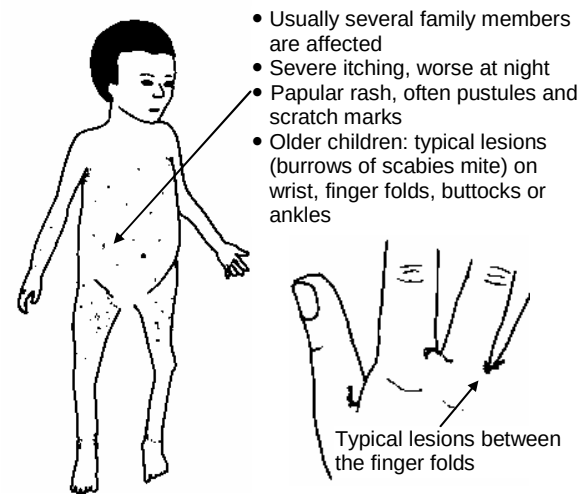


Figure 16–13 *Scabies*.

LICE INFESTATION (PEDICULOSIS)

Lice are small insects that live in hair or human clothes. They are transmitted by close contact.

Head lice

Head lice live in the hair. They are common and make a child's head itch so that the child scratches his head. These scratches can become secondarily infected. On examination, you look for the lice itself and for its eggs (nits) that are attached to the hair (figure 16–14).

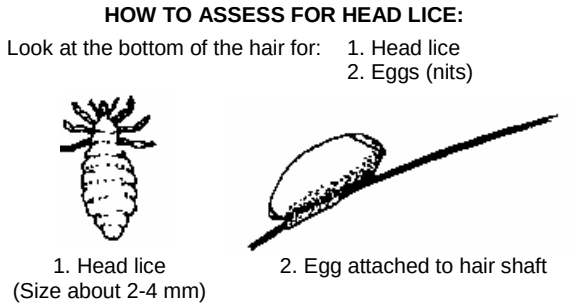


Figure 16–14 *Head lice*.

Management

The easiest treatment is to shave the head completely.

If the family does not agree to do that, treat the child's head with benzyl benzoate, using a pure 25% solution. Wash the child's hair, then rub the solution in the hair and leave for 24 hours (12 hours if the child is under 2

years old). Wash the solution off and repeat the procedure the next day. Treat any secondary infection.

Body lice

Body lice live in clothing. They attach their eggs (nits) to clothing fibres. They can cause itchy papules or pyoderma. Treat any secondary infection, advise washing the clothes and treat the child with benzyl benzoate, using a pure 25% solution.

Insect bites

Bites of different kinds of insects (mosquitoes, fleas, ticks, lice) can cause local reactions. There may be localised redness and oedema with severe itching. Sometimes a secondary infection occurs. Severe allergic reactions are rare. Insect bites can be very disturbing for a child, especially at night.

Management

Treat any secondary infection. Apply calamine solution. In more severe itching, give an oral anti-histamine (for example, promethazine or chlorphenamine). Discuss with the family ways to reduce the number of bites by using bednets, netting for windows or flea powder.

Creeping eruption (larva migrans)

The meaning of creeping is "slowly moving". Creeping eruption is rare but easily diagnosed. It presents as a very itchy skin lesion that looks like a worm under the skin. It is moving slowly, a few cm every day. It is caused by a strongyloides larva that entered the child's body through the skin and failed to find the way to the intestine. It is not dangerous and the larva will die after a few months. It will die earlier if you give the child mebendazole.

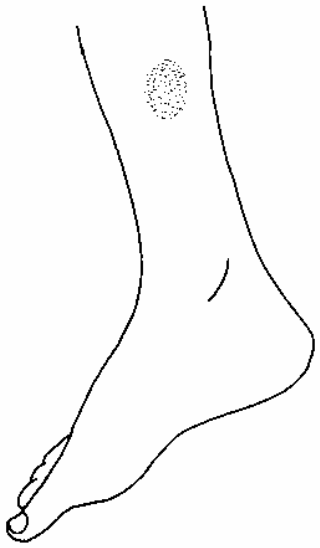
Leprosy

Leprosy is a chronic infectious disease that is usually known for its skin signs, but it is the damage to peripheral nerves that is responsible for causing life-long disability. These dangerous results of the disease can be prevented easily if the disease is recognised early and treated correctly. The leprosy bacillus (Mycobacterium lepra) is multiplying very slowly. The incubation period (the time from infection to the appearance of clinical signs) is several years. A child is infected by close contact with a leprosy patient. However, most people who are infected do not develop the disease because their immunity is strong enough to fight the bacilli.

Clinical features

Clinical signs usually do not appear in young children because of the long incubation period. In early leprosy, a child is generally well and it may be difficult to make a family believe that their child is suffering from a dangerous illness.

Early signs are anaesthetic, pale skin patches. When a nerve that innervates muscles is affected, it causes muscle weakness followed by muscle wasting and later deformity. In advanced disease feet or hands may become anaesthetic and the child may injure himself without noticing.



- **Older child**
- **Always**:
  - Chronic patch
  - Larger than 1 cm
  - Painless
  - No itching
  - No pus
- **Sometimes**:
  - Pale
  - Anaesthetic

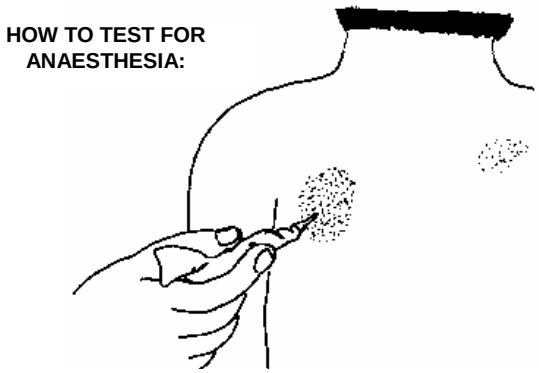
Figure 16–15 ***Leprosy***.

When you should think about leprosy:

Whenever you see a chronic skin lesion in an older child ask yourself, "Could that be leprosy?"

How to diagnose leprosy

- Look at the lesion and test it for anaesthesia (see figure 16–16). Early signs are one or more pale patches. The patches may be macular or slightly raised, they are usually larger than 1 cm. Because of the nerve involvement the patches are typically anaesthetic, that means the child has lost the feeling in that part of the skin. The patches are **never itchy** and there is **never any pus**.
- Skin scraping is a special test with which you try to find leprosy bacilli at the edge of the skin lesion. This is done by a specially trained laboratory technician.
- Nerves in the skin around a leprosy lesion thicken. However, it needs a lot of experience, to be able to feel a thickened nerve with confidence.



Take a pointed piece of cotton wool. Use it to touch the child's skin. At first touch healthy skin and ask the child to point to the place where you have touched him. Once he has understood your testing, ask him to close his eyes and then touch him on a healthy part of the body and then on the lesion. Repeat it for the different parts of the lesion. If he can tell you when you touch healthy skin, but not when you touch the lesion, he has leprosy.

Figure 16–16 ***How to test for anaesthesia***.

What to do if you think a child could have leprosy?

1. Refer the child to a leprosy control programme for confirmation, defining of the correct stage of leprosy and for supervised treatment. As in tuberculosis, leprosy must always be treated with multiple drugs according to international standard guidelines, otherwise drug resistance will develop and the child will not be cured.
2. Treatment must be continuously taken for 1 or more years.
3. If the child has anaesthetic hands or feet, warn him about the danger of being injured without him noticing it. For example, he may burn his hands by touching a very hot pot or he may step onto a thorn without noticing when walking barefoot.
4. Examine all other people in the child's household for leprosy to find the person who infected the child. You need to examine everyone while he is undressed, otherwise you may miss a lesion.
5. Discuss with the family that leprosy is curable, the risk of transmission to other people is very small and that there is no reason to isolate the child.

Causes of hypopigmentation

- Pityriasis alba
- Ringworm
- Vitiligo
- After inflammation (skin infection, psoriasis, eczema)
- Pityriasis versicolor
- Leprosy

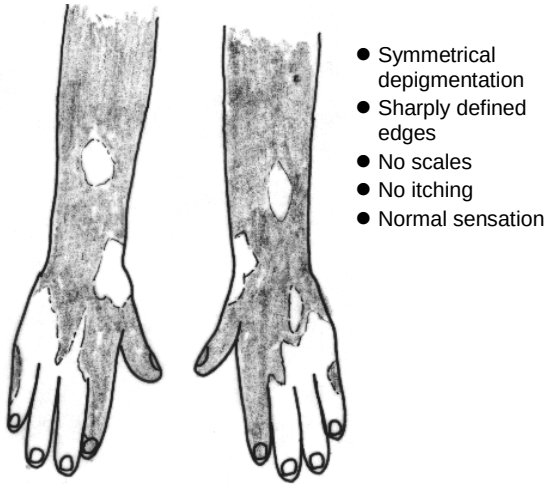


Figure 16–17 ***Vitiligo***.

Vitiligo

Melanocytes are those skin cells that produce the normal skin colour. In vitiligo, melanocytes do not function normally and this results in localised skin depigmentation. The depigmentation is macular, symmetrical and with sharply defined edges (figure 16–17). There are no scales and sensation is normal. Specific treatment is not available.

Eczema

Eczema is a chronic inflammation of the skin. This inflammation can be caused by external factors, so called contact dermatitis. Other children have inherited the tendency to develop eczema, this is called atopic eczema. It usually starts when a child is 2-18 months old. You often find other sufferers from atopic eczema and asthma in the same family.

ATOPIC ECZEMA

Atopic eczema is characterised by symmetrical, very itchy skin lesions. They start as small papules and then develop into chronic dry and scaly lesions. During the acute inflammatory stage the skin may be red and wet, blisters may develop. The places where eczema appears are very typical for each age group, see figure 16–18.

Management

The inflammation can be treated but it tends to recur and you should not promise the family a permanent cure. However, reassure them that the condition will get better and usually disappears when a child gets older.

1. Advise the family to wash the child every day but not to apply soap to any of the affected areas.

2. The main basic treatment is keeping the skin moist by using a moisturising cream every day (for example, vaseline).
3. If these measures do not help, give hydrocortisone cream 1% three times daily for 5-7 days.
   - Do not use preparations stronger than 0.5% hydrocortisone in the face.
   - Do not use steroid creams for periods longer than 7-10 days.
4. If itching disturbs the child's sleep, give an antihistamine (for example, promethazine) at night.
5. Keep the child's finger nails as short as possible to prevent scratching.
6. Treat any secondary infection.

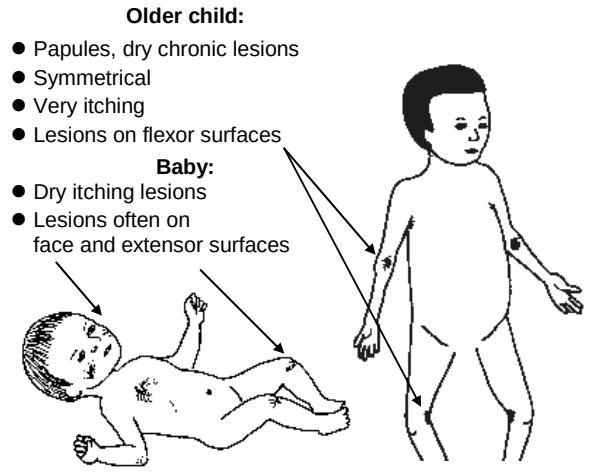


Figure 16–18 ***Eczema. Note the different distribution of the lesions in the different age groups***.

PITYRIASIS ALBA

Pityriasis alba presents as white dry patches on the face of children. It is a variant of atopic eczema. It is not, as frequently believed, a sign of intestinal worm infestation.

If necessary, treat with vaseline or hydrocortisone cream 0.5% for 5 days.

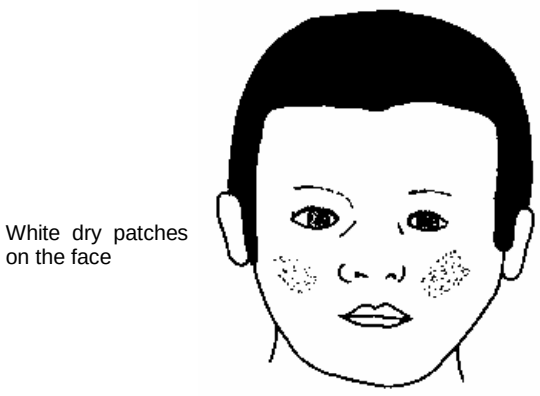


Figure 16–19 ***Pityriasis alba***.

CONTACT DERMATITIS

Some agents, such as creams or metals (for example, earrings) can cause irritation and an itchy rash like eczema.

Find out what has caused the reaction and stop the responsible agent. Give calamine solution and treat any secondary infection.

Seborrhoeic dermatitis

Seborrhoeic dermatitis starts when a child is 2-3 months old. The whole scalp, eyebrows and bottom area are covered with dry scales. There is no itching and the child is typically never ill or distressed. The cause of seborrhoeic dermatitis is unknown.

Sometimes seborrhoeic dermatitis is mistaken for widespread impetigo and unnecessarily treated with antibiotics. A child with seborrhoeic dermatitis is well, the distribution of the affected areas are typical (see figure 16–20). A child with very widespread impetigo is unwell, the lesions are wet and do not follow the typical distribution of seborrhoeic dermatitis.

Management

Apply cooking oil to the scales and leave it for a few hours before washing it off. Reassure the family that seborrhoeic dermatitis will improve when the child gets older.

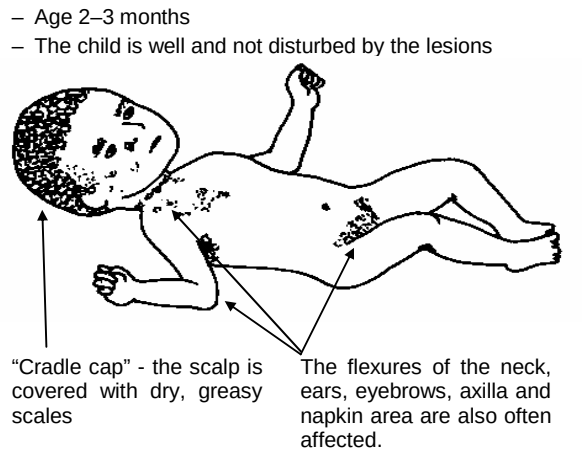


Figure 16–20 ***Seborrhoeic dermatitis***.

Psoriasis

Sometimes psoriasis is mistaken for eczema. The lesions of psoriasis are typically red with silvery scaling. The scales may only become noticeable by scratching a lesion. Psoriasis lesions are often plaque-like and typically cover the extensor-surfaces of the joints while eczema is found at the flexor surfaces.

You find psoriasis also on the scalp. There is no hair loss. Psoriasis only itches mildly.

Management

Treatment is often difficult and psoriasis can follow a very chronic course. It is important to keep the skin moist. Sun-light is beneficial. Steroid creams are often prescribed. However, they have the disadvantage that the lesions may reappear quickly once the steroid cream has been stopped. First, try calamine solution or, for very dry lesions, salicylic acid 3–5% in vaseline.

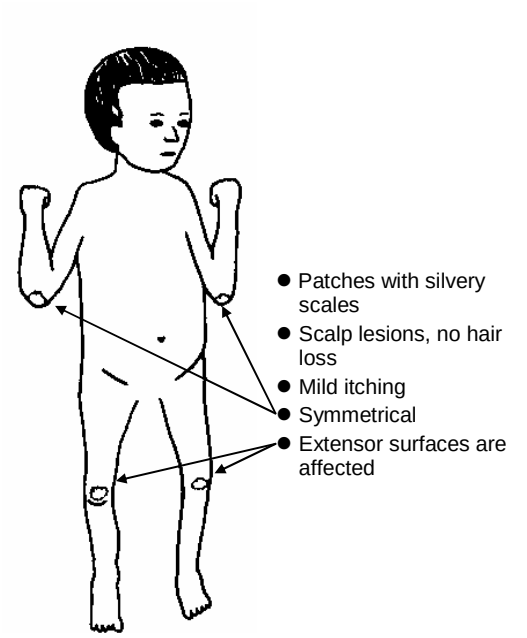


Figure 16–21 *Psoriasis*.

Heat rash

If a child is sweating and his skin is soaked with his sweat for a long time, an itchy rash will develop. Treat by frequently washing the child's skin with cold water and applying calamine solution.

Hair loss

As described above, fungal infection of the scalp (**scalp ringworm**) can cause hair to break off shortly above the ringworm lesion.

In **severe malnutrition**, especially kwashiorkor, hair may become reddish and can be pulled out easily.

In **alopecia areata** there is patchy hair loss without any underlying skin lesion. In severe cases, the hair loss may be complete, which is very distressing for the family. There is no specific treatment, advise the family to wait for hair growth to return, instead of spending money on expensive treatments that do not help.

Causes of hair loss

- Ringworm
- Alopecia areata
- Severe malnutrition
- Psychological

Allergic reactions - urticaria

Allergic reactions can be caused by uncountable agents (for example drugs, chemicals, pollens, insect bites, food). The reactions can be mild with urticaria, swelling of the face and lips or severe with breathing difficulty, collapse or shock.

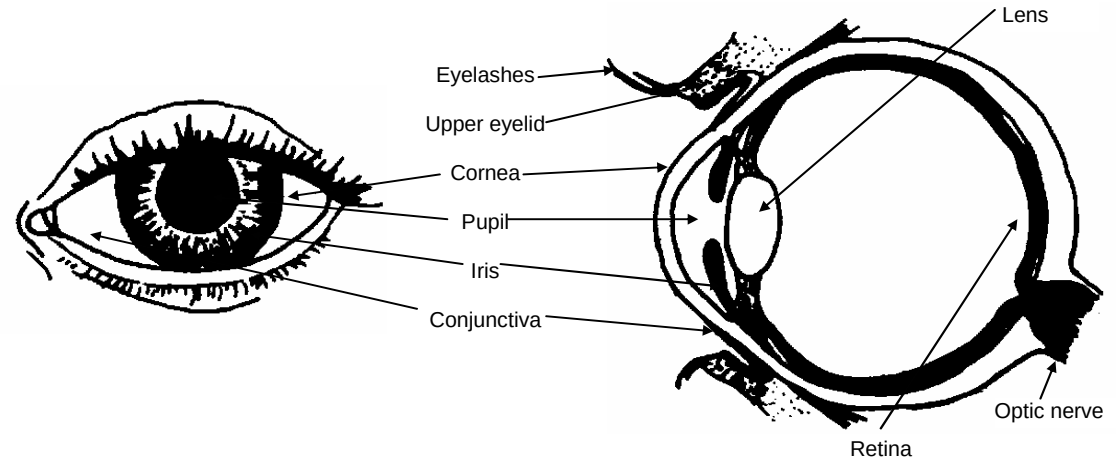
Management is the same, whatever the cause. Follow the management guidelines as given on page 207.

References

1. Buxton PK. *ABC of Dermatology.* 2nd edition. London: BMJ Publishing Group, 1993.
2. Hull D, Johnston DI. *Essential Paediatrics.* 3rd edition. Edinburgh: Churchill Livingstone, 1993.
3. Illingworth RS. *Common Symptoms of Disease in Children.* 9th edition. London: Blackwell Scientific Publications 1988.
4. King M, King F, Martodipoero S. *Primary Child Care*. Book One. Oxford: Oxford University Press 1978.
5. Stanfield P. *Child Health*. 2nd edition. Nairobi: African Medical and Research Foundation, 1997.
6. Steigleder GK, Maibach HI. *Pocket Atlas of Dermatology.* 2nd edition. New York: Thieme Medical Publishers, 1992.

17. Eye problems

Understand what you see - what you need to know about the anatomy of the eye



Pupil: The pupil looks black because it is a hole through which the light goes to the inside of the eye.

Iris. The iris contains two muscles, which change the size of the pupil. This action controls the amount of light that goes into the eye: in bright light, it makes the pupil smaller; in the dark, the pupil gets wider.

Cornea. This is the clear and transparent layer that covers pupil and iris. It is like the glass of a window that lets the light into the eye. It is also important for refraction.

Conjunctiva. This is a thin clear membrane that covers the white of the eye (sclera) and the inside of the upper and lower eyelid.

Eyelids. They protect the eyes.

Lens. It is behind the pupil and is clear like the cornea.

Retina. Light goes through the pupil and reaches the retina. The retina contains nerves that carry the message of the seen image to the brain along the **optic nerve**.

Figure 17–1 ***Anatomy of the eye***.

There are a large number of different eye diseases but about 90% of children who come to you have one of about 15 different conditions. If you know those well you will be able to help most children. It is also important to recognise those conditions that are dangerous for the eye and may cause blindness. Blindness is common in Afghanistan and it is usually caused by damage to the cornea that could have been prevented. One of the most common causes is vitamin A deficiency.

There are five main ways in which eye problems present:

1. **Red eyes**
2. **Injuries** and **foreign bodies**
3. **Abnormal whiteness** of the eye
4. **Swellings** around the eye
5. **Loss of vision** - difficulty in seeing

How to assess children with eye problems

The basic assessment is the same in all eye problems. Always ask the four questions below. Always look carefully at all the parts of the eye mentioned below. If you do not follow a systematic approach you will miss dangerous conditions and misdiagnose problems.

NOTE: Do not perform your examination forcefully. It is impossible to examine the eyes of a frightened and crying child. Be patient and win the trust of the child so that he opens his eyes for you by himself.

Take a history

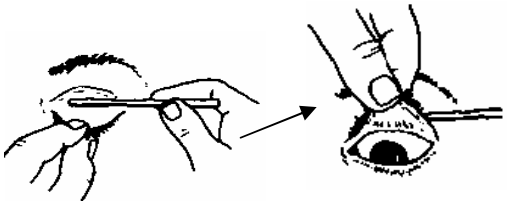
- Always ask the following four questions:
  1. Was there any injury to the eye or did something go into the eye?
  2. When did the symptoms start?
  3. Is there any loss of vision?
  4. What other symptoms does the child have? Pain? Itching? Any systemic disease such as measles?

Examine the eye

- Always look at all these parts of the eye carefully:
  1. Look at the **cornea**: is it clear?

2. Look at the **pupil**: is it black or not? Is it round or irregular shaped?
   Shine a torch into the pupil: does it react to light (is getting smaller)?
3. Look at the **white of the eye**: is it white or red? Is there any purulent discharge? Any abnormalities (dryness or white spots)?
4. Look at the **eyelids**: any swelling?
   Evert the eyelid in all children with chronic red eye to differentiate between allergic conjunctivitis and trachoma. Also, evert the eyelid in children with a suspected foreign body. This procedure is not painful (see figure 17–2).

1. Ask the child to look down.
2. Turn the eyelid up over a stick (for example, a match).



Everted eyelid:

Figure 17–2 ***How to evert an eyelid***.

○ **Test the vision** to know if a disease could have affected a child's vision or if a child is not seeing well. How to do it is described in figure 17–16.

Danger signs

Always refer a child with any of these symptoms because he may suffer from a serious condition:

- ◆ Loss of vision
- ◆ Any disease that has affected the cornea (unless it is an old scar)
- ◆ Any injury that may have penetrated the eye
- ◆ Severe eye pain
- ◆ Eyelashes that are turned in and scratch the cornea

List of basic medicines and equipment

- Tetracycline eye ointment 1%
- Gentamicin eye drops
- Vitamin A capsules 200,000 IU
- Atropine eye ointment 1%
- Eye pads

NOTE: Do not use eye medicines that contain steroids. They can have serious side-effects and should only be prescribed by specialists.

HOW TO GIVE EYE OINTMENT CORRECTLY:

Explain this to the family when you prescribe eye medicines:

1. Wash your hands before you insert eye medicines
2. Wash off any purulent discharge with warm clean water or tea.
3. Ask the child to look up. Pull down the lower eyelid and squeeze a small amount of ointment (about 1 cm) from the tube into the lower eyelid.

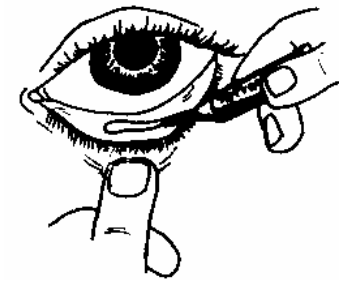


Figure 17–3 ***How to give eye ointment correctly***.

Causes of the red eye and their characteristics

Causes	Characteristics
ACUTE	
• Bacterial conjunctivitis	– Discharge with pus – Irritation but no pain
• Viral conjunctivitis	– Discharge – Less pus than in bacterial conjunctivitis – Often part of an upper airway infection
• Allergy	– Watery discharge, no pus – Very itchy
• Corneal ulcer or inflammation	– Very painful – Grey-white spots on the cornea – Pupil normal – Possibly pus in the eye
• Foreign body or injury	– History – Only one eye affected
• Rare but dangerous: Iritis	– Painful – Redness mainly around the cornea, cornea clear – Small irregular pupils
CHRONIC	
• Allergy	
• Trachoma	

The red eye

The most common cause is a harmless conjunctivitis. There is discomfort and itching and discharge but no real pain. If there is real pain or if the vision is decreased, it is not a simple conjunctivitis. It may be iritis or corneal ulceration. Both can cause blindness if not treated promptly. Do not miss either of them.

The acute red eye

CONJUNCTIVITIS

Infections cause inflammation of the conjunctiva. Infection can be caused by many different bacteria or viruses.

Clinical features

- The symptoms started a few days ago, often both eyes are affected. If they started some weeks ago, it is not acute conjunctivitis.
- There is a sticky discharge. In bacterial infection, it is very purulent (yellow) or mucous (white), see figure 17–4. In viral infection, there is less pus and there are usually signs of an upper airway infection. If the discharge is just watery, it is not caused by a bacterial infection.
- There is discomfort but no real pain.
- Cornea, pupil and vision are normal.

Figure 17–4 ***Bacterial conjunctivitis***.

Management

- Treat **bacterial conjunctivitis** with tetracycline eye ointment. Put it in both eyes, even if only one eye is affected, 3 times daily. Treat for 5-7 days. (Figure 17–3)

  If there is no response after 2 days, use gentamicin eye drops or chloramphenicol eye ointment.
- **Viral conjunctivitis** does not need any specific treatment, except in measles. It is part of the viral illness and goes away by itself.

Recurrent conjunctivitis in babies - a blocked tear duct

In babies with **recurrent conjunctivitis** think about a **blocked tear duct**. It is a common minor abnormality. There is a swelling between the babies nose and eye. Usually the blockage opens a few weeks after birth. Sometimes fluid collects in the duct and becomes infected. You can press on the swelling and see discharge coming out of the duct. Show the mother how to massage the skin over the swelling about 4 times a day for two weeks. She should start from the inner corner of the eye and then down to the side of the nose. This may help to open the duct.

Conjunctivitis in **measles**, see page 32; conjunctivitis in the **newborn**, see page 192.

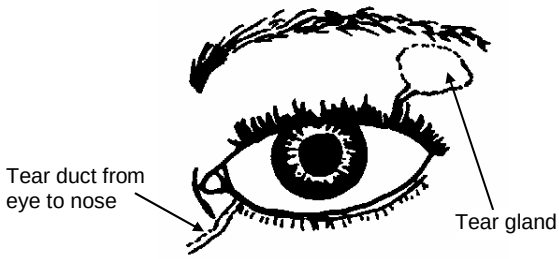


Figure 17–5 ***Anatomy of the tear duct***.

IRITIS

The cause of iritis (inflammation of the iris) is usually unknown. Its onset may be slow or very sudden.

Clinical features

- Redness is greatest around the cornea
- Very painful
- The eye is very watery but without discharge
- Pupil may be small or irregular
- Sometimes the vision is decreased

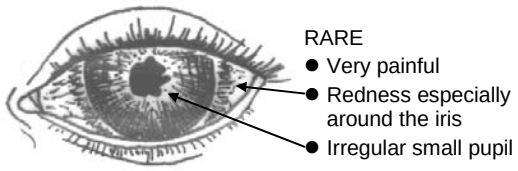


Figure 17–6 ***Iritis***.

Management

Iritis is very dangerous because the inflamed iris can stick to the front of the lens or form a membrane over the pupil. This can cause glaucoma (increased pressure inside the eye) or blindness. You can prevent these dangers by fully dilating the pupil. Dilatation pulls the iris away from the lens. Give atropine eye drops or ointment 3 times a day for 1 week. The inflammation will settle by itself. If possible, refer the patient to an ophthalmologist.

CORNEAL ULCER – IT IS AN EMERGENCY

Disease of the cornea is very dangerous. A small scratch or infection can damage the thin surface of the cornea. Then a painful corneal ulcer and severe inflammation may develop. In very severe cases, the cornea may perforate and the eye may be lost. Corneal ulcers often heal with scarring so that the clearness of the cornea is lost and vision is reduced.

Many different problems can cause corneal damage. Often it is a combination of different factors such as measles and malnutrition.

Causes of corneal ulcer or corneal inflammation

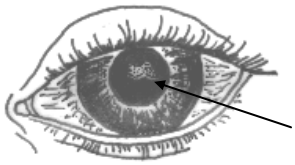
- Trauma
- Secondary infection after trauma
- Vitamin A deficiency
- Herpes zoster and simplex virus
- Exposure of the eye when the child cannot close it completely

RARE

- Trachoma when inverted eyelashes scratch the cornea

Clinical features

- Severe pain
- Usually only one eye is red with discharge
- The cornea is not clear. Look at the eye carefully in a good light. You may see the lesion as a grey patch or as a part of the cornea that is less shiny
- The pupil is normal. In severe cases, you may see pus behind the cornea (hypopyon). This is a sign that the eye is in greatest danger. If the cornea bursts parts of the eye may come out.



VERY DANGEROUS
- Painful
- Cornea not clear
- Ulcer on cornea

Figure 17–7 *Corneal ulcer*.

Management

It is an emergency and needs intensive treatment. If possible start treatment and refer:

1. Give a high dose of ***vitamin A*** to all children with corneal disease.
2. *If there is any sign of infection*, intensive antibiotic treatment is needed. Tetracycline eye ointment is not sufficient. It is best to use ***strong gentamicin eye drops*** that you make up yourself by injecting 80 mg gentamicin into a 5 ml bottle of ordinary gentamicin eye drops.
    - At first give gentamicin drops hourly, when the infection has responded, reduce the frequency to 2 hourly, then 4 hourly.
    - If there is pus behind the cornea, give benzylpenicillin IM or IV.
3. Give ***atropine eye ointment*** 3 times a day for 1 week. This is to dilate the eyes because the iris is usually also inflamed.

Prevention

1. Treat any small corneal abrasion after a mild trauma with tetracycline eye ointment until it has healed.
2. Give vitamin A to all children with measles and to all with malnutrition.
3. Do not use traditional eye medicines.
4. Refer all children whose eyelashes are turned in (trachoma) for operation.
5. If the eye is exposed because a child cannot close his eye (coma, facial palsy), apply plenty of eye ointment and put a plaster over the lids so that the eye stays closed.

The chronic red eye

TRACHOMA:

- Sticky discharge
- Mild discomfort only, no itch, rather soreness

Everted eyelid:

- ***Early stage***: redness and small whitish spots (about 1 mm or less), called follicles
- ***Later stage***: thickening (whitish patches) and redness. These make it impossible to see the normal blood vessels of the conjunctiva

ALLERGIC CONJUNCTIVITIS (spring catarrh):

- Watery eyes
- Very itchy
- Seasonal differences

Everted eyelid:

- Conjunctiva may look normal
- There may be watery swellings

Figure 17–8 *How to differentiate between trachoma and allergic conjunctivitis*.

ALLERGIC CONJUNCTIVITIS

Not every red eye is caused by infection; allergic conjunctivitis (vernal conjunctivitis) is very common. It is caused by allergy to dust or pollen. Important differential diagnosis is trachoma.

Clinical features

- The eyes are red and itching
- The eyes are watery but there is no purulent discharge
- Sometimes swelling around the iris, or of the conjunctiva under the eyelid, which you find when you evert the upper eyelid.
- Symptoms show seasonal differences: they are worse during summer and better in winter.

Management

Allergic conjunctivitis is very troublesome for children. Families often run from one doctor or traditional healer to another to find a cure. It is important for the family to understand that it is a chronic condition that can be improved, but not be cured. It may persist into adult life.

- Sodium chloride 0.9% drops

- Steroid eye drops may help in severe cases but can have serious side-effects. They should only be prescribed under the supervision of an ophthalmologist.
- Especially if there are other allergic symptoms, such as a watery nose and sneezing, give an oral anti-histamine (for example, promethazine or chlorphenamine).

NOTE: Do not give antibiotic creams; they are useless.

TRACHOMA

Beside vitamin A deficiency, trachoma is another important cause of blindness. You find it especially in dry areas with a lack of water and poor sanitation. It is a chronic eye infection caused by chlamydia bacteria. The repeated inflammation causes scarring of the eyelids. This pulls the eyelashes inwards (trichiasis). These scratch the cornea causing ulceration, scarring and blindness. The infection starts in childhood but the later stage of blindness is usually reached in adulthood.

Clinical features

The main signs occur on the conjunctiva inside the upper eyelid.

- The eye has been mildly red with sticky discharge for several weeks and often other children in the same household are affected.
- See figure 17–8 for the typical clinical signs on the conjunctiva of the upper lid.

Management and prevention

When you find a child with trachoma in one family, examine all the other household members. Trachoma spreads easily from one person to another. It is commonly transmitted in the following ways:

- Children touch their discharging eyes and spread the infection around the house with dirty fingers.
- Mothers are using their headscarf or dirty cloths to wipe children's faces.
- Flies sitting on the eyes of children carry the infection from one child to another.

The main management aim is to interrupt the ways of transmission:

1. Wash the hands of children at least 2 times a days, best before each meal.
2. Teach mothers only to use clean cloths to wipe children's faces.
3. Try to reduce the number of flies and cover the eyes of sleeping children with a clean cloth.
4. Treat infected eyes with tetracycline eye ointment 3 times daily for 6 weeks. Tell the family to continue for that length of time, otherwise the child may become blind later.
5. Refer urgently those people with inturned eyelashes for surgery.

Eye injuries and foreign body

We need to distinguish between blunt injuries to the eye (for example, a punch with the fist) and injuries that have penetrated the eye. With foreign bodies you need to differentiate between foreign bodies on the surface of the eye and those that have penetrated the eye.

PENETRATING TRAUMA

A severe penetrating trauma is an emergency that often causes loss of the eye. Do not apply any medicines to the eye. Instead, before referral, cover the eye with a clean eye pad that should not press on the eye.

Even tiny perforations of the cornea from a thorn entering and coming out of the eye can result in loss of the eye. A torn conjunctiva usually heals well by itself but you need to be sure that no deeper structures have been damaged. Refer if in doubt.

NOTE: Sadly, one type of penetrating injury is caused by the carelessness of doctors and nurses. Too often at private clinics or hospitals, used needles are thrown away with the usual waste. Children find them and shoot them with their catapults. Sometimes a needle goes into the eye, which usually means loss of the eye. It is your responsibility to dispose of used needles safely!

FOREIGN BODIES

Always take a careful history and evert the upper eye lid, otherwise you may miss a foreign body:

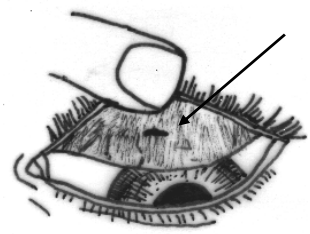


Figure 17–9 ***Foreign body under the upper eyelid***.

Management of a penetrated foreign body

When a foreign body has entered the inside of the eye, there are few symptoms in the beginning. However, serious infection leading to rapid loss of the eye may develop quickly. It is an emergency. Do not try to remove the foreign body but refer the child urgently.

Management of a non-penetrated foreign body

A foreign body is on or inside the conjunctiva or cornea. It causes redness of the eye, irritation and watering.

1. Try to remove the foreign body by gentle wiping with a clean cloth or flushing with clean warm water. After removing it, check again that there is no penetration of the eye.
2. Apply tetracycline eye ointment for 3 days.
3. *If you cannot remove the foreign body*, refer to an ophthalmologist.

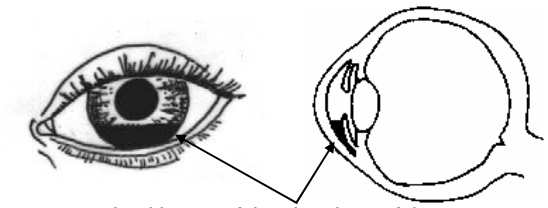
BLUNT TRAUMA

In blunt trauma, examine the eye very carefully to make sure that the eye is not perforated. Always check the child's vision.

Apply eye ointment and rest the eye with an eye pad for 2 days. If not improving, refer.

Causes of blood in the eye:

HYPHAEMA:



Blood in one of the chambers of the eye

Management:
If the chamber is not full, treat with atropine and ask the family to keep the child resting. The blood will get absorbed by itself
If the chamber is full, it is dangerous, refer the child urgently. If referral is not possible, give atropine and acetazolamide tablets (over age 12 y: 250 mg 6 hourly, otherwise ½ or ¼ Tbl)

SUBCONJUNCTIVAL HAEMORRHAGE:

This is bleeding under the conjunctiva, it looks dangerous but is not. No treatment is necessary and it will heal by itself after 2-3 weeks. It can occur with whooping cough or spontaneously.

Figure 17–10 ***Differential diagnosis of*** b***lood in the eye: hyphaema and subconjunctival haemorrhage***.

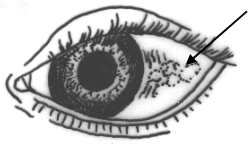
CHEMICAL INJURIES

If any irritating chemical has come into the eye, immediately flush it out for 10 minutes with clean water. Flush longer if the chemical was lime or another alkaline substance. Pour the water from the outside towards the inside of the eye. Cover the other eye to make sure you do not flush the chemical into the healthy eye. Apply antibiotic eye ointment and steroid eye drops for 5 days. Refer to an ophthalmologist.

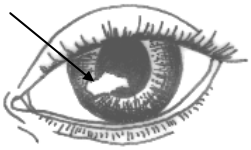
Abnormal whiteness of the eyes

On clinical examination, define the areas of abnormal whiteness of the eye. It may be on the conjunctiva (Bitot's spots), on the cornea (corneal scar) or the pupil may appear white (cataract or retinoblastoma).

- Bitot's spots or dryness of cornea (**xerophthalmia** - **Vitamin A deficiency)**.



- Whiteness in front of the pupil. Part or all of the cornea of the cornea is white. You may not be able to see the pupil. There is no redness: **corneal scar**.



- White pupil. The cornea is clear. You can see the pupil but it is white or grey. This comes from a **cataract** (cloudiness of the lens) or a **retinoblastoma** (a rare but important tumour).

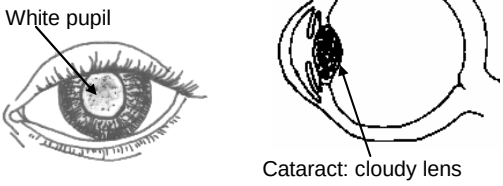


Figure 17–11 ***Causes and differential diagnosis of abnormal whiteness of the eye***.

VITAMIN A DEFICIENCY (Xerophthalmia = dry eyes)

Vitamin A deficiency is probably the main cause of childhood blindness in Afghanistan. Vitamin A is very important for several body functions. It is essential for the transmission of the light stimulus from the retina to the brain. That explains why the earliest sign of vitamin A deficiency is night blindness. Vitamin A is also essential for the maintenance of body membranes such as cornea, conjunctiva and gut mucosa. It also plays a role in the general body defence. Beside its blinding effects on the eye, vitamin A deficiency increases the severity and death rate from measles and diarrhoeal diseases.

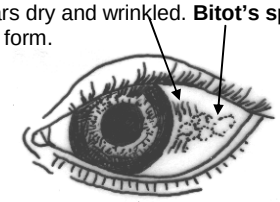
Causes for vitamin A deficiency are a diet deficient in green leafy vegetables and carrots, malnutrition, measles and chronic diarrhoea in which vitamin A is not absorbed from the gut - usually several factors come together.

Clinical features

Many children suffer asymptomatic vitamin A deficiency. In a situation where there is a sudden demand for vitamin A to repair body surfaces, a child can pass rapidly to the stage of corneal softening and perforation. Risk situations are severe malnutrition, especially during the recovery phase, measles or chronic diarrhoea.

- Earliest sign is **night blindness**: as soon as it gets dark, a child has difficulty in walking around.

- Later: dryness of the conjunctiva (**xerophthalmia**) - the conjunctiva appears dry and wrinkled. **Bitot's spots**, little grey plaques may form.



- As the disease gets worse, the cornea becomes dry, hazy (not clear) and rough.

(These stages are completely curable with vitamin A treatment)

- **Ulceration of the cornea** may develop rapidly. In late stages, the cornea softens (**keratomalacia**) and melts away. This makes the child blind. Parts of the eye may prolapse to the outside. Often this stage is so acute that a child becomes blind in a few hours or days. It is an emergency. When treated early, the scar that develops may allow some sight to come back.

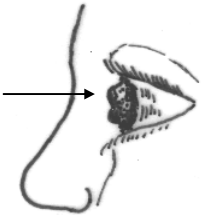


Figure 17–12 ***Vitamin A deficiency.***

Management

1. Even if you only suspect vitamin A deficiency give treatment. Give one dose ***vitamin A*** when you first see the child, then one the next day and one after 1 week. Repeat one single dose after 4 months.

Under 6 months	50,000 Units
7–12 months	100,000 Units
Over 1 year	200,000 Units

2. *If there are signs of infection*, give tetracycline eye ointment.
3. *If there is a corneal ulcer or prolapse* give vitamin A and gentamicin eye drops and refer urgently.

Prevention

1. Give ***vitamin A*** to all children at risk:
   - Any child with **diarrhoea** or **severe infection**: one single dose only
   - Child with **measles**: one dose daily for 2 days
   - **Severe malnutrition**: one dose daily on day 1, day 2 and after 1 week. Repeat one single dose after 4 months.
2. **Every woman within 1 month after delivery**: give one single dose of vitamin A 400,000 IU to increase the vitamin A content of the breastmilk. Do not give it during pregnancy because it can harm the baby.
3. **Diet**: dark-green leafy vegetables (for example, spinach) and carrots contain plenty of vitamin A and should be included in the daily diet of children. It is important to add them to weaning food.

CORNEAL SCAR

This can follow an injury or corneal ulcer. Typical complaint is visual loss. If the child's vision is so poor that he cannot walk alone, refer him to discuss the possibility of surgery. (Figure 17–11)

CATARACT and RETINOBLASTOMA

Cataract in children is usually congenital. Often more than one family member is affected. Clinical findings are shown in figure 17–11. It is important to recognise cataract early in babies. The cloudiness of the lens prevents light to reach the retina. The child will not develop vision if he is not operated on as soon as possible. A cataract should be removed before the age of 1 year. An operation at a later date will not be able to restore a child's vision.

Most important differential diagnosis is **retinoblastoma**, a rare cancer. To exclude it, refer all children with a white pupil urgently to the nearest ophthalmologist.

Orbital cellulitis - lumps of the eyelids - pterygium

ORBITAL CELLULITIS

This is a possibly dangerous infection because it can spread to the brain. If not treated rapidly, an abscess may form and push the eye forward. Usually only one side is affected.

Management

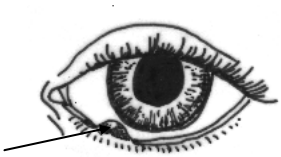
1. Procaine penicillin IM

2. *If severe,* benzylpenicillin and chloramphenicol IM or IV

LUMPS OF THE EYELIDS

Hordeolom (stye)

It is an infection like a boil. It is **acute** and **painful**.



Picture 17–13 *Hordeolom (stye)*.

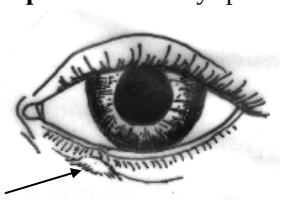
Management

1. Tetracycline eye ointment.
2. Warm compress: wet a clean cloth with warm water. Do not make it too wet, water should not run from the cloth. Hold this warm compress on the lump for 15 minutes 4 times a day.

Chalazion

It is caused by a blocked sweat gland. The swelling is **hard** and **not painful**. It may persist for several months.

.



Picture 17–14 *Chalazion*.

Management

Warm compress, see above "Hordeolom".

PTERYGIUM

Pterygium is a benign fleshy thickening of the eye surface. Once it has reached the border of the pupil, refer for assessment and possible operation it may cause vision problems.

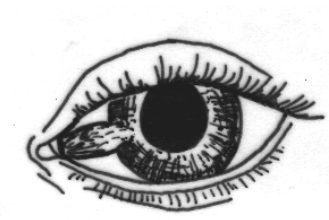


Figure 17–15 *Pterygium*.

Causes of chronic visual problems in children

COMMON

- Corneal scar (following vitamin A deficiency, injury or corneal ulcer)
- Squint
- Congenital cataract
- Refractive errors

RARE

- Retinal disease, tumour

Vision loss - difficulties in seeing

How to notice poor vision in children?

- A family may be concerned about a child's vision.
- A child may bump into things and falls easily.
- A child holds things very close to his face when looking at them.
- A child has difficulty using small things.
- A child may perform poorly at school.
- A blind child may not start to walk.

You need to check the vision in all these children. Test also the vision of children with eye problems that could cause blindness: injuries, iritis or corneal problems.

Test also the vision in children who have other physical handicaps because poor vision will disable them further.

How to test a child's vision

- Examine the eyes for a **squint**. *Clinical signs* are that "one eye goes out" and that the light reflex in the eyes is asymmetrical. A squint is normal up to 6 weeks of age. After age 7 years, there is no benefit in treating a squint.
- In *young children,* ask the mother whether he looks at her. Watch a child to see whether he can pick up small items from your hand.
- For *older children*, use an E-chart to check the child's eyesight.

How to use the E-chart

Each eye is tested separately while the other eye is carefully covered. Point to the larger letters first and then to smaller and smaller letters. The child being tested points with his fingers in the direction the E opens (figure 17–16).

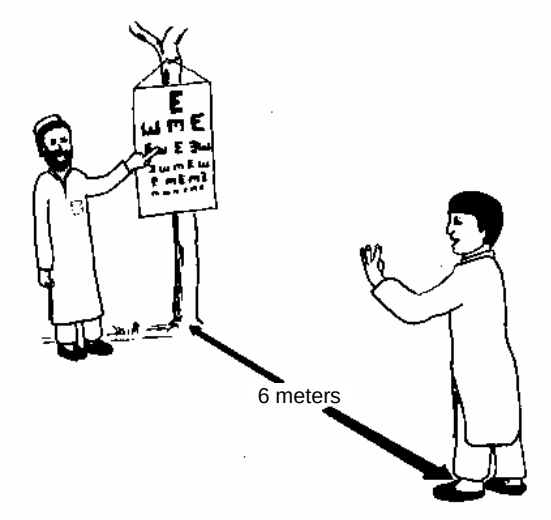


Figure 17–16 ***Vision testing using an E-chart***.

Recording of the results

Write a big V for vision and an R for the right and an L for the left eye. For each eye write down first the number 6, because you tested at 6 meters distance. Then write down for each eye the number of the smallest line of Es that the child could see: 6, 9, 18 or 60. For example if a child could see the smallest row of E clearly, you record it as 6/6.

Interpretation

- If he can read 6/6 and 6/9, the vision is good.
- If he can read 6/18 but not 6/9, his vision is poor and you should refer him for further assessment.
- If he cannot read 6/60 but sees light, he is blind.

Test whether glasses could help a child by making a pinhole through a piece of paper. When the child can see much better when he is looking through the pinhole, glasses may help him a lot.

Generally, refer children with poor vision in one or both eyes for further assessment by an ophthalmologist.

How to help children who cannot see well

1. Give a child many opportunities to learn about his world; give him different materials to touch.
2. Ask the family to explain to their child everything they see. Encourage other children to play and talk to their blind brother or sister.
3. Encourage the family to help the child to move around and to learn to take care of himself. Sometimes, families are overprotective.
4. Teach families how to walk with their blind child. They should lead from the front and not walk behind him. They should help him to walk alone in the area they live. The family should show the child important landmarks in the area that he can feel or hear.
5. Teach the child to use a stick to find his way.
6. Take care of the education of a blind child. The blind alphabet (Braille) is available for Afghanistan. IAM offers services for visually impaired children (VISA programme).

References

1. Foster A. Scripts: different topics such as eye diseases in the tropics: London (ca. 1996).
2. Illingworth RS. *Common Symptoms of Disease in Children.* 9th edition. London: Blackwell Scientific Publications 1988.
3. King M, King F, Martodipoero S. *Primary Child Care.* Book One. Oxford: Oxford University Press 1978.
4. Sheffield V, Savage-King F. *Primary Eye Care.* Slide teaching set of the Tropical Child Health Unit, Institute of Child Health, London. St.Albans: TALC 1985.
5. Sommer A. *Vitamin A deficiency and its consequences.* 3rd edition. Geneva: WHO, 1995.
6. Stanfield P. *Child Health.* 2nd edition. Nairobi: African Medical and Research Foundation, 1997.
7. Werner D. *Where there is no doctor.* Revised edition. London: The Macmillan Press, 1993.

18. Injuries, burns, shock, bites and poisoning

Injuries are often preventable. This chapter contains some important basics of first aid (emergency care) that everyone should know about (for example, the emergency treatment of burns).

Emergency care of injured children

Whether a child has been injured in a car accident or in a rocket attack, whether he has fallen from a roof or fallen into fire, first aid is always the same concentrating on maintaining the child's airway (breathing) and circulation.

Safe his life from immediate death

1. Remove the child from any area of immediate danger.
2. If he is unconscious, put him in the coma position and clean his airway as described under "The unconscious child" on page 134. Too often, even in hospitals, unconscious children are left lying on their backs, which exposes them to the danger of aspiration and respiratory arrest, instead of putting them in the coma position.
3. Check the pulse. If it is fast and weak, the child is in shock and needs urgent treatment. First aid is by lifting the child's legs and pelvis up, further details see below under "Shock".
4. Stop any external bleeding by applying firm pressure to it.

Assess for other injuries and problems

After the first life-saving measures, find out how the injury happened. Examine the child carefully. In severe injuries, completely undress the child. Internal injuries and pelvic fractures are often missed. Severe injuries should be treated at a hospital.

How to get a child ready for transportation to a hospital

1. All external bleeding should be under control. Tell the family to apply firm pressure throughout the journey to the hospital if bleeding has not stopped completely.
2. Make sure the child is not shocked. If there is the risk of shock, or the child is still bleeding, continue an infusion on the way to hospital.
3. Fractures should be immobilised so that fractured bones do not puncture the skin or cause continuing pain.
4. Give the child pain relief if the hospital is far away. Never sedate an injured child.
5. If the child is unconscious, make sure his family understands that the child must remain in the coma position all the way to the hospital.
6. Write a letter with your initial findings and treatment and send it with the child to the hospital.

Do not forget tetanus prophylaxis - even for small wounds

Even very small wounds (for example a thorn prick) can provide an entry for tetanus bacteria causing a devastating disease with a high mortality. Therefore, any child with an injury needs ATS (anti-tetanus serum) immediately, followed by a full course of tetanus toxoid (for details, see page 131).

Pain-relief in children

The choice of analgesic (painkiller) depends on the severity of pain. If pain is not controlled with one drug, change to the next stronger one. It is possible to combine two analgesics (for example, ibuprofen and morphine, to reduce the morphine dose). However, do not combine codeine and morphine; nor aspirin and ibuprofen.

Do not forget to look for other factors that cause increased pain, for example infection, too tight bandages or casts, missed fractures or poor positioning.

Specific drugs for pain relief (dosages see "List of essential drugs" at the end of the book)

MILD PAIN

- Paracetamol
- Aspirin (avoid in children under 6 years)

MODERATE PAIN

- Ibuprofen
- Codeine (it is stronger than ibuprofen)

SEVERE PAIN

- Morphine

Burns

The main point about burns is their prevention. Many burns occur from fireplaces on the floor used for cooking. Speak to families and to elders about how to

prevent burns. One very effective way is to raise the fireplace by building a platform of stones or bricks. It should be at least 1 m high so that children cannot reach it.

How to assess a child with burns

The management of burns depends on the area burnt and the depth of the burns.

Take a history

- What happened?
- How long ago?
- What treatment has the family already used?

Examine the child

- What percentage of the child's body surface has been burnt? The body surface of children is different from adults, so you cannot apply the well-known "rule of 9". Use the "rule of 7" instead:

THE RULE OF 7:
Divide the child's body surface in units of 7%. This helps to estimate what percentage of body surface has been burnt.

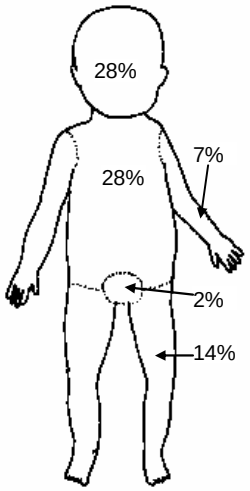


Figure 18–1 ***The rule of 7***.

- What is the depth of the burn: superficial, partial thickness or full thickness burn (see figure 18–2)?
- If the burn is old: are there any local or systemic signs of infection, such as redness, pus, or fever?

Management of burns

First aid

Immediately after a burn has occurred, cool the skin by dipping it into clean, cold water. This will reduce the pain and may prevent a deep burn developing. Do it for about 5-20 minutes. If the burn happened longer than 20 minutes ago, this method will not be effective.

NOTE: Never put any traditional medicine on burns.

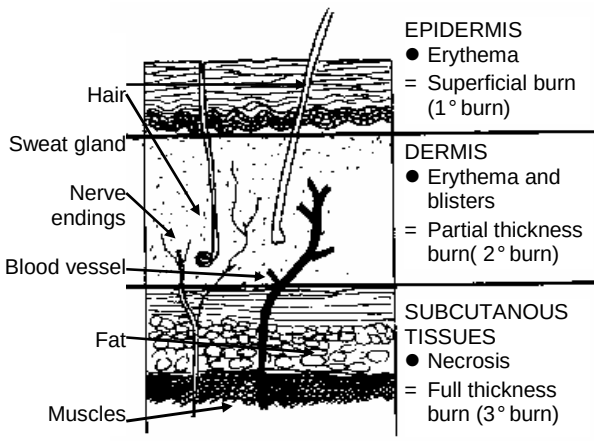


Figure 18–2 ***The thickness of burns. Shortly after a burn has happened, its full depth is not always obvious***.

The following children at danger should be treated at a hospital:

- Children who have burnt more than 10% of their body surface. If hospital treatment is not available, set up a drip and replace fluid losses. Give an extra 10 ml/kg fluid per 10% of burnt body surface. This can be given orally as ORS or IV as ringer-lactate or sodium chloride 0.9%. Assure good pain relief, and clean handling of the patient. Check the haemoglobin and watch the renal function. Local treatment, see below.
- Children with flame burns of their face. These children may also have inhaled smoke and may have suffered internal burns of the airways.
- A full thickness burn that has not healed after 2-3 weeks.

Further management

1. **Tetanus prophylaxis**: give all children with burns tetanus toxoid or if they were not previously immunised anti-tetanus serum (ATS).
2. **Local treatment**:
   - Always wash your hands before and after you examine burns.
   - Clean the burnt area. Give good analgesia before you do this (morphine IM, if possible). Use sodium chloride 0.9% or boiled water to clean away any dirt or dead tissue.

Burns of the body, genitalia, face and neck
Let the air dry out the area and do not use any ointments or dressings. This is called the "exposure method ".

Burns of the hand or feet
After cleaning the burnt area, apply vaseline and bandage the limb. In burns of the hand, bandage each finger separately. Silver sulphadiazine can be used for local treatment, other antibiotic creams are not indicated. The dressing must be done under sterile conditions.

The positioning of joints

The position of the joint is very important. If a deep burn is crossing a joint flexure (the site where the joint bends), there is the risk that contraction from scarring will develop after healing. Prevent it by splinting the affected joint in extension (see figure 18–3).

Changing of dressings and wound care

- If it is not a full thickness burn, change the dressing every 5-10 days.
- For full thickness burns, change the dressing every 3-4 days.
- Change the dressing earlier if it is soaked from exudate, pain increases, fever or regional lymphadenopathy develops.
- Soak the dressing in sodium chloride 0.9% before changing it because this will make the procedure less painful.
- In full thickness burns, remove any dead tissue. Drain pus. Skin grafting may become necessary later.

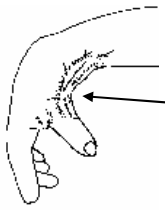
3. **Pain relief**. The choice of drug depends on the severity of pain (see box on page 167).

NOTE: There is no evidence that prophylactic antibiotics - local or systemic- reduce the incidence of infections. Therefore, only prescribe antibiotics if there are signs of infection. However, infection by streptococcal bacteria can be prevented. Give procaine penicillin IM for 5 days to all children with severe burns.

WHY SCAR TISSUE IS DANGEROUS:

Scar tissue that develops after a deep burn can be very dangerous. It may form a contracture that pulls a patient's body in an abnormal position. Children are at risk because their body will grow but a scar will not grow.

For example:
This burn of the right hand has been treated in a wrong position.
.



A scar has formed a contracture that makes it impossible to use the thumb or straighten the hand.
.

Splinting the hand in this position could have easily prevented this disability:

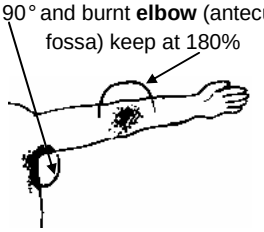
HOW TO PREVENT THE DANGERS OF SCARS - CORRECT POSITIONING:

Splint a joint continuously for 3-6 weeks, then mobilise. Splint it in a position that will limit the risk of lasting disability

Examples:

- Burnt **ankle**: keep at 90°

- Burnt **axilla**: keep at 90° and burnt **elbow** (antecubital fossa) keep at 180%



- Burnt **hand** and **fingers**, see above
- Burnt **neck**: keep in extension
- Burnt **hips** and **knees**: keep in extension

Figure 18–3 ***Correct positioning of burnt extremities and neck.***

Mine injuries

Increasing the awareness about mines can reduce the number of mine injuries. Known mine fields in a community should be clearly marked and reported to one of those agencies who are undertaking mine clearance.

Often children lose arms or legs or get eye injuries. Services are available that offer treatment, rehabilitation and aids for mine victims.

Shock

Shock is dysfunction of the circulation so that tissues and vital organs are not sufficiently perfused, meaning that there is not enough blood flow to meet the metabolic needs. First there will be some compensatory mechanisms, but with the progression of shock, the body is no longer able to compensate and cell death will occur.

Shock can be caused in three ways:

1. Loss of intravascular volume (hypovolaemic shock). This may be caused by bleeding, severe fluid loss from diarrhoea or severe burns.
2. Sudden dilatation of the blood vessels (vasogenic shock). This may be caused by bacterial toxins in sepsis (septic shock), or a severe allergic reaction (anaphylactic shock).
3. Failure of the heart to maintain circulation (cardiogenic shock). This occurs most commonly in abnormal hearts.

How to recognise shock

It is important to recognise and treat shock early:

◆ The child looks very pale.

- The skin looks mottled, especially in young children.
- Hands, feet and nose are typically cold in hypovolaemic shock; in early septic shock, they are warm.
- Weak or impalpable peripheral pulses. At first, the pulse is only slightly raised, later it is very fast (tachycardia).

  Normal pulse rates in children:

  Under 1 year 80-160/minute
  Over 1 year 70-120/minute
  (Add 10 more for every degree of fever over 37°C.)
- Blood pressure is normal at first, later low.

Late signs (when the compensatory mechanisms are failing):

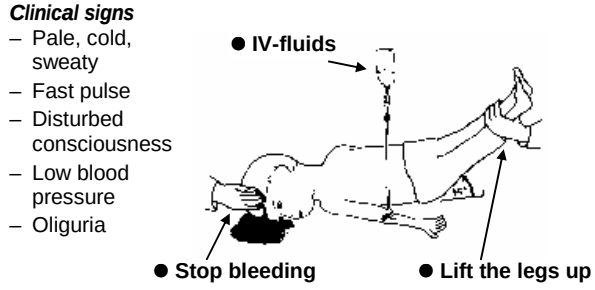
- The skin is cold and sweaty.
- The child's consciousness is altered: lethargy, coma.
- Oliguria (reduced urine output).

Assess the circulatory situation by measuring the capillary refill time: press with your finger on a fingernail of the child so that the blood bleaches. Then take your finger away and measure the time it takes until the capillaries of the nailbed have been filled with blood again. A prolonged refill time of more than 2 seconds indicates impaired circulation and shock.

Management of shock

For shock from **severe dehydration**, see page 69; for shock from **severe allergic reaction**, see page 207; for **septic shock**, see page 22. If shock is caused **by heart failure**, it is very difficult to treat because certain inotropic drugs (for example, dopamine) are usually not available.

1. Lift the leg and pelvis of the child up while you are inserting a cannula. If you cannot find a peripheral vein, you can give IV fluids into the bone marrow of the tibia or subclavian vein.
2. Give polygeline (haemaccel) or saline 0.9% 15 ml/kg over 15-30 minutes. Repeat if necessary until you can feel strong peripheral pulses.



(Not shown in the figure: ● **Cover the child with a blanket**)

Figure 18–4 *Shock*.

If the shock is very severe and clearly from blood loss, O rhesus negative whole blood 15 ml/kg can be given without cross-matching.

3. Do not forget to stop what is causing the shock (for example bleeding).
4. Give oxygen; because of circulatory failure, shocked children do not show cyanosis despite hypoxaemia.
5. Monitor the child closely, especially urine output, because he may develop acute renal failure.

Animal bites

DOG BITES

The threat of dog bites - rabies

Besides the injury caused by the actual bite, the great danger of dog bites is the possible transmission of rabies, a deadly viral illness. Rabies is common in Afghanistan. Beside dogs and cats, also other animals can spread the disease. Often the animal shows some signs of the disease: strange behaviour, foaming at the mouth so that it cannot eat or drink. Sometimes an animal goes wild and bites everyone nearby. The animal dies within 5-7 days. However, sometimes animals without symptoms (asymptomatic carrier) can transmit rabies.

In humans, the first symptoms of rabies appear usually within 3-8 weeks after the bite, sometimes many months later. At first, the place of the bite becomes painful, then the child starts to breath irregularly, swallowing becomes difficult and painful. Thick saliva drools out of his mouth. The child is alert but very fearful and irritable. Convulsions and paralysis occur before the child dies.

Once the first symptoms occur, there is no cure and therefore proper treatment of bite injuries is the only way to save children from rabies.

Management

1. Clean the wound thoroughly with soap and water. Soap will destroy rabies virus. Remove any dead tissue and leave the wound open.
2. Give tetanus prophylaxis.
3. Give prophylactic antibiotics for 5 days. "First choice" is erythromycin, otherwise procaine penicillin or amoxicillin.
4. Give rabies immunisation if the child has been bitten by an unknown or possibly mad dog. If possible, keep the animal under observation for 10 days. If it remains healthy, you do not need to immunise. Sometimes WHO provides the vaccine through government hospitals.

SNAKE BITES

Not every bite by a poisonous snake includes venoming (poisoning). Signs of poisoning are local pain and swelling. The swelling may spread and necrosis may develop. Systemic complications include bleeding disorders with shock, neurological problems causing swallowing or breathing difficulty, or heart arrhythmia.

Management

First aid

1. Do not apply a tourniquet, do not incise the bite.
2. Wipe the site of the bite with a clean cloth and cover it.
3. Immobilise the whole limb.

Further management

4. Give tetanus prophylaxis.
5. Give pain relief.
6. Observe the patient:
   - *If there is no local swelling after 2 hours*, discharge the child and reassure the family.
   - *If there is local swelling*, observe the child at least for 12 hours.
   - Give procaine penicillin IM for 5 days if necrosis develops.
   - If there is swelling or necrosis, keep the limb immobilised and raised.
   - Treat complications such as shock.

SCORPION STINGS

Pain is the main problem with scorpion stings. Children under 2 years may develop convulsions, irregular breathing or vomiting. Treatment is symptomatic. Good pain relief can be achieved by infiltration of the sting area with a long acting local anaesthetic.

Poisoning

Accidental poisoning could be prevented if drugs, insecticides and kerosene were kept out of reach of children.

General principles of management

1. Find out: WHAT was taken, WHEN it was taken and HOW much was taken.
2. Clear the airway, maintain circulation. Put in coma position if disturbed consciousness.
3. Empty the stomach if you see the child within 4 hours of poisoning and he is conscious. *Do not empty the stomach* if a corrosive substance or kerosene was ingested, or if the child is unconscious.

   How to empty the stomach
   - If available give **ipecac syrup** (if under 18 months 10 ml, if over 18 months 15 ml). This causes vomiting after about 20 minutes.
   - **Stomach wash-out**. Lie the child head down on the left side and pass a wide gauge soft rubber tube into the stomach. Pour 100–200 ml clean water down the tube and aspirate it. Repeat until the stomach is empty. Take care of the airway during the procedure.
4. Treat any complications.

KEROSENE POISONING

Main danger is aspiration into the lungs, therefore vomiting should never be induced. Kerosene can also cause coma.

Management

1. Do not induce vomiting, do not wash out the stomach.
2. Give oxygen if necessary.
3. Start treatment for pneumonia.

INSECTICIDE POISONING

Clinical features of organophosphate poisoning are muscle tremor, sweating, increased secretions, slow pulse (bradycardia) and pinpoint pupils. Later convulsions, coma and paralysis develop.

Management

1. Empty the stomach if the poison was swallowed.
2. Remove clothes and wash the skin with water and soap if poisoning is from skin contact.
3. Give atropine 2 mg IV every 20-30 minutes until the pupils dilate.

References

1. Balldin B. *KCMC Management schedules of some children's diseases at hospital level.* 5th edition. Moshi, Tanzania: KCMC Educational Committee 1994.
2. Gray DP, Steele R, Sweeney K, Evans P. Rabies in endemic countries. *British Medical Journal* 1994: 308; 487-488.
3. King M (Editor). *Primary Surgery*, Volume 2, Trauma. Oxford: Oxford University Press 1987.
4. *Snake bites.* Script to lecture. Liverpool: Liverpool School of Tropical Medicine 1991.
5. Stanfield P. *Child Health.* 2nd edition. Nairobi: African Medical and Research Foundation 1997.
6. Werner D. *Where there is no doctor*. Revised edition. London: The Macmillan Press 1993.

19. The disabled child

Disability - we can do something about it

About 5% of children are born with a disability or become disabled during their childhood. These children may have some difficulty moving, hearing or learning. Learning difficulty is also called mental handicap. Sadly, the management of disabled children receives very little attention in the training of doctors and in medical practice. In this chapter, you will learn how disability can be prevented, how you can recognise it and how you can support a disabled child and his family.

It is the aim of this chapter to give a general understanding of disability in children and to outline basic management principles. Management of specific disabilities can be found at other parts in this book, see box below:

References to other parts of the book, dealing with specific disabilities

Problems with the senses
- Deafness, pages 44–45
- Poor vision and blindness, pages 165–166

Communication problems
- Speech delay, box on page 173

Problems with movement
- Cerebral palsy, pages 140–143
- Club foot, pages 118–119
- Congenital dislocated hip, pages 117–118
- Contractures, pages 139, 142–143, 169
- Delayed walking, box on page 173
- Painful joints, page 112
- Paralysis, pages 136–143

Psychological problems
- Past stressful experiences, chapter 20

How to prevent disability

More than half of all disabilities are preventable. The following guidelines show how to prevent disabilities in children:

- **Before marriage**: choose a wife from a distant family. If husband and wife are first cousins, there is a high risk that their children may be born with a congenital disease. This risk is small if they belong to different families.
- **Before pregnancy**: provide sufficient iodine and folic acid in a woman's diet before she becomes pregnant.
- **During pregnancy**: provide good antenatal care and good nutrition for pregnant women (see chapter 22. "The importance of maternal health").
- **During delivery and baby's first month**:
  - Delivery should be supervised by a trained birth attendant.
  - Encourage early breastfeeding.
  - Provide good neonatal care (see chapter 21. "Care and problems of the newborn").
- **During child's first years**:
  - Immunise the child.
  - Ensure good nutrition.
  - Identify and treat potentially disabling illnesses promptly. Good health care for sick children prevents disabilities (for example, good management of measles prevents blindness and malnutrition, and good management of middle ear infections prevents deafness).
  - Create a safe environment for the child (for example, children should not play near fireplaces or not play in any possibly mined areas).

Some examples of disabilities and their prevention

Cause	Disabling effect	How to prevent it
Poliomyelitis	Paralysis causes difficulty in walking and moving	Immunisation
Vitamin A deficiency	Dry eyes and blindness	Good diet, vitamin A capsules to all children at risk
Landmines	Loss of limbs	Mine clearance, teaching children about mines
Painful joints (chronic arthritis)	Stiffness and contractures	Exercises

How to recognise a disabled child

Every child develops in four main areas:

1. Physical (body movements)
2. Mental (learning)
3. Senses (hearing and vision)
4. Social (speech and relating to others)

Child development follows stages. Some children will develop faster than others, many slow children will catch up later. A disabled child will have difficulties in one or more of the four areas.

Causes of delayed speech development

- Difficult living circumstances
- Malnutrition
- Hearing defect
- Cerebral palsy
- Mental handicap
- Cleft palate

Causes of delayed walking

COMMON

- Malnutrition
- Cerebral palsy
- Poliomyelitis
- Mental handicap
- Other severe illnesses
- Familial (normal - in some families, many children start walking late)

RARE

- Inherited muscular dystrophy

Families, especially mothers are usually aware whether a baby or child is developing normally or whether there are problems. Therefore, listen to mothers carefully and let them explain their concerns. Take a mother's concern seriously because she is often the first to recognise a problem.

The "Ten Questions" Screen

The following is a simple developmental screening questionnaire. It helps you to identify children with developmental problems if you ask the family these questions:

1. Compared with other children, did the child have any serious delay in sitting, standing or walking?
2. Compared with other children, does the child have difficulty seeing, either in the daytime or at night?
3. Does the child appear to have difficulty hearing?
4. When you tell the child to do something, does he seem to understand what you are saying?
5. Does the child have difficulty in walking or moving his arms or does he have weakness or stiffness in the arms or legs?
6. Does the child sometimes have fits, becomes stiff, or lose consciousness?
7. Does the child learn to do things like other children his age?
8. Does the child speak at all (can he make himself understood in words, can he say any recognisable words)?
9. For 2-year-olds ask:
   Can he name at least one object (for example, bread, an animal, a cup, a spoon, a toy)?

   For 3-to 9-year-olds ask:
   Is the child's speech in any way different from normal (not clear enough to be understood by people other than his immediate family)?
10. Compared with other children of his age, does the child appear in any way mentally backward, dull, or slow?

Important milestones

Certain clearly recognisable steps in the development, for example, when a child starts walking, are called "milestones". Although some children will develop faster than others, we know the basic time-table of childhood development, meaning that we know when a child is expected to reach certain milestones.

Below are some important milestones. The time given is the age at which most children (about 97%) pass these milestones. If a child has not achieved these milestones by the upper limit of age, you should assess him carefully to find out:

- Is the child slow at more than one area?
- Is there a reason why a child is slow?
- Is the child suffering from additional problems?

(for details, see text)

Important milestones

- Smiles by 2 months
- Stable head control by 5 months
- Able to sit unsupported by 8 months
- Crawling by 9 months
- Able to stand without support by 12 months
- Able to walk without support by 18 months
- Feeds himself with bread by 8 months
- Picks up small things between tip of thumb and forefinger (should be able to do it with each hand)
- Babbling and cooing by 12 months
- Says single words with meaning by 21 months
- Talking in sentences by 3 years

How to assess a child with a suspected disability

If you suspect that a child may have a disability, assess him carefully:

- Observe carefully his movements and behaviour, before you approach him for examination. Watch the child while he is with his mother. While you watch the child, consider the four different areas of development (movements, hearing and vision, speech and relating to others and mental development). Does the child appear to be slow in one or more areas? The box "Important milestones" gives you some guidance what to expect from a child in each area.

- Then, especially if a child is slow in one area, assess him thoroughly to detect other problems which you may either be able to treat or for which you could give special advice to a family. Beside

the area the family is worried about, pay particular attention to all of the following:

- **Vision**: assess the eyes.
- **Hearing**: ask about chronic ear discharge and examine the ears.
- **Movements**: assess all limbs and the spine. Look for weakness or spasticity. Test, what the child can do (for example, sitting, walking). How to do a detailed examination of limbs is explained on page 127.
- **Feeding**: ask about swallowing difficulties and look for signs of malnutrition. Discuss good nutrition with the family.
- **Convulsions**?
- **Speech problems**? Examine the throat for a cleft palate.
- **Immunisations** completed?
- **Social life**: is the child integrated into family life? Do other children play with him or not? Does the mother give him tasks to do? What does the family find worrying or difficult with the child?

If a child is slow in more than one area, a mental handicap is likely. Children, whose minds are slow to learn (mental handicap), are usually also slow to use their bodies (for example, they are slow to learn to walk). Their delayed mental development slows their physical development.

However, physically disabled children who are mentally completely normal, may also be slow in more than one developmental area. Children with physical difficulties have often opposite problems to mentally handicapped children. Their minds are very quick to learn but the physical disability makes it harder and slower for them to use their bodies (for example, a child whose mind is unaffected but who is deaf will also have problems in learning to speak because he cannot hear what other people say).

Causes of mental handicap

- **Born with a malformed (badly made) brain**. Causes can be iodine deficiency of the mother during pregnancy, or an intrauterine infection like rubella, but often we do not know the exact reason
- **Damage to the brain during delivery** (for example, birth asphyxia or birth trauma)
- **Brain damage caused by a serious disease** (for example, meningitis, severe newborn infection, malnutrition or neonatal jaundice)
- Some children with **congenital diseases** have a mental handicap

How to support a disabled child and his family

1. Define a child's problems and look for treatable causes

If a child's development is slow, ask yourself: is there any specific cause that you could treat (for example malnutrition, chronic otitis media or contractures)? Are there any other problems that need attention? Severely handicapped children may have problems swallowing or convulsions that need to be controlled. If a child is slow in one area, make sure that he can make the best use of all the other functions. He needs them to make up for and improve the area where there is a problem. Reading about "Cerebral palsy" (see pages 140–143) will give you more ideas about the different areas that should be considered.

After having defined a child's problem or problems, the most important and most difficult part is to explain the condition to the family in a way that they will be able to understand it and that they will be encouraged to help their child long-term. Your advice must be very clear and simple.

2. Explain the problem to the family

Explain to the family the nature of the problem. Tell them that the child is slower to develop in certain areas than other children. Tell them that he needs their special support to develop as well as possible. Help them to accept their child with a disability. Tell them that their child has the same general needs as other children. He needs the same love and education, play and the company of other children. He should not be isolated and they should not be ashamed of him. Disability is not a punishment for sin.

Avoid the three common mistakes:

Mistake 1: to raise unrealistic hopes of a quick recovery. It is not honest to tell the family that a child will recover quickly. Progress will be slow and it means hard long-term efforts for the family. It is possible that a child will not be able to achieve the same final developmental stage as other children.

Mistake 2: to leave the family with the impression that nothing can be done to help their child anyway. When studying this book, you will learn how simple interventions can change the future of a child's life and can give hope to families.

Mistake 3: to prescribe unnecessary medicines.

3. Discuss how a family can help their disabled child and set realistic aims

All children need stimulation for healthy development. Stimulation means opportunities to explore and play. In children without impairment, stimulation comes naturally. Because of his impairment a disabled child has special needs and needs extra support and stimulation to develop despite his disability.

1. After defining the areas where a child needs special stimulation, discuss with his family the needs and local resources to help the child.
2. Set realistic aims. In severely disabled children, you would not try to achieve normality but to help the child to become as independent of his family as possible. Aims would be that he is able to feed himself, to go to the toilet by himself or to dress and undress himself.

References

1. Bacon R, Neville R, Robins A. Building on ability. *Child Health Dialogue* 1997: 7, 9-11.
2. Eunson P. Learning about disability. *Child Health Dialogue* 1997: 7, 3.
3. Illingworth RS. *Basic Developmental Screening 0-4 years.* 5th edition. Oxford: Blackwell Scientific Publications 1990.
4. King M, King F, Martodipoero S. *Primary Child Care*. Book One. Oxford: Oxford University Press 1978.
5. Werner D. *Disabled Village Children.* 2nd edition. Palo Alto, CA: The Hesperian Foundation 1996.
6. Wirz S, Campbell H. Child health and disability. *Child Health Dialogue* 1997: 7, 1.

20. How to help children in distress

Children are the future of a country...

Children are the future of a country. War does not affect the health of children only by direct injuries, or destruction of infrastructure with resulting food shortage and poor hygiene. War also damages the souls of children through the experiences of terror, loss of homes, friends and family members, torture and abuse. A badly treated osteomyelitis results in life-long discharge and disability. In the same way, unrecognised and untreated stress in children related to traumatic experiences may cause life-long mental harm. It has been suggested that more than half of all Afghan children are mentally affected and injured by traumatic war experiences.

It is therefore important for anyone who works in child health in Afghanistan to be able to recognise distressed children in need of help and to give their families practical guidance on how to help these children. In this chapter, some practical principles will be outlined that will help in this crucial task. Special therapy like putting groups of affected children together will not be discussed, but something that each family can apply to the mental needs of their own child. It is the responsibility of the doctor to discuss and explain these principles to the family. Medicines are not helpful, some of them can even be dangerous.

How to recognise war affected children

It is normal for everyone, adults and children, to have strong emotional reactions after a bad experience. Normal reactions include sadness, despair, emptiness, remembering the frightening experience all the time, confusion, tiredness, inability to continue normal life, changed behaviour, and sleep problems. These reactions usually lessen after a few weeks or months.

Some children will continue to have problems, especially those who live in a chronically violent and difficult situation. These children suffer from so-called post-traumatic stress. It is not a sickness for which medicines are helpful, some may even be dangerous.

Those children with ongoing problems who need special support can be recognised in two ways:

1. Observation of their behaviour
2. Listening to what they say

How children react to unrelieved stressful experiences

- Some children are tired, worried and frightened and have lost all interest in playing. They may find it very difficult to concentrate on work, some may be very restless.
- Some children become withdrawn from friends or families. They may behave like a much younger child.
- Some children suffer from nightmares.
- Some children are very fearful of noises or of men with guns.
- Some children become aggressive. They feel very unhappy but are not able to express their feelings other than by hitting others and being destructive, because they themselves have experienced violence.
- Some children show bad behaviour. Misbehaviour can reflect feelings of guilt. These children feel guilty (for example, when a relative has been killed in fighting) although there is no rational reason to feel like that. They behave in a way that invites punishment. They do this because they feel guilty and feel they deserve punishment.
- It is normal for children all over the world to play war games. However when a child replays the same scene of violence or suffering again and again it may show that he is not recovering from the experience.
- Some children complain about physical symptoms such as poor appetite, generalised aches and pains, or say their body feels hot. Some who had previously been dry at night start urinating again while asleep. Fever, diarrhoea and cough are not likely to be emotional.

The basis of why a distressed child can be helped

Many children will never forget their traumatic experiences, so it is of no use to expect them to do that. However, a child can be relieved from the feelings he associates with his experience. He can be helped to forget the feelings of despair and fear, and remembering what happened will become less painful. He can come to terms with his experience.

The way to relieve feelings is through being able to talk and communicate the bad experiences. It has been said that as long as an experience has not been communicated, it remains in the heart and is felt. Once it has been expressed, it becomes more and more a part of thinking and becomes increasingly distant from feelings; its burden becomes lighter.

Practical guidelines on how families can help their distressed children

The basic ways how a family can help a distressed child can be summarised:

1. Recognise that the problem they have noticed in their child has been caused by previous bad experiences.
2. Help the child to express and communicate his experiences and feelings.
3. Help him to look forward to the rest of his life with hope and to continue everyday living.

Recognition that the child's problem is caused by previous bad experiences

Families are encouraged when they understand the reason for a problem they have noticed in a child and that they will be able to help. If the child is very aggressive it is important that the parents do not hit the child and that they do not react with aggressiveness. Otherwise, there will be a vicious cycle of aggressiveness.

Help a child to express his feelings

The expression of feelings is the most important way to gain relief from the pain of bad experiences. At the same time, a distressed child needs more support and care than other children. Cuddling and hugging a child is very important so that he feels comforted, cared for, and understood. It helps a child to develop trust and leave his isolation.

- **Communicating by talking**. In some families children find it difficult to express their feelings to adults because neither of them are used to this. Each family is different and must find the most suitable person to whom the child will be able to communicate his feelings. Often children are able to help each other.

  A child can be encouraged to talk by asking questions "What was it like?" or "What was the saddest and most worrying thing about it?"

  When a child complains about nightmares, ask him to tell you his dreams. If he does not want to, do not force him.

  It helps a child to show him your own feelings of sadness and to say, "I am very sad about it as well" or "Other children would have felt the same in your situation". This helps a child to feel that he is not alone with his feelings.

  Comments that help a child to increase his self-confidence and value are very good. Encourage and praise him by saying something like, "You are a great help to us", "We are very happy about you" or "It was very brave how you reacted in that situation".

  It is important to be honest with the child and not to stop him talking. It may be the most natural wish to say something like, "Now you must forget what happened" or to give false promises like "There will never again be fighting in our city". This may not be true and the child will not trust in his listener. Expressing himself is the only way for him to cope with his bad experiences. That may also be very painful for the listener who often has gone through the same distressing situation. Some children refuse to talk. Do not force them but wait and show them in other ways that you are close to them.
- **Drawing, another way of expressing feelings**. A child can express and communicate his feelings in ways other than speaking. One method is by drawing pictures. A child may not be used to drawing pictures. At first the family can give him paper and pencil or crayons and ask him to draw whatever he likes. Later they can give him topics and ask him, for example: draw your family; draw your dream, or draw about war. Ask him about the meaning of his pictures and keep the pictures. This also helps the child to feel respected and feel his efforts are valued.
- **Re-enacting the scene**. Use stones, sticks or other objects to create a scene. Then these can be moved around to show what happened. The re-enactment may need to be gone through many times with the adult questioning and talking about what the child saw, felt, smelt, heard or touch. Sometimes it is useful to say, could we think of another end to this scene? How would you like it to have ended? What would you like it to be now? This is to help the child to get in touch with the idea of another, better reality that may be a hope for the future.

Help a child to look forward with hope and to continue everyday living

Distressed children need help to continue with a normal life. The parents need to be realistic about what to expect because a child may be limited in his ability to concentrate or may feel tired all the time.

The family should try to continue the same routine of daily life that existed before the traumatic experience. This also applies in a refugee situation, for example, meals should be taken at the time the family is used to.

It helps to give the child small tasks that he is able to complete, like fetching water, helping with cleaning the house or doing a limited amount of study for school every day. Each family is different in their expectations and, of course, the tasks depend on the child's age. It is important for the child to feel that life continues and that there is a future to look forward to.

How to support a family with a war affected child

Obviously, it takes time to explain these principles to the affected family. The principles should not just be told as technical rules - you should spend time discussing the individual situation with the family. You should inquire about who could help the child. Find out which way the child is used to communicate feelings with other family members, and think together with the family about one practical task that could be given to the child.

After you have spoken to the family they should not just have heard some rules but must have understood how they can apply them to their own situation. It is important that they have understood that relief from bad experiences comes through expressing feelings. Ask them to repeat what they will try to do. Make another appointment with them for one or two weeks later to find out what has happened. Explain to them that a deep wound of the body does not heal quickly and that wounds of the heart and soul also take time to get better. Encourage them that they will be able to help their child.

Frequently the adults in a family will also be suffering from post-traumatic stress. You can expect that working through the trauma of a child will also help the adult. You must be prepared to support the adult and take time to listen to him and his feelings that emerge when he works with his child.

References

1. Barnen B. *A few recommendations for the families of war affected children*. Peshawar: Swedish Save the Children (ca.1991).
2. Richman N. *Communicating with children - helping children in distress*. Development Manual 2. London: Save the Children 1993.

21. Essential care and problems of the newborn

It is urgent to improve newborn care

A baby from birth until the age of 4 weeks is called a newborn or neonate. The task of improving newborn care is urgent. More deaths occur during the first week of life than at any other time in childhood. Failure to detect risk pregnancies, to notice danger signs during labour or to recognise signs of serious disease in the newborn are the major factors for the unacceptably high neonatal mortality rate. Improving antenatal and neonatal care could prevent many of these deaths. Because of the close link between maternal and newborn health, the whole of chapter 22 has been dedicated to explain how maternal health can be improved easily and effectively.

This chapter contains practical guidance on how to care for the normal newborn, how to recognise danger signs of serious neonatal disease and how to manage common newborn problems.

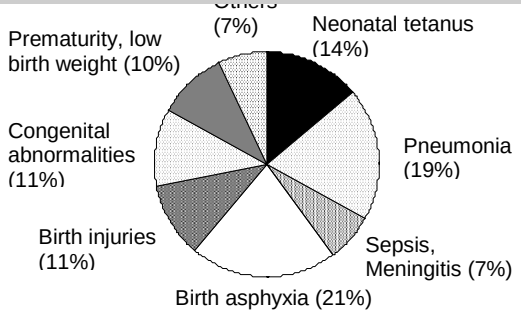


Figure 21–1 ***Causes of neonatal death in 1993***. ***Source: WHO***.

How to care for the normal newborn

The key points of good care for the newborn

Good care for the newborn is neither difficult nor expensive. For a summary of the 7 key points, see box.

Clean delivery - How to deliver a baby with a minimal risk of infection

1. **Clean hands**. Everyone involved in the delivery should wash his hands with soap and clean water. After washing the hands nothing dirty should be touched, otherwise handwashing must be repeated.
2. **Clean genital area (perineum)**. Wash the mother's perineum with soap and water.
3. **Clean delivery surface**. The place onto which the mother delivers the baby must be clean. If possible, a clean plastic sheet should be used.
4. **Clean cutting of the cord**. A razor blade that has been sterilised by boiling for 10 minutes is one of the best tools for cutting the cord. The cord ties should also be sterile. Never allow anyone to apply traditional colour to the cord because of the high risk of neonatal tetanus. Use gentian violet if the family insists on traditional ways of treating the cord.

Summary - the seven key points of good care for the newborn

1. Clean delivery
2. Preventing the newborn from getting cold
3. Helping the newborn to start breathing
4. Establishing breastfeeding within one hour of delivery
5. Preventing eye infections
6. Immunisation
7. Recognising danger signs and managing newborn problems

Contents of a basic delivery kit

If you attend deliveries, always have an essential delivery kit ready. It should contain:

- Soap
- Sticks for cleaning your fingernails
- A sterile razor blade
- Cord ties
- Cotton balls
- A plastic sheet of around 1 x 1 metre

Preventing the newborn from getting cold

A baby loses his body heat very rapidly, even in summer. Hypothermia is an important factor in many neonatal deaths. Preterm and low birth weight babies are particularly at risk. When a baby gets too cold, it is usually from lack of knowledge and not lack of equipment.

1. At birth, dry the baby immediately and cover him, before the cord is cut.
2. Wrap the baby in a dry towel that should also cover his head. Hand him to his mother for skin-to-skin care as explained in figure 21–2. The mother's body is the best heat source for a newborn. If skin-to-skin care is not possible, dress the baby immediately with several layers of warm clothing. Include a hat, because a newborn loses most of his heat from the head.
3. Start breastfeeding within one hour after birth. This will provide the baby with food calories to produce body heat.
4. Do not bath a newborn soon after birth. Drying him is enough. The white smear, called vernix, that often covers babies is clean and actually contains anti-infection factors. There is no need to wash it off. You can bath a baby after 24 hours if his condition is stable but the room and water should be warm, the bathing should be done quickly and the baby dried and wrapped up immediately afterwards.

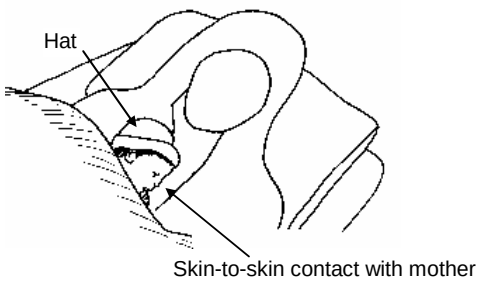


Figure 21–2 ***Skin-to-skin care to keep the baby warm***.

Helping the newborn to start breathing – the management of birth asphyxia

Lack of oxygen during labour or delivery (birth asphyxia) is a common cause of neonatal death and morbidity. It is especially common in women who did not receive antenatal care and whose delivery was not supervised by a trained birth attendant. Many conditions that are likely to cause birth asphyxia can be identified before or during labour. Additional causes include neonatal head injury or drugs given to the mother during labour that depress the newborn's respiration (for example, diazepam, morphine or aminophylline).

How to recognise birth asphyxia during delivery

The following signs indicate asphyxia during labour:

- A foetal heart rate above 160/minute
- Slowing of the foetal heart rate (bradycardia) to less than 100/minute. Slowing of the heart rate occurs naturally during each uterine contraction but the heart rate returns to normal immediately afterwards unless the baby is suffering from asphyxia.
- Amniotic fluid that is stained green by meconium.

How to resuscitate a newborn

A baby who does not cry at birth and does not breathe needs immediate help:

1. **Dry** and **cover** the baby so that he does not become hypothermic.
2. **Clean his airway**. This is best done by suction of nose and mouth and lower airways with a so-called mucous extractor. However, suction is often not available. Clean the airway by wiping the mouth with a finger covered with a clean cloth. The drainage of secretions is helped if the head of the newborn is kept lower than his body.
3. **Slap the baby's feet**, some newborns react to this stimulation.

If the baby does not start breathing:

4. **Start mouth-to-mouth breathing** to inflate the baby's lungs. This is a very effective method to which most newborns will respond (see figure 21–3):
   - Cover mouth and nose of the baby with your mouth.
   - Push the lower jaw gently up with your finger. Gently extend the neck. The baby's face should look straight up to the ceiling.
   - Using only your cheek muscles, blow air into the lungs of the newborn at a rate of 40-60 per minute.
   - Leave the baby as much time for breathing out as for breathing in. The chest and abdomen must move with each ventilation. If not, clear the airways again and check the position of the baby's head.

If breathing does not start after 1 minute of mouth to mouth breathing and the baby's heart rate is absent or below 60/minute (the heartbeat is best counted by listening with a stethoscope or feeling the apex beat):

5. Start **external cardiac compressions** (figure 21–4):
   - Compress the chest about 2 cm with two fingers at the lower third of the sternum;
   - After every 3 compressions do 1 ventilation so that you achieve a heart rate of about 120/minute and a respiration rate of about 40/minute.
6. *If a baby is unusually pale and appears shocked*:
   - Consider acute blood loss and give 40 ml of whole blood or saline 0.9%.

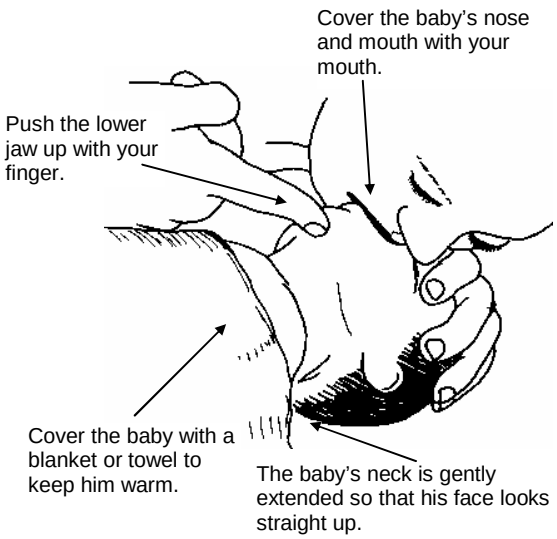


Figure 21–3 ***Newborn resuscitation: mouth-to-mouth breathing.***

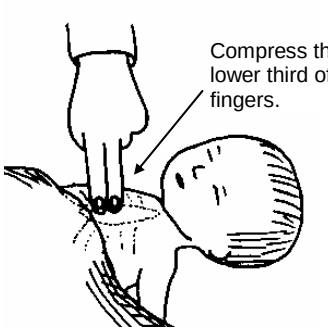


Figure 21–4 ***Newborn resuscitation: cardiac massage***.

If a newborn has responded to these measures:

1. Start breastfeeding immediately to reduce the risk of hypoglycaemia.
2. Observe the newborn for 24 hours, especially count his respiratory rate, at first every hour. A baby who had difficulties in starting to breathe will often have problems in maintaining good respiration.
3. Give one single dose vitamin K 1 mg IM to prevent haemorrhagic disease of the newborn.

How long to continue resuscitation?

Stop resuscitation after 10 minutes if there has not been any response. Drugs (adrenaline, glucose, sodium bicarbonate) are rarely helpful. Use them only in a hospital with facilities for special newborn care.

Starting breastfeeding within 1 hour after birth

For details about breastfeeding, see page 12.

Preventing eye infections

During birth, gonococcus or chlamydia bacteria can be transmitted to the newborn and manifest as eye infections with possible serious consequences. These infections can be prevented.

1. **Wipe the eyes** of the newborn immediately after birth with a clean, dry swab or cloth.
2. Apply ***silver nitrate 1% solution*** or tetracycline eye ointment 1% to both eyes within 1 hour after delivery.

Immunisation

Give to the newborn soon after birth: ***BCG*** and the first ***oral polio vaccine***

Give to the mother: ***tetanus toxoid*** if she has not been fully immunised during pregnancy. Also give her a single dose of ***vitamin A*** (retinol) 400,000 units within 1 month after delivery to increase the vitamin A content of her breastmilk.

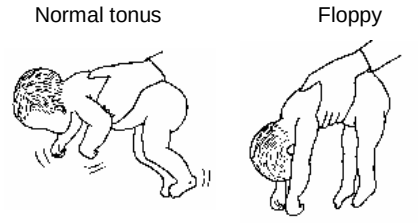
How to assess the newborn after birth

Immediately after birth, check the vital signs (breathing and heart beat) and look for major abnormalities.

Fully examine every newborn during the first 2-3 days after birth. The aim is to detect any condition needing urgent treatment or special care. Identify low birth weight babies because they need special attention. If a newborn seems to be very small, measure his chest circumference (see figure 21–5) and look for any signs of prematurity (see table on page 182).

Your assessment should cover all the following points:

- **Feeding**:
  - Feeding and suckling well?
  - Entirely breastfed? Any problems with breastfeeding?
- **Tonus**: normal, floppy or stiff (hypertonic)?



- **Temperature**: cold to touch?
- **Colour**:
  - Pale?
  - Jaundice?
  - Cyanosis?

- **Eyes**:
  - Red?
  - Discharge?
  - White pupil?
- **Breathing**:
  - Fast breathing (count the respiratory rate)?
  - Chest indrawing?
- **Heart**: heart murmur?
- **Abdomen**:
  - Palpable mass?
  - Distension?
- **Umbilicus**:
  - Red? Purulent discharge?
  - How is the family taking care of the cord stump?
- **Throat**: cleft lip or cleft palate (feel the soft and hard palate with your finger)?
- **Back and extremities**:
  - Legs asymmetrical, different length?
  - Hips: normal abduction?
  - Club feet?
  - Back: midline swelling?
- **Patent anus**?
- **Other congenital abnormalities**?

Essential advice for the mother and family

It is very important to give the family some basic but possibly life-saving advice:

1. Discuss about breastfeeding (see page 12) and how to keep the cord stump clean (see pages 179 and 192).
2. Tell the mother to take the baby for immunisation when he is 6 weeks old (it may be better to say 40 days).
3. Tell her to bring the baby back to you immediately if she is worried or if the baby develops any of the following danger signs:
   - Suckling poorly or not at all
   - Difficulty breathing or grunting
   - Having fits or is very floppy
   - Yellow skin
   - Cold or hot to touch
   - Eye redness or discharge
   - Discharge or redness from cord stump
4. Sometimes a family may ask how to extend intervals between the birth of children.

HOW TO RECOGNISE AND MANAGE PROBLEMS OF A NEWBORN

The low birth weight baby

A low birth weight is defined by a birth weight of less than 2.5 kg. However, hanging weighing scales will not usually be available. Alternatively you can measure the chest circumference at the height of the nipples because the birth weight is very closely related to the chest circumference. If the chest circumference is less than 30 cm, a baby will weigh less than 2.5 kg.

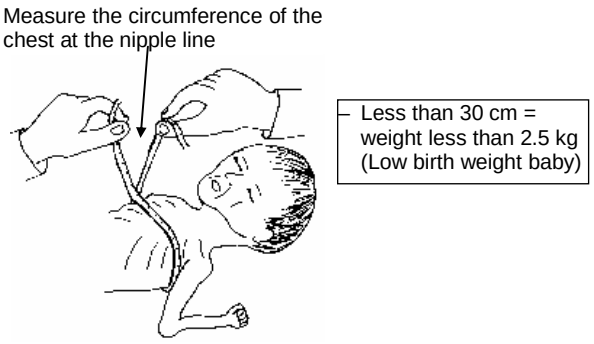


Figure 21–5 ***How to measure the chest circumference***.

How to differentiate between small-for-date and preterm babies

	Small-for-date baby	Preterm baby
Colour	Pale	Red
Skin	Thick, loose, dry	Thin and smooth
Hair	Thick, dark	Fine, soft (Lanugo hair)
Ear lobe	Formed, firm	Poorly formed, foldable
Muscle tonus	Good	Floppy
Plantar creases	Normal 	Poorly developed 

How to care for low birth weight babies

Low birth weight babies need special attention. They are at risk of hypothermia and poor growth. The most important parts of their care are:

1. **Keep the baby warm**.
2. **Start early breastfeeding**. This will also deal with the risk of low blood sugar.

The special needs of preterm babies

Most low birth weight babies are born around full term but have suffered poor growth while they were in the uterus. These children who are already born malnourished are called small-for-date-babies.

Some babies are born too early and did not have enough time to grow. If they are born earlier than 37 weeks gestation, they are called preterm. Often you will not know the duration of a pregnancy but you can distinguish small-for-date babies from preterm babies by simple clinical signs (see above). A preterm baby is not just born with a low birth weight, he is at risk of other problems because some organs of his body have had no time to develop.

A preterm baby may develop any of the following problems:

- **The problem of maintaining body temperature**. A preterm baby is at risk of hypothermia. Incubators are relatively ineffective, often difficult to maintain and therefore unsafe. Do not use them. Skin-to-skin contact with the mother is safe, simple and preferable (see figure 21–2).
- **The problem of infections**. Premature infants have very weak body defences and are at risk of infections. Infections can be prevented by washing the hands with soap and clean water before handling the baby and by breastfeeding because breastmilk contains defence factors.
- **The problems with breathing**. A baby born before 32 weeks gestation will soon after birth develop respiratory distress, this is caused by lung immaturity (hyaline membrane disease).
- **The problem with feeding**. Preterm babies can have difficulties suckling. Breastmilk should be expressed and given by spoon.
- **The problem of late anaemia**. A preterm baby may develop anaemia after a few months because of poor iron stores. Give ferrous sulphate until the child is 6 months old (to a newborn give 25 mg once a day, not more;. 25 mg equals about 1/8 tablet ferrous sulphate 200 mg).
- **The problem of jaundice**. Preterm infants are likely to develop jaundice as a result of immature liver function.

Poor weight gain after birth

It is normal for a newborn to lose about 5-10% of his birth weight during the first few days after birth. By day 10, he should have regained his birth weight. A baby who is not putting on weight should be assessed. Very often the cause is a feeding problem.

Birth trauma

Birth trauma is seen if a delivery has not been supervised by a trained birth attendant, if the labour was prolonged or after instrumental delivery.

INJURIES TO HEAD AND BRAIN

Moulding is a normal process by which the soft bones of the skull overlap each other to make it easier for the head to pass the birth canal. After a few days, the head shape returns to normal.

Caput succedanum is common. It is a swelling of the part that passed first through the birth canal (presenting part). It is caused by bruising under the skin and disappears after a few days. The eyes may show bleeding, which will also disappear after a few days. Reassure the parents.

Cephalhaemaotoma (figure 21–6) occurs less often. It is a larger swelling caused by bleeding between the membrane covering the outside of a skull bone and the bone itself. The swelling is limited to one skull bone and is fluctuant on examination. No treatment is necessary and it will disappear after several weeks. Never aspirate it.

Subdural haematoma. Very rarely bleeding occurs between the membrane covering the inside of the skull bones and the bones themselves. This very serious condition presents with a bulging fontanelle, inactivity, floppiness, convulsions and possibly shock. Treatment is by aspiration under strictly sterile conditions through a gap between the skull bones.

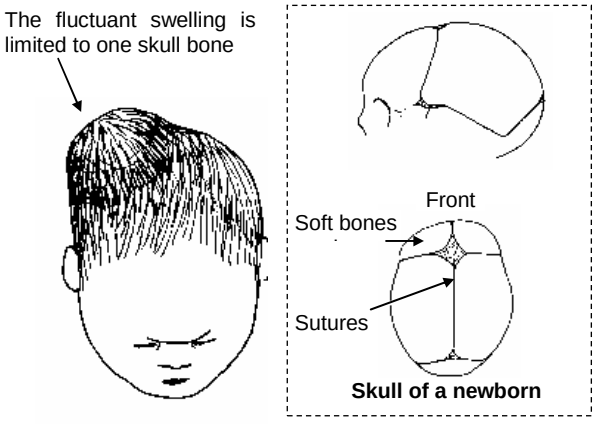


Figure 21–6 *Cephalhaematoma*.

Brain injury. Lack of oxygen (asphyxia) over a prolonged time before, during or after birth can damage the brain tissue. Sometimes brain damage is caused by bleeding or swelling around or inside the brain. These brain injuries are irreversible but it is important to prevent further damage and to support the child's future development, see chapter 19. "The disabled child". Children with brain damage are very

floppy or very stiff at birth with weak suckling. They are sleepy and can have irregular breathing or convulsions. It is essential to rule out septicaemia, meningitis, hypoglycaemia or neonatal tetanus.

FRACTURES, DISLOCATIONS and NERVE DAMAGE

Fractures are often not recognised immediately after birth but become noticeable later when a lump (callus formation) appears during the healing process around the fracture. Apply a splint to any leg fracture and bandage a fractured arm to the chest. Healing is usually uncomplicated.

The manipulation of the spine and arms during breech delivery can result in stretching of nerves (cervical or brachial plexus) with resulting palsy. The weakness usually resolves after a few weeks. Treat it as described on page 136 and in figure 21–7. Facial palsy can occur after forceps delivery when the forceps have compressed the facial nerve. Facial palsy also usually resolves by itself.

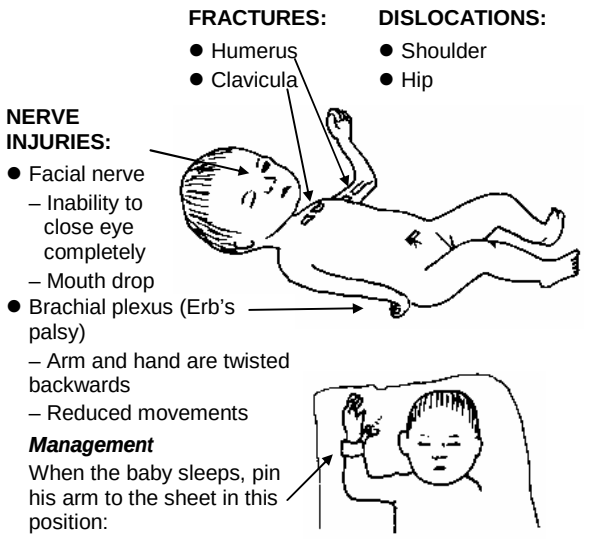


Figure 21–7 ***Birth injuries: common fractures, dislocations and nerve injuries.***

Congenital malformations

Congenital malformations occur in about 3-4% of all births. Some are minor or are not noticed until later in life. Some will have severe effects on the life and development of the child. If good surgical services are readily available, some of these are treatable. It is important to recognise those congenital malformations that can be treated even with limited resources and to understand the implications of some common conditions.

- **CONGENITAL CATARACT** (see page 164)

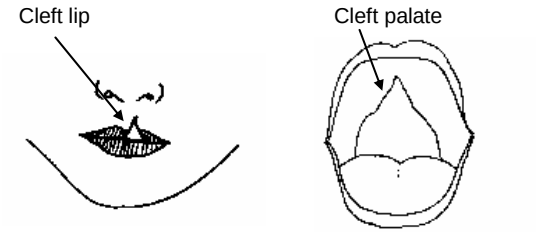
  Signs: white pupil

  Problem: blindness

  Treatment: operation as early as soon as possible

- **CLEFT LIP OR PALATE**

  Problems: poor feeding, ear infections, deafness, speech problems

  Treatment: operation cleft lip at age 3-4 months, cleft palate at around 8 months

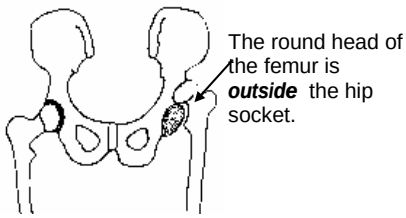
- **CONGENITAL HEART DISEASE** (see page 123)

  Signs: central cyanosis, respiratory distress at rest or during feeding, heart murmur

  Problems: heart failure, early death

  Treatment: symptomatic treatment of heart failure, operation

- **CONGENITAL DISLOCATION OF THE HIP** (see page 117)

  Signs: different leg length, asymmetrical hip creases, limited abduction

  Problems: disability, abnormal gait, arthrosis

  Treatment: see figure 13–8

- **CLUB FOOT (TALIPES)** (see page 118)

  Problems: disability, abnormal gait

  Treatment: strapping of the foot, beginning as soon after birth as possible (see figure 13–13)

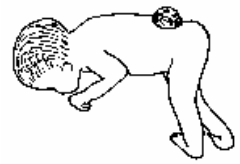
- **EXTRA 6TH FINGER OR TOE**

  Problems: none

  Treatment: tie it off with a piece of string. It will become black and fall off.

- **NEURAL TUBE DEFECT - SPINA BIFIDA** (see page 144)



Signs: defects of skin and spine through which part of the spinal cord comes out

Problems: neurological defects, paralysis. If operation is not possible, babies usually die from meningitis or hydrocephalus.

How to reduced the risk of recurrence in further pregnancies: folic acid 2.5 mg daily

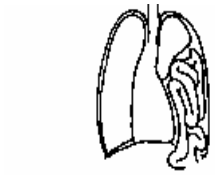
- **INTESTINAL OBSTRUCTION**

Signs: the time at which the symptoms start depends on the site of obstruction. Babies with oesophageal atresia show excessive salivation because they are not able to swallow their own saliva. In obstruction of the duodenum frequent bile-stained vomiting starts soon after birth. In lower intestinal obstruction, vomiting and abdominal distension start after 1-2 days. Meconium is not passed.

Diagnosis: plain erect and supine abdominal x-rays. With the onset of breathing, the baby swallows air that passes down the gut and marks the gut lumen. There will be no air beyond the obstruction and the different malformations cause typical x-ray features.

Treatment: the only way to save a baby's life is urgent surgery.

- **DIAPHRAGMATIC HERNIA**



Gut has passed into the chest cavity through a defect in the diaphragm and compresses the affected lung

Signs: respiratory distress starting several hours after birth

Problem: hypoxia

Treatment: operation

- **CONGENITAL HYPOTHYROIDISM**

Signs: coarse face, dry skin, hoarse cry, floppiness, umbilical hernia, prolonged jaundice, constipation

Problem: mental handicap

Treatment: thyroid hormone replacement

Prevention: congenital hypothyroidism is often caused by iodine deficiency and is a preventable cause of mental handicap (see page 196).

- NOTE: **Enlarged breasts and vaginal discharge** are common concerns to parents but you can reassure them that this is a normal effect of maternal hormones that will disappear after a few days.

Jaundice

When red blood cells break down, haemoglobin is released and a yellow substance (bilirubin) is formed. Bilirubin is combined in the liver with other substances (bilirubin metabolism) and is excreted through the bile ducts into the gut. We differentiate between two types of bilirubin:

1. Bilirubin that has not yet metabolised in the liver is called **unconjugated or indirect bilirubin**.
2. Bilirubin that has been metabolised in the liver is called **conjugated or direct bilirubin**.

Only unconjugated bilirubin is dangerous for a newborn. Once unconjugated bilirubin has reached a certain blood level, it can enter the brain and cause serious harm (kernicterus). **Kernicterus** may either kill a baby or cause permanent brain damage. The critical bilirubin level above which bilirubin passes into the brain is 20 mg/100 ml in the normal newborn and is even lower in preterm or severely asphyxiated babies. It is not possible to cure the damage caused by kernicterus but it is possible to prevent it. Early recognition and management of severe jaundice are therefore essential. Management aims are to prevent the bilirubin from rising and to reduce its blood level. Active treatment is indicated once bilirubin has reached 12 mg/100 ml.

How to determine the degree of jaundice by clinical examination

It is often not possible to measure bilirubin accurately. However, jaundice spreads in a typical way. You can get a rough estimate of the degree of jaundice by looking how far the jaundice has spread (figure 21–8).

Danger signs of jaundice

- The jaundice has started within 24 hours after birth.
- The jaundice spreads rapidly.
- The jaundice has spread to the arms, legs or even the hands.
- The child shows symptoms of kernicterus. Early symptoms are poor suckling, vomiting and sleepiness.

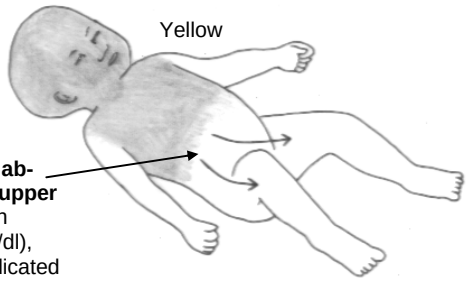
How to find the cause of jaundice

It is helpful to divide jaundiced babies into three groups, according to the time of onset and duration of jaundice:

1. Jaundice starting within the first 24 hours after birth
2. Jaundice starting between day 2-5
3. Jaundice persisting for more than 10 days (prolonged jaundice)

Jaundice spreads from head → chest → abdomen and upper legs → arms and lower legs → hands and feet

Jaundice of **head and chest**:
Bilirubin not dangerously high. Only dangerous if started within 24 hours after birth or is rapidly spreading.



Jaundice has reached **arms and legs**. DANGER! The further it spreads to the hands and feet the higher bilirubin is (14–20 mg/dl).

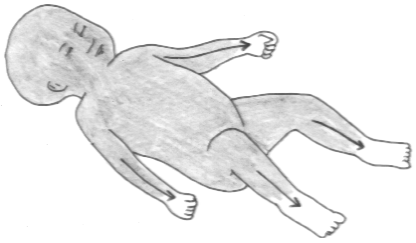


Figure 21–8 ***Spread of jaundice in the newborn***.

Jaundice starting during the first 24 hours after birth

Jaundice that is present at birth or starts during the first 24 hours is an emergency because the bilirubin level will rise rapidly and cause kernicterus. Anaemia is an additional problem because early jaundice is usually caused by an increased breakdown of red blood cells (haemolysis).

Destruction of the foetal or newborn red blood cells can be caused by maternal antibodies. The commonest is ABO incompatibility. The mother usually is blood group 0, the baby either blood group A or B. Unlike rhesus incompatibility, there is no increased risk that future babies will be jaundiced.

Jaundice caused by incompatible rhesus groups is often very severe. The problem occurs when a mother who is rhesus negative has been sensitised with rhesus positive blood during a previous pregnancy of a rhesus positive baby, a miscarriage or a mismatched blood transfusion. Haemolysis will be worse in future pregnancies and future babies may die of severe intrauterine haemolysis and anaemia (hydrops fetalis). The only way to prevent this is by giving rhesus immunoglobulin (anti-D antibodies) to a rhesus negative mother within 24 hours after birth or miscarriage. The injection has no effect if antibodies have already been produced during previous pregnancies.

For G6PD deficiency, see page 109.

Jaundice starting between day 2–5

The number of red blood cells is high in a newborn. It takes some days before the liver of a newborn is fully functioning. Therefore, many healthy babies become jaundiced between 2-3 days of age. The jaundice reaches its peak at day 5 and disappears by day 7-10. This is called physiological jaundice. It is usually neither severe nor dangerous.

However, if the baby is ill, the bilirubin is above 12 mg/100 ml, or is rising after day 5, start investigations and treat for infection.

Jaundice persisting for more than 10 days

The other causes given in the box, for example infection, are common but consider biliary atresia if the jaundice has occurred for the first time in the second week. Biliary atresia is a congenital

Causes of jaundice according to time of appearance

Starting within the first 24 hours after birth **VERY DANGEROUS**	Starting between day 2–5	Persisting for more than 10 days **(prolonged jaundice)**
HAEMOLYTIC ANAEMIA • ABO incompatibility • Rhesus incompatibility • G6PD deficiency ***INTRAUTERINE INFECTIONS*** (rare)	***NORMAL*** • Physiological jaundice ***PATHOLOGICAL*** • Increased destruction of red blood cells from extensive bruising or large cephalhaematoma • Infections: septicaemia, meningitis, urinary tract infection, pneumonia • Dehydration • Preterm baby • Rare: congenital metabolic disorders	***INFECTION*** • Septicaemia, meningitis • Urinary tract infection, often unrecognised • Hepatitis due to intrauterine infection ***OTHERS*** • Drugs (for example, co-trimoxazole or other sulphonamides) • Preterm baby • Hypothyroidism • Congenital metabolic disorders • Malformation of the bile ducts

abnormality with blockage of the bile ducts through which bilirubin is excreted into the gut. In this case, the stools of the newborn are clay-white and the urine dark brown. The bilirubin is conjugated and there is no risk of kernicterus. Treatment for biliary atresia is not available.

Helpful investigations

- Bilirubin. In prolonged jaundice it is helpful to differentiate between conjugated and unconjugated bilirubin
- Mother's and baby's blood groups
- Blood film to look for signs of haemolysis
- Haemoglobin
- White blood cell count for signs of infection
- Liver function tests (GPT, AP)
- Urine examination
- Blood culture

Management

1. **Start breastfeeding early** because jaundice occurs less often when breastfeeding is started within one hour after delivery.
2. **Give phototherapy with blue light**. This is very effective. Blue light lowers the bilirubin level by breaking up the bilirubin into a form that can easily be excreted through the kidneys. You can make the equipment yourself. Take six 40 Watt white-light fluorescent tubes and place them at a distance of 40-45 cm above the baby. The baby is naked and should be exposed to the light all the time, only interrupted by breastfeeding. Turn him onto another side after each breastfeed so that all sides are exposed to the lights. The baby's eyes must be covered with eye pads but checked 2 times daily for infection. Fluid loss is increased and the baby needs more frequent breastfeeds. If the baby is suckling poorly, express breast milk and give it by spoon. If possible, monitor the bilirubin daily. Stop phototherapy once the bilirubin is below 12 mg/100 ml.
3. *If phototherapy is not available*, full daylight can be used instead. In this case, it is important to prevent the baby from both overheating or becoming too cold.
4. For severe cases an exchange transfusion would be the best treatment. However, it is a major procedure and its success depends on paying attention to every little detail.

NOTE: Do not use phenobarbital to treat neonatal jaundice. Phenobarbital has been given in the past with the idea of increasing bilirubin metabolism in the liver, but it has been shown that phenobarbital for neonatal jaundice causes more harm than benefit.

Serious neonatal infections: septicaemia, meningitis and pneumonia

A newborn with septicaemia often also suffers from meningitis and a newborn with pneumonia from septicaemia. Newborns are infected during birth from an infection inside the uterus or birth canal. Clinical symptoms often start during the first few days after delivery but sometimes may be delayed until some weeks later. Neonatal infection is caused by different bacteria than infections in older children. This is the reason why "first choice" antibiotics for serious infections in children younger than 2 months are different from those for older children.

At increased risk of serious infection are the following babies:

- Those who are delivered after prolonged rupture of membranes (24 hours or longer), especially if a vaginal examination had been performed more than 8 hours before delivery
- Those whose mother had unexplained fever during delivery
- Those with foul-smelling amniotic fluid
- Preterm babies

Clinical features

The clinical signs of severe infection are unspecific. As a general rule: if a baby is not doing well, think of him as infected until proven otherwise.

The following are possible signs of septicaemia in a newborn. Other diseases causing these signs are listed in the relevant boxes below:

- ◆ Difficult breathing, grunting, respiratory rate over 60/minute
- ◆ Inability to feed or poor suckling
- ◆ Abnormal sleepiness or lethargy
- ◆ Less than normal movements, the baby is floppy or stiff
- ◆ Cold to touch (hypothermia)
- ◆ Convulsions
- ◆ Weak or absent cry
- ◆ Diarrhoea
- ◆ Low blood sugar (hypoglycaemia)

Causes of abnormal sleepiness

- Septicaemia, meningitis, pneumonia
- Brain injury
- Kernicterus
- Hypoglycaemia (low blood sugar)
- Drugs
- Hypothermia

Diagnosis and investigations

Diagnosis is based on clinical findings. A white blood cell count (WBC) below 5,000 or above 25,000 supports a diagnosis of severe infection. Do not delay treatment while you wait for WBC results as an infection can kill a newborn rapidly.

Blood culture, culture of gastric aspirate, lumbar puncture with microscopy, culture of spinal fluid and urine culture could be taken to confirm the infection but are not essential if resources are limited.

Management

1. Give ***ampicillin*** 200 mg/kg/day divided in 2 doses and ***gentamicin*** 5–7.5 mg/kg once a day IM/IV Treat for 14 days.

Ampicillin	300 mg	every 12 hours
Gentamicin	15–20 mg	once a day

2. **Keep the baby warm**.
3. **Treat any additional problems** (for example hypoglycaemia or convulsions).
4. Give one single dose ***vitamin K*** 1 mg IM and one single dose ***retinol (vitamin A)*** 50,000 units orally.

Hypoglycaemia

Hypoglycaemia is a blood sugar of less than 30 mg/dl in a normal newborn and less than 20 mg/dl in a preterm baby. It is an emergency because it may cause convulsions or brain damage. It can be prevented by early breastfeeding. Hypoglycaemia often accompanies asphyxia, convulsions, septicaemia and hypothermia. Suspect and treat hypoglycaemia in any sick newborn.

Management

1. *If the child is able to drink*, give breastmilk frequently. If this is not possible, give 10 ml glucose 10% orally. Alternatively, give 2 tablespoons of clean water mixed with one spoon sugar and continue frequent feeds.
2. *If the child cannot drink or suffers convulsions*, give 10 ml glucose 10% IV over 5 minutes. There is no place for a glucose bolus that may provoke "rebound hypoglycaemia". Any bolus must be followed by a continuous slow infusion of glucose 10% until the baby is stable or his blood sugar is above 40 mg/dl.

   If only a more concentrated glucose solution is available, dilute it to a 10% solution, see box. Start frequent breastfeeding as soon as the child can suck.

How to prepare a 10% glucose solution

FROM A 50% GLUCOSE SOLUTION

Mix 1 part of the 50% solution with 4 times that amount of water for injection or sodium chloride 0.9%.

For example, take 2 ml 50% solution and mix with 8 ml water for injection = 10 ml glucose 10% solution.

FROM A 25% GLUCOSE SOLUTION

Mix 1 part of the 25% solution with 1.5 times that amount of water for injection or sodium chloride 0.9%.

For example, take 4 ml 25% solution and mix with 6 ml water for injection = 10 ml glucose 10% solution.

Difficult breathing

Signs of difficult breathing (respiratory distress) are:

- Fast breathing rate above 60/minute
- Chest indrawing during inspiration
- Grunting
- Central cyanosis
- Convulsions due to hypoxia

Finding out how soon after birth the difficult breathing started provides some guidance towards its cause, see box below:

Causes of respiratory distress (difficult breathing)

ONSET WITHIN 4 HOURS AFTER DELIVERY

- Aspiration pneumonia
- Hyaline membrane disease in preterm babies

ONSET USUALLY MORE THAN 4 HOURS AFTER DELIVERY

- Pneumonia
- Septicaemia
- Congenital heart disease
- Diaphragmatic hernia
- Pneumothorax
- Malformations
- Shock
- Anaemia

IRREGULAR BREATHING WITH APNOEA ATTACKS

- Brain injury

MANAGEMENT OF PNEUMONIA

Treatment of pneumonia is with oxygen and the same antibiotics (***ampicillin*** and ***gentamicin***) as for septicaemia.

If neither hospitalisation nor regular clinical visits for injections are possible, give oral ***co-trimoxazole***, except for premature or jaundiced babies.

Co-trimoxazole	60 mg	2 times daily

Aspiration pneumonia

Sometimes in foetal distress, meconium is passed before delivery and stains the amniotic fluid green. If the baby aspirates this meconium, asphyxia from upper airway obstruction or chemical pneumonia can occur.

Prevention

In cases of meconium stained liquor, clean the airway thoroughly as soon as the head is delivered to prevent these complications.

Central cyanosis

Central cyanosis can be seen as blueness of the lips and tongue. It indicates a lack of oxygen in the blood. Blue hands and feet are not a sign of central cyanosis.

Observing how a cyanosed newborn is breathing provides good guidance towards the cause of the cyanosis, see box below:

Causes of central cyanosis

CENTRAL CYANOSIS WITH RESPIRATORY DISTRESS

- Lung problem (see "Causes of respirators distress")

CENTRAL CYANOSIS WITHOUT RESPIRATORY DISTRESS

- Heart problems

CENTRAL CYANOSIS WITH POOR BREATHING EFFORT OR IRREGULAR BREATHING

- Brain injury or asphyxia
- Drugs that depress breathing (for example, diazepam or morphine). These drugs may have been given either to the mother before delivery or directly to the newborn.

Inability to feed or poor suckling

Inability to feed or poor suckling are very important danger signs, especially in a child who was feeding well before; for possible causes see box.

Only if the baby has no other symptoms or signs and appears to be well consider a feeding problem and advise regarding breastfeeding. Do not forget to check for oral thrush (see page 48).

Causes of inability to feed or poor suckling

- Septicaemia, meningitis, pneumonia
- Neonatal tetanus
- Brain injury
- Hypoglycaemia (low blood sugar)
- Kernicterus

NEONATAL TETANUS

Tetanus bacteria (Clostridium tetani) that entered the body through unclean handling of the cord are the cause of neonatal tetanus. The bacteria produce dangerous and often lethal toxins. The toxins are taken up by the nerves and result in painful muscle contractions. The majority of babies who develop neonatal tetanus will die. Although neonatal tetanus could easily be prevented, it remains one of the main killers of neonates.

Clinical findings

Signs of neonatal tetanus appear usually 5-7 days after delivery. The earlier they appear the worse the prognosis. Muscle contractions start in the jaw and a baby will stop feeding because he cannot open his mouth (trismus). This is often the first presenting sign. As tetanus progresses, stiffness becomes widespread and later, all muscles contract in spasms. Unlike a convulsion during which a baby is unconscious, a newborn with tetanus is awake and cries during the painful spasms.

Management

1. **Sedate the baby**. Give ***diazepam*** 5 mg IM immediately, and then 5 mg orally. If oral is not possible, repeat diazepam 2.5 mg IM 6 hourly and give an extra dose when spasms occur.
2. Give ***anti-tetanus serum*** 10,000 units IM.
3. Give ***benzylpenicillin*** 100,000 units (= 60 mg) IM 2 times daily. *Alternatively*, you can use ampicillin 150 mg IM 2 times daily.
4. **Clean the cord stump** and keep it dry.
5. Give ***dexamethasone*** 4 mg IM 3 times daily for 4 days.
6. Nurse the child in a quiet, dark room and avoid any unnecessary handling.
7. Feed by nasogastric tube or IV fluids.

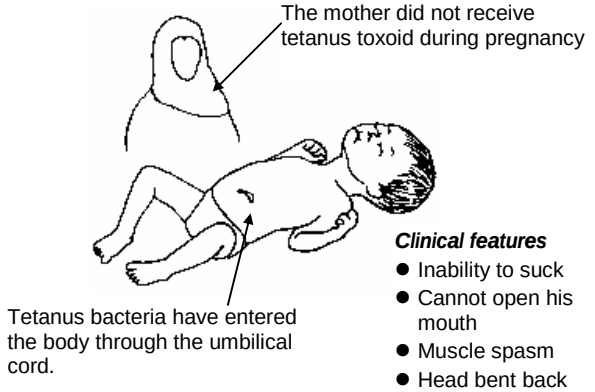


Figure 21–9 ***Neonatal tetanus***.

Prevention

1. Make sure, all pregnant women have been immunised against tetanus. Give a first injection when you assess a pregnant woman the first time, a second 4-6 weeks later, at least 1 month before the expected date of delivery. The maternal anti-toxin is transmitted through the placenta to the newborn and protects him from tetanus.
2. Assure clean delivery and especially clean handling and care of the cord (see above under "Clean delivery" on page 179).
3. If there is any doubt whether a baby had been delivered under clean conditions, give a single dose anti-tetanus serum (ATS) 750 units IM at birth.

Diarrhoea

It is common for a breastfed baby to pass six or more soft stools daily but any frequent stools that are watery, with or without blood, should be regarded as a sign of serious bacterial infection.

Hypothermia or cold injury

If a newborn's body is cold to touch, his body temperature is 36°C or less. A hypothermic child becomes lethargic, floppy, sucks poorly and his breathing rate and heart rate slow down, finally he dies. Hypothermia can be a sign of poor care but it can also indicate serious bacterial infection.

Management

1. Warm the baby as described in figure 21–2.
2. Treat for septicaemia.
3. Treat for hypoglycaemia.
4. Keep a close watch on the newborn to make sure that his temperature is rising.

Fever or hyperthermia

If a newborn is hot to touch, his body temperature is 38°C or more. Fever is very rare in newborn babies. The most common cause of hyperthermia is wrapping a baby in too many layers of clothing. Risks of hyperthermia are convulsions, dehydration and coma.

Convulsions

In a newborn, it is not always easy to distinguish between normal and abnormal movements. Many newborns show sudden jerks, especially when they wake up. Generalised convulsions (tonic-clonic convulsions) are rare in neonates. The commonest presentation of neonatal convulsions are eye rolling, jerking movements or chewing.

Causes of neonatal convulsions

- Birth asphyxia, cerebral bleeding
- Hypoglycaemia
- Meningitis, septicaemia, pneumonia (hypoxia)
- Kernicterus
- Neonatal tetanus (not true convulsions but muscle spasms)
- Dehydration and electrolyte disturbances:
  - high sodium, above 150 mmol/l (hypernatraemia)
  - low sodium, below 125 mmol/l (hyponatraemia)
- Hyperthermia
- Withdrawal symptoms if the mother has been addicted to drugs (opium, benzodiazepines)

RARE

- Low calcium
- Intrauterine infections
- Low vitamin B_6 (pyridoxine)
- Congenital metabolic disorders

The time of onset after birth provides some guidance towards the cause of the convulsions:

Convulsions beginning within the first 4 days after delivery:

- Birth trauma
- Birth asphyxia

Convulsions starting 6 days or later after delivery:

- Metabolic disturbances
- Meningitis
- The spasms of neonatal tetanus, which are not true convulsions but muscle spasms

Management

Whatever the cause, control of the fits is a priority to prevent brain damage:

1. Give **oxygen**.
2. Give ***10% glucose*** 10 ml IV.
3. *If no response, g*ive ***phenobarbital*** 25 mg IV or IM. Repeat 25 mg IM after 1 hour.
4. *If no response 5 minutes after the first phenobarbital dose,* give paraldehyde 0.3 ml IV. If paraldehyde is not available, give diazepam 2 mg rectally (inject with syringe without needle) or 1 ml IV.
5. *If no response 5 minutes after giving paraldehyde or diazepam, g*ive calcium gluconate 10% 1.5 ml slowly IV.
6. *If no response,* give magnesium 90 mg IV.
7. *If no response,* give pyridoxine 50 mg IV.

If the child suffers from recurrent convulsions:

8. Start phenobarbital 15 mg IM or orally 18 hours after the first dose and then give it once daily.

If indicated, treat dehydration with ringer-lactate 25 ml IV over 1 hour and treat septicaemia/meningitis with ampicillin and gentamicin as explained above.

Helpful investigations

If possible do these investigations at the same time as treating the convulsion:

- Blood glucose
- White blood cell count
- Calcium
- Electrolytes
- Urea
- Bilirubin
- Lumbar puncture

Vomiting

It is common for a newborn to bring up some milk after feeds (possetting). When only small amounts come up after feeds and the baby appears to be well and feeds well, disease is very unlikely. Some babies have swallowed amniotic fluid or maternal blood during birth and vomit repeatedly for the first one or two days before this stops spontaneously.

A newborn with vomiting is likely to suffer from serious disease if he has any of the following danger signs:

- Vomiting is continuous
- Vomits are bile-stained
- Abdomen is distended
- Failure to pass meconium in the first 24 hours
- Baby is ill, not drinking well and has any of the danger signs listed under "Serious neonatal infections" on page 187

Causes of vomiting in the newborn

- Normal possetting
- Serious infections like septicaemia
- Intestinal obstruction
- Suckling and swallowing difficulties because of malformations or brain damage
- Kernicterus
- Metabolic disorders

Failure to pass meconium in the first 24 hours after birth

A newborn usually passes meconium, his first green stool, in the first 24 hours after birth. If a baby fails to pass meconium, do a rectal examination. Examine with your little finger and find out whether his anus is open. If you cannot find the anal opening, the newborn has an **imperforated anus** and needs urgent surgery. If the anus is normal, feel whether or not there is meconium in the rectum.

A rectal examination is usually the cure for a **meconium plug**, a plug of thick meconium, causing obstruction. In other causes of **intestinal obstruction** from congenital abnormalities, you find the rectum empty. Abdominal x-rays are necessary to determine the site of obstruction. Treatment is immediate surgery.

Causes of failure to pass meconium

- Seriously ill newborn
- Meconium plug
- Imperforated anus or intestinal obstruction
- Mother on antihypertensive drugs

Neonatal bleeding

The total blood volume of a newborn is about 300 ml and even a loss of as little as 15–30 ml can put a baby at risk of shock and death. Such a child will be pale, breathless and with tachycardia. Urgent blood transfusion is necessary. Give cross-matched or O rhesus negative blood 10 ml/kg, which is about 30 ml over 4-6 hours. Never give more than 5 drops per minute.

Causes of neonatal bleeding

- If already born pale and shocked: incision of placenta during caesarean section or tear of umbilical cord
- Poorly tied cord stump
- Cephalhaematoma, subdural haematoma
- Septicaemia
- Haemorrhagic disease of the newborn (after day 4)

POORLY TIED CORD STUMP

It is very sad if a newborn bleeds to death simply because his cord has been tied poorly. Such bleeding can go unrecognised for hours. Whenever you tie a cord, make sure bleeding and oozing has stopped completely.

HAEMORRHAGIC DISEASE OF THE NEWBORN

The levels of those coagulation factors (factors that stop bleeding) that are made with the help of vitamin K are low in all newborns. The vitamin K concentration is lowest on the third day after birth. Sometimes it is so low that spontaneous bleeding occurs. Bleeding is

often from the cord or inside the stomach. Some babies are at special risk, see box, and should be given vitamin K 1 mg IM at birth.

Management of spontaneous bleeding

1. Give ***vitamin K*** 1 mg IV or IM.
2. *If the bleeding has not stopped after 2 hours, r*epeat vitamin K and treat the baby for septicaemia.

Newborn at risk of haemorrhagic disease

Give one single dose vitamin K 1 mg IM to the following newborn babies at birth:

- Preterm babies
- All babies who needed help with starting to breathe (birth asphyxia)
- Babies born after prolonged labour (more than 12 hours)
- Babies delivered by caesarean section or by forceps

Eye infections

Conjunctivitis (ophtalmia neonatorum) occurs in the first 2 weeks of life. Often both eyelids are swollen and red with purulent discharge. In many babies, the eye infection will progress to corneal damage or systemic disease. Eye care at birth as described above can prevent infection.

It is not always possible to be certain from clinical examination, which of the two common bacteria, gonococcus or chlamydia, have caused the conjunctivitis.

The time of onset and severity provides some guidance towards the more likely cause:

- **Gonococcus** infection tends to start earlier, within the first 4 days after birth, and is more severe.
- **Chlamydia** infection begins more commonly after 4 days and is milder.

Start treatment for the more likely cause.

Management of gonococcus

1. ***Benzylpenicillin*** (crystalline penicillin) IM 2 times daily for 3 days
2. ***Gentamicin eye drops***, at first hourly
3. *If there is no improvement,* cefotaxime IM one single dose

Management of Chlamydia

The conjunctivitis resolves spontaneously after a few weeks. However, without treatment some children will develop chlamydia pneumonia 1-3 months later.

1. ***Tetracycline eye ointment 1%***
2. Oral ***erythromycin*** 40 mg/kg/day divided into 2-3 doses for 2 weeks

62.5 mg	2-3 times daily

Infections of the cord stump (omphalitis)

The cord stump is the main entry for infections after birth. It is therefore essential to continue keeping it dry and clean and not to apply anything to it. Do not use any dressing. It is sufficient if the cord stump is protected by clean clothing. If it has become dirty by stool or urine, simply wash the cord stump with cooled boiled water and dry with a clean cloth.

1. If pus is draining from the stump and the surrounding skin has become red:
   - Clean the stump
   - Apply gentian violet 2 times daily
   - Treat with oral co-trimoxazole, amoxicillin or erythromycin.
2. If the baby is generally unwell, or the redness is widespread, treat for septicaemia.

Skin infections

Skin rashes are common during the first days of life and usually harmless. Paint pustules with gentian violet. If the baby shows signs of systemic illness (for example, poor feeding or hypothermia) treat as septicaemia with ampicillin and gentamicin.

Two important points about hospital care for the sick newborn

1. A sick newborn should be kept separate from healthy babies and other sick children to reduce the risk of cross-infection.
2. The simplest but most important measure to reduce transmission of infection inside a hospital is cleanliness. Everyone who handles a newborn should wash his hands with soap and clean water before he touches a baby.

References

1. Cherian T. A guide to treatment and care (that young infants with severe disease need). *ARI News* 1992; 24: 3-4.
2. Ebrahim GJ. *Paediatric Practice in Developing Countries.* 2nd edition. London: Macmillan Education Ltd. 1993.
3. Hull D, Johnston DI. *Essential Paediatrics*. 3rd edition. Edinburgh: Churchill Livingstone 1993.
4. Illingworth RS. *Common Symptoms of Disease in Children.* 9th edition. London: Blackwell Scientific Publications 1988.

5. Mulholland K, Weber M. Recognising causes and signs of pneumonia. *ARI News* 1992; 24: 2-3.
6. Sanders RKM. The management of tetanus 1996. *Tropical doctor* 1996; 26: 107-115.
7. Shah PM. Delivery of Newborn Care outside the Hospital Setting. *International Child Health* 1993; 1: 49-56.
8. Stanfield P, Brueton M, Chan M, Parkin M, Waterston T. *Diseases of Children in the Subtropics and Tropics.* 4th edition. Kent: Edward Arnold 1991.
9. Stanfield P. *Child Health*. 2nd edition. Nairobi: African Medical and Research Foundation 1997.
10. World Health Organisation. *Management of the Sick Newborn.* Report of a Technical Working Group. WHO/FRH/MSM/96.12. Geneva: WHO 1996.
11. World Health Organisation. *Essential Newborn Care.* Report of a Technical Working Group. WHO/FRH/MSM/96.13. Geneva: WHO 1996.
12. World Health Organisation. *Hypoglycaemia of the Newborn - Review of the Literature.* WHO/MSM/97.1. Geneva: WHO 1997.
13. World Health Organisation *Thermal Protection of the Newborn: a practical guide.* WHO/RHT/MSM/97.2. Geneva: WHO 1997.

22. The importance of maternal health

The effective way to reduce maternal and newborn mortality - antenatal care

The last 15 years have brought major developments in our understanding of how maternal health affects the foetus and newborn (see box). We are aware of risk factors in the obstetric history of the mother that increase her and her child's risk to die. This knowledge has resulted in simple, effective and cheap management strategies that can be easily applied anywhere in Afghanistan.

Many believe that high technology hospitals and expensive equipment are necessary to reduce the mortality of a mother or her child. This is not true. The most important factor determining the outcome of the pregnancy and survival of the newborn is whether or not a mother received antenatal care during her pregnancy. Antenatal care is cheap and simple. Its benefit is beyond any doubt. Studies have shown that in those women who had received preventive health care during pregnancy, the maternal mortality rate dropped 15 times! In addition, the incidence of intrauterine death, neonatal death and the number of low birth weight babies dropped remarkably.

The aim of antenatal care is to prevent maternal death and to improve the survival of the newborn by identifying those women who are at risk of developing complications. These identified as risk pregnancies need special attention, and may need referral to a specialist and/or may need delivery in a hospital. Sadly, only 20% or fewer women in Afghanistan receive any antenatal care. This is the main reason for the frighteningly high mortality rate of mothers and their babies.

Who can provide antenatal care?

Traditional birth helpers attend more than half of all deliveries in Afghanistan. Experiences from many other countries have shown great benefit if these traditional birth attendants receive basic training:

- They can learn to recognise and prevent anaemia and the need for tetanus vaccine.
- They can be trained to recognise risk pregnancies that should be referred for specialised care or hospital delivery.
- They can be taught how to perform a clean delivery and how to recognise danger signs during labour.
- They can learn how to take care of the newborn and to encourage early breastfeeding.

Traditional birth attendants often live in the neighbourhood or belong to the wider family of a woman.

Some examples of how maternal health affects the child

Maternal health	Effect on the child's health
Maternal anaemia	Low birth weight baby, anaemia during infancy
Hypertension, eclampsia	Low birth weight babies
Urinary tract infection	Premature labour, foetal death
Streptomycin during pregnancy	Neonatal deafness
Prolonged rupture of membranes	Septicaemia
Delivery not supervised by trained birth attendant	Birth asphyxia, birth trauma, neonatal tetanus

Summary of antenatal care

Assess a woman at 4, 6, 8 and 9 months of her pregnancy and keep a record of the visits.

If there are any risk factors, refer to a specialist for assessment or for hospital delivery.

AT THE FIRST VISIT, IDENTIFY RISK FACTORS

Take a history

- Age?
- Number of previous pregnancies?
- Problems during previous pregnancies?
- Immunised against tetanus?

Examine the woman

- Malnutrition?
- Anaemia?
- High blood pressure?
- Any other problems: heart disease (murmur), TB, urinary tract infections, malaria or iodine deficiency (struma)?
- Measure the fundal height.

Management

1. Discuss good nutrition.
2. Educate the woman about danger signs of pre-eclampsia and about the dangers of unnecessary drugs.
3. Start prophylaxis for anaemia.
4. If indicated, give tetanus toxoid, malaria prophylaxis and advise about iodine intake.
5. Make an appointment for the next visit.

LATER FOLLOW-UP VISITS

1. Ask about specific complaints.
2. Check for anaemia and measure the blood pressure.
3. Feel fundal height and the position of the baby.
4. Continue maternal education, discuss delivery and care of the newborn after delivery.

Avoid unnecessary drugs, but make sure the mother takes anaemia prophylaxis and is fully immunised against tetanus.

This makes it easy for them to provide antenatal care. They are well accepted because they are usually women.

Every doctor who wants to help reduce maternal, foetal and neonatal mortality should find ways of caring for the needs of pregnant women in partnership with these traditional birth attendants. Only a joint effort will be successful.

How to care for a woman during her pregnancy (antenatal care)

Assess a pregnant woman as early in her pregnancy as possible. She should be assessed at least four times during her pregnancy, this is at 4, 6, 8 and 9 months. Some Mother and Child Health Services advise the woman to come more often. That is even better, but not realistic for the majority of women. Of course, you should follow up women with special risks more often.

Ideally, keep records of the antenatal visits. Write down basic information about the pregnancy and clinical findings. Give these records to the woman to keep and to bring with her whenever she comes.

How to assess a pregnant woman at her first visit

At the first visit, take a detailed history to find any factors that indicate an increased risk of complications. Examine every woman carefully who comes to you for the first time. She may have unrecognised problems that could deteriorate during this pregnancy.

Take a history

- **Age**: how old is the woman? Pregnancies of women younger than 15 years and older than 35 years old are associated with higher risks.
- **Number of previous pregnancies**: how many times has she been pregnant before? Maternal mortality rises with the number of pregnancies. Women who have had 6 or more children have a high risk of complications such as anaemia, high blood pressure, unstable lie, preterm labour, rupture of uterus and postpartum haemorrhage.
- **Previous pregnancies**: were there any problems during previous pregnancies? Ask the woman what happened during her previous pregnancies and births, because certain events may recur during this pregnancy (see box). This will give you an idea about her likelihood to develop complications.

Identify risk factors by asking what happened during the previous pregnancies

Risk pregnancies are those with any of the following in a previous pregnancy:

- High blood pressure
- Antepartum haemorrhage
- Caesarean section
- Stillbirth
- Postpartum haemorrhage
- Death of the newborn

- **Tetanus immunisation**: is the woman fully immunised against tetanus? Many babies in Afghanistan die from neonatal tetanus. Therefore, every pregnant woman should receive tetanus toxoid to protect her and her baby against the disease. Give her the first immunisation when she comes to you the first time during her pregnancy. If she has not previously had the full course of tetanus protection, she should be immunised again 1-2 months later, but not later than 1 month before expected delivery. Otherwise the immunisation may not be effective (for further ways to reduce the risk of neonatal tetanus see page 190).

Examine the woman

- **Assess for malnutrition**. Measure the MUAC (mid-upper arm circumference) as explained in figure 3–5; the method is the same for adults and children.

  If a woman's MUAC is less than 22.5 cm, she is markedly malnourished. If the mother is undernourished, her foetus will not receive enough nutritients to grow normally. Good nutrition is particularly important during the last trimester of pregnancy. A foetus of a malnourished woman is at risk of intrauterine asphyxia and death. He will be born with a low birth weight and is at high risk of infection and hypoglycaemia (for management of low birth weight babies, see page 182). The birth weight is the single most important factor determining survival or death of a newborn.

  Factors responsible for maternal malnutrition:

  - Poor maternal diet
  - Frequent pregnancies. If pregnancies are less than two years apart, there is not enough time to restore the maternal nutritional reserves. It takes two years of eating a normal diet to restore the body's iron reserves so that they are sufficient for another pregnancy. Frequent pregnancies are therefore associated with maternal malnutrition and anaemia. If pregnancies are two or more years apart, the health of both, mother and child, improves.
  - Chronic infections or other underlying diseases.

How to improve maternal nutrition:

Good nutrition is important before and during pregnancy and should be encouraged. Use the traditional concept of "parhez" (special diet) to advise a healthy mixed diet, rich in protein food, energy food, and vitamins. Discourage dangerous diets. Do not comment on harmless ideas.

- **Assess for anaemia**: anaemia is the most common and one of the most serious problems in pregnancy. It is very dangerous for the mother. If a mother is anaemic, already very little blood loss during the delivery can cause shock and death. Heart failure can occur at any time during pregnancy or in the first days after delivery. Anaemia makes the mother also more susceptible to infections.

Factors responsible for maternal anaemia:

- Poor diet
- Frequent pregnancies
- Chronic infections
- Malaria

How to diagnose anaemia?

- *Take a history* and ask for symptoms of anaemia: Is the woman very tired? Does she become breathless when she walks?
- *Examine the woman*, the clinical signs are the same in children and adults, see page 105.
- *Helpful investigation*. Where resources allow, measure haemoglobin (Hb) once in pregnancy. If the family is very poor, measure it if clinical examination suggests severe anaemia or the woman shows symptoms of anaemia.

Degree of anaemia	Haemoglobin (Hb) g/dl
Moderate anaemia	7.0–10.9
Severe anaemia	4.0–6.9
Very severe anaemia	Less than 4.0

Management

If a woman is anaemic, give ***ferrous sulphate*** 200 mg 3 times daily and ***folic acid*** 5 mg once daily for not less than 3 months. Alternatively, a combined tablet can be given 3 times daily.

If a woman presents with severe anaemia late in pregnancy, consider a blood transfusion to reduce her risk of dying during delivery.

Prevention

1. Give ***ferrous sulphate*** 200 mg once daily and ***folic acid*** 5 mg once daily to all pregnant women throughout pregnancy. Alternatively, give a tablet that contains a combination of ferrous sulphate and folic acid once daily.
2. Advise on a **good diet**.
3. Give **malaria prophylaxis** to those who live in endemic malarious areas. Give a woman 3 tablets ***Fansidar*** as one single dose two times during her pregnancy. The first dose should be given when the woman is about 3-4 months pregnant (not earlier), the second one at 7 months (28 weeks) pregnancy. This has been shown to be more effective and beneficial than chloroquine prophylaxis.

- **Take the blood pressure**: high blood pressure during pregnancy is a danger sign. A diagnosis of hypertension is made when the blood pressure is 140/90 mm Hg or greater. Mild hypertension alone is not a serious risk. However, a woman with hypertension and proteinuria should be watched closely and considered for induction of delivery. In severe hypertension the diastolic blood pressure is 110 mm Hg or higher. Examine the urine for proteinuria.

  The following are danger signs of pre-eclampsia and present a medical emergency. Educate all pregnant women about these danger signs and tell the women to come immediately if they notice any of them:

  - Generalised oedema (including face and hands)
  - Severe headaches
  - Blurred vision
  - Upper abdominal pain

- **Identify other problems**:
  - **Heart disease**: listen for a heart murmur. A woman with rheumatic heart disease needs special attention because of the risk of developing heart failure during pregnancy or after delivery. She needs endocarditis prophylaxis during labour (ampicillin 1 g and gentamicin 120 mg IV about 1 hour before delivery and then 6 hours afterwards. Alternative: oral amoxicillin 3 g 1 hour before delivery and then 500 mg 6 hours after delivery). Anaemia management in these women is particularly important. A murmur heard at the left sternal edge and not radiating to the neck is a so called innocent (physiological) murmur that has no dangerous consequences.
  - **Pulmonary tuberculosis**: Suspect pulmonary tuberculosis in any woman who has been coughing for more than 3 weeks. Refer her to the next tuberculosis control programme for sputum examination.
  - **Urinary tract infection** (UTI): A UTI in pregnancy can present with atypical symptoms. Consider a UTI if a pregnant woman complains about lower abdominal pain or loin pain with or without fever. Have her urine examined if possible. In addition to the risk of progression to severe pyelonephritis, an undiagnosed UTI can cause foetal death or induce preterm labour. Amoxicillin or ampicillin are the “first choice” drugs for UTI in pregnancy.
  - **Malaria**: malaria is associated with anaemia, abortion, preterm delivery, and small for date babies. Treat and give prophylaxis, see above under “Prevention” of anaemia.
  - **Iodine deficiency**: if a woman lives in areas with a high incidence of goitre, assume that she

suffers from underlying iodine deficiency. The iodine content in local food and water, the main source of iodine, in those areas will be small. This is not dangerous for a mother but it is for her foetus. Poor intake of iodine during pregnancy results in children born with neurological damage, mental handicap or signs of hypothyroidism.

Management

In areas with a high incidence of goitre, all women in childbearing age or all pregnant women should receive iodine supplements. Use either of the following:

– Iodised salt for cooking
– One single injection of iodine (iodinated oil 480 mg) IM, which will provide sufficient iodine for 3-5 years
– One oral iodine oil capsule 200 mg, which will provide sufficient iodine for 1-2 years

○ **Feel the size of the uterus and the baby's position**: the size of the uterus will give you a good indication of the month of pregnancy (see figure 22–1). If the pregnancy is advanced, feel the position of the baby. Determine whether there is only one baby in the uterus.

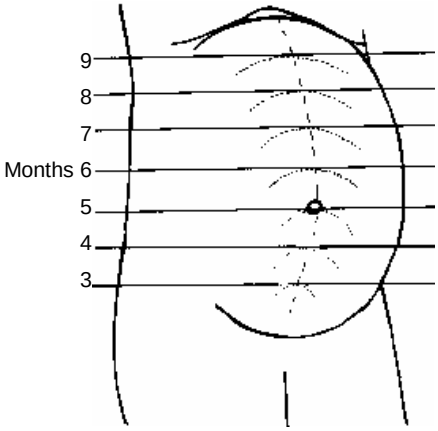
How to assess a pregnant woman at follow-up visits

1. Ask about **complaints** and examine accordingly.
2. Take the **blood pressure** and look for **oedema**.
3. Look for **anaemia** and make sure the mother is taking prophylaxis for anaemia.
4. Measure the **fundal height**. It is a reliable method for detecting foetal growth retardation. Low birth weight babies need special care after delivery.
5. **Educate the mother**:
   - Discuss good nutrition.
   - Warn about the risks of unnecessary drugs.
   - Start discussing the delivery.

In the last three months of pregnancy (in addition to 1-5):

6. Feel for the **position of the baby** to detect an abnormal lie (abnormal position) or multiple pregnancies.
7. **Discuss delivery**: if there is no indication to refer a woman for a hospital delivery (see box), ask the mother where she will deliver and who will attend the delivery. Make sure the birth attendant and the family understand the need for clean delivery and indicators of danger during labour. They should also know how to keep the newborn warm and to start breastfeeding within one hour after delivery. Teach them how to care for the normal newborn (see page 179).

FUNDAL HEIGHT AS THE PREGNANCY ADVANCES:



CHECKING THAT THE BABY IS IN A GOOD POSITION:

- If the baby's head is down, his birth is likely to go well.
- If his head is up, the birth may be more difficult (breech delivery) and delivery should be at a hospital.
- If the baby is sideways, the mother must have her baby in a hospital. She and her baby are at danger.

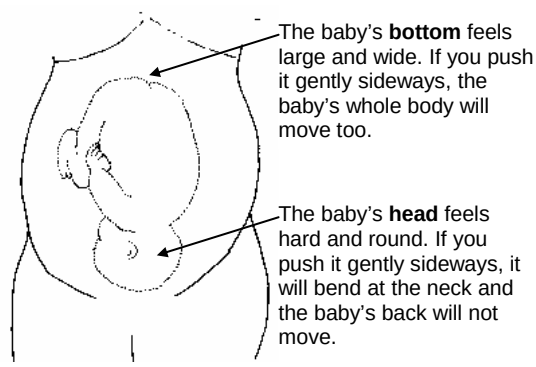


Figure 22–1 ***Fundal height and foetal position. For more details refer to a textbook of obstetrics.***

Indications for referring a woman to give birth in a hospital

Maternal disease

- Severe anaemia
- High blood pressure
- Rheumatic heart disease
- Hepatitis
- Very short stature

Risk factors from previous pregnancies

- Previous caesarean section or instrumental delivery
- Previous postpartum haemorrhage

Risk factors in the present pregnancy

- Pre-eclampsia/eclampsia
- Vaginal bleeding towards the end of pregnancy
- Baby's position is not head first (malpresentation)
- Multiple pregnancy (twins)

Drugs during pregnancy

Drugs can be harmful to the foetus at any time during the pregnancy. During the first trimester (months 1-3 of pregnancy), they may cause congenital abnormalities. During the second and third trimester (months 4-9 of pregnancy) drugs may affect foetal growth or may be toxic for the foetus. Drugs given shortly before delivery or during labour may have negative effects on the progress of the delivery or the health of the newborn. Avoid prescribing any drugs in pregnancy, exceptions are iron, folic acid, tetanus toxoid, iodine supplements, and malaria prophylaxis. If you have to use medicines, only give those that are safe in pregnancy (see the table "Drugs in pregnancy").

Drugs in pregnancy

***Safe* in pregnancy**	***Avoid*** **- unless the benefit is clearly greater than the risk.**	***Contra-indicated*** **- never give during pregnancy**
Amitriptyline	Acetylsalicylic acid (Aspirin - avoid in last trimester)	Albendazole
Amoxicillin	Aminophylline (avoid before delivery)	Ciprofloxacin
Ampicillin	Adrenaline (epinephrine - can be given in an emergency)	Cimetidine
Antacids	Atenolol	Co-trimoxazole
Benzathine benzylpenicillin	Chloramphenicol (do not give in third trimester)	Doxycycline
Benzylpenicillin	Chlorpheniramine	Ergometrine
Cephalosporines	Chlorpromazine	Gentamicin
Chloroquine	Dexamethasone	Glibenclamide
Cloxacillin	Diazepam	Griseofulvin
Digoxin	Sulfadoxine + pyrimethamine (Fansidar - do not use in first trimester)	Hydrochlorothiazide
Erythromycin	Frusemide (use only for heart failure with pulmonary oedema)	Mebendazole
Ethambutol	Ibuprofen	Metamizole (Analgin, Novalgin) - banned in many countries, never use it!
Hydralazine	Metronidazole (avoid in first trimester)	Nalidixic acid
Insulin	Phenobarbitone*	Nifedipine
Isoniazid	Phenytoin*	Ranitidine
Lignocaine (Lidocaine)	Prednisolone	Retinol (Vitamin A)
Methyldopa	Promethazine	Streptomycin
Metoclopramide	Propranolol (avoid in third trimester)	Tetracycline
Niclosamide	Pyrantel	
Nystatin	Quinine (can be given in an emergency)	
Oral rehydration solution (ORS)	Spironolactone	
Paracetamol		
Penicillin V		
Procaine penicillin		
Pyrazinamide		
Pyridoxine (vitamin B_6)		
Salbutamol		

* About phenobarbitone and phenytoin when used as antiepileptics: do not stop them if an epileptic woman, already taking any of them, becomes pregnant. The risk of phenobarbital or phenytoin is small, compared with the dangers of grand mal epileptic convulsions to the pregnant mother and foetus. Give folic acid throughout pregnancy and prophylactic vitamin K to the newborn after birth.

Delivery and maternal death

The main causes of maternal death during delivery are:

- Haemorrhage
- Difficult labour
- Eclampsia
- Sepsis
- Anaemia

When the mother dies, the newborn will also be at high risk to die.

Danger signs during delivery

- Prolonged labour (more than 12 hours)
- Prolonged pushing
- The baby does not come head first
- Fever
- Fits
- Bleeding during labour

References

1. Care during pregnancy. *Child Health Dialogue*. London: AHRTAG 1997; 8: 4-5.
2. Rubin P (ed.). *Prescribing in Pregnancy*. 2nd edition. London: BMJ Publishing Group 1995.
3. Shulman CE, Dorman EK, Cutts F et al. Intermittent sulphadoxine-pyrimethamine to prevent anaemia secondary to malaria in pregnancy: a randomised placebo-controlled trial. *The Lancet* 1999; 353, 9153.
4. Stanfield P, Brueton M, Chan M, Parkin M, Waterston T. *Diseases of Children in the Subtropics and Tropics*. 4th edition. Kent: Edward Arnold 1991.
5. World Health Organisation. *Prevention and Management of Severe Anaemia in Pregnancy*. Report of a Technical Working Group. WHO/FHE/MSM/93.5. Geneva: WHO 1993.
6. World Health Organisation. *Antenatal Care*. Report of a Technical Working Group. WHO/FRH/MSM/96.8. Geneva: WHO 1996.

Appendix

A. Immunisations

Many killer diseases of children could be prevented, many disabilities be avoided by immunisations. Immunisations, beside improving nutrition and basic hygiene, are one of the main interventions that reduce childhood mortality significantly.

It is important to be familiar with the immunisation schedule as well as common fears of immunisations and the true contra-indications to immunisation.

Immunisation schedules

The following immunisation schedules for children and women are according to *Expanded Programme on Immunisation (EPI):*

Immunisation schedule for children

At birth or soon after	BCG
6 weeks	DPT/Polio 1
10 weeks	DPT/Polio 2
14 weeks	DPT/Polio 3
9 months	Measles/Polio 4

BCG = BCG vaccine against tuberculosis
DPT = diphtheria-pertussis-tetanus vaccine
Polio = poliomyelitis vaccine (live attenuated) oral solution
Measles = measles vaccine

If necessary, you can give BCG, diphtheria-pertussis-tetanus, polio and measles vaccine all at the same time.

Immunisation schedule for Women

Women between the ages of 15-45 years (women of childbearing age) should all be immunised with tetanus vaccine (tetanus toxoid) in order to protect their newborn babies from neonatal tetanus. Give the first immunisation to a pregnant woman when she consults you for the first time during her pregnancy. If she has not previously had the full course of tetanus protection, she should be immunised again 1-2 months later, at the latest 1 month before expected delivery.

The recommended full schedule consists of the following vaccinations:

Tetanus 1	TT I	Start when a woman is 15 years old or at any time until she reaches 45 years
Tetanus 2	TT II	4 weeks after tetanus 1
Tetanus 3	TT III	6 months after tetanus 2
Tetanus 4	TT IV	1 year after tetanus 3
Tetanus 5	TT V	1 year after tetanus 4

About the false fear of complications and contra-indications

People often think there are many contra-indications to immunisations. It is a widespread misunderstanding that children should not be immunised if they are ill (for example, malnutrition, a mild fever less than 39°C, diarrhoea or upper airway infection with cough). This is not correct. The second paragraph below lists many conditions in which you can safely immunise. In fact, there are only a few true contra-indications; these are given in the next paragraph.

Contra-indications to immunisation

- Children who experience severe adverse reactions (side-effects) following a dose of vaccine should not be given a second dose of the same vaccine. Severe adverse reactions are: collapse or shock, convulsions without fever, encephalitis, anaphylaxis (severe allergic reaction), severe local reactions.
- Children with immune deficiency diseases, or who are immunosuppressed as the result of drug therapy (for example, high-dose corticosteroids) should not be given live vaccines. Of the above immunisation schedules BCG, measles and polio are live vaccines. Severe malnutrition is not a contra-indication but an urgent indication for immunisation.
- Children with severe acute illnesses, for example pneumonia, meningitis, bacillary dysentery.

You can immunise children with the following conditions

- Children with upper respiratory tract infections with fever less than 39°C
- Children with diarrhoea and fever less than 39°C
- Children with malnutrition, including severe malnutrition
- Children with allergy or asthma
- Children who are treated with antibiotics
- Children with eczema or localised skin lesions
- Children with chronic heart, lung, liver or kidney diseases
- Premature or low birth weight babies
- Children with convulsions
- Children who are breastfed

B. Fluid needs of children

The importance of keeping a correct fluid balance for sick children

The daily fluid balance of children needs special consideration and care. Most diseases of children lead to either a decreased fluid intake or increased loss of fluids. Many diseases can cause a fluid imbalance that can be life-threatening in itself. Children become more easily dehydrated than adults if their fluid needs are not met. On the other hand, children are easily overhydrated, which can lead to heart failure or brain oedema. It is therefore essential to calculate fluid needs of sick children accurately to keep their body fluids in balance.

The aim is to give sick children their daily fluid requirements plus replacing any additional fluid losses (for example from diarrhoea or vomiting). This is usually done orally by increasing the amount of fluids a child is usually drinking, for example breastmilk is excellent to provide maintenance fluids. Oral rehydration salts (ORS) are helpful to prevent dehydration in diarrhoea. Infusions are rarely necessary and are associated with serious dangers.

Daily (24 hours) fluid needs of a child

The following are daily fluid requirements:

Newborn during 1st week of life

Day 1	60 ml/kg/day
Day 2	90 ml/kg/day
Day 3	120 ml/kg/day
Day 4-7	150 ml/kg/day

After 1st week of life – age 9 years

Calculate the fluid needs according to the child's weight:

For the first 10 kg body weight	100 ml/kg
For the next 10 kg body weight	+ 50 ml/kg
For every kg more than 20 kg	+ 25 ml/kg

Example 1:
Daily fluid needs of a child **weighing 14 kg**:

For the first 10 kg body weight	= 100 ml x 10 (kg)	= 1000 ml
Next 4 kg body weight	= 50 ml x 4 (kg)	= 200 ml
Total daily fluid needs		= 1200 ml

Example 2:
Daily fluid needs of a child **weighing 23 kg**:

For the first 10 kg body weight	= 100 ml x 10 (kg)	= 1000 ml
Next 10 kg body weight	= 50 ml x 10 (kg)	= 500 ml
3 kg more than 20 kg	= 25 ml x 3 (kg)	= 75 ml
Total daily fluid needs		= 1575 ml

Children older than 10 years

2–3 litres daily

See also: management of dehydration, page 67; fluid requirements in renal failure, page 97; fluid requirements in meningitis, page 133.

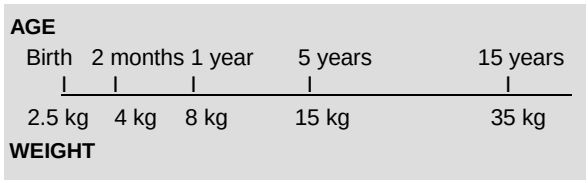
C. Practical tips about drugs and procedures

Correct drug doses in children

It is important to calculate drug doses for children carefully, otherwise the dose may be too low and not effective, or too high and possibly harmful.

Most drug doses in children are based on the child's weight in kilograms (kg) and are given as a dose per day (24 hours) that is usually divided into several smaller doses. To prescribe according to the child's weight, a reliable weighing scale is necessary. This will usually not be available. There are two other methods that help to prescribe drugs for children correctly when scales are not available.

Method 1: memorising the average weight at 5 key points of children's age. Memorise the following 5 "points" of age/weight. They give you a good and practical base for estimating the weight of a child:



Method 2: estimating paediatric doses based on the adult dose. If you can only remember the adult dose of a drug, estimate children's doses as follows:

Adults	adult dose
Children	
6–12 years	1/2 adult dose
1–5 years	1/4 adult dose
2–12 months	1/8 adult dose

NOTE: Do not use this method for drugs that are particularly dangerous for children (for example, aminophylline or gentamicin).

Oral medicines

About the different preparations

Whenever possible, choose the oral route to give medicines to children. When you give oral medicines,

it is often preferable to break up tablets to the correct size instead of using syrups. Although syrups are well liked by children, they have several disadvantages to tablets or capsules:

- Tablets and capsules, when you compare the amount of medicine you get, are cheaper than syrups.
- Syrups need to be prepared with clean, boiled water. There is the danger of contamination.
- Syrups loose their efficiency if stored for too long or under hot conditions.
- Tablets are sometimes easier to dose than syrups. A mother is usually told how many teaspoons of syrup to give to her child, because drug doses for syrups are measured in mg drug/5 ml. However, the size of a teaspoon may vary from 3–5 ml, which makes a significant difference to the amount of drug given to a child.

About administration of oral medicines

Tablets

For smaller children, break a tablet into the appropriate size (1/2 or 1/4 tablet). Grind it up well on a spoon and mix the powder with boiled water or tea, and sugar. When you put it in the mouth of a child, put the medicine inside the cheeks so that the child cannot spit it out so easily. If the tablet is bitter (for example, chloroquine) use plenty of sugar.

Capsules

Capsules can be opened and the powder mixed with boiled water and sugar as explained for tablets. Be careful not to give too much medicine to young children.

Syrups

Explain to the family how to prepare powder for syrup with clean boiled water. Show them up to which mark they have to fill the bottle. Explain to them that they can only use the syrup for 2 weeks after preparation. Make sure the child gets the correct dose according to the actual size of a teaspoon (3–5 ml).

Injections and infusions

Injections are often given unnecessarily which exposes a child to considerable risks. (Figure A–1)

DIRTY SYRINGES AND NEEDLES CAN KILL CHILDREN!

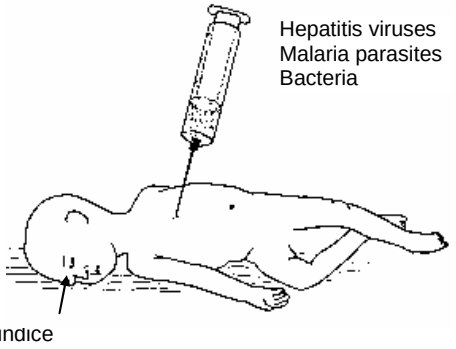


Figure A–1 ***Dirty syringes and needles can kill children***.

Indications for injections

The few indications to give injections

- A severe illness in which oral drugs would not act fast enough or the child is unable to take medicine by mouth (for example, an unconscious child).
- To give a drug that will not be absorbed when given orally (for example, gentamicin).
- In abdominal disease, or after abdominal surgery, when a child is not allowed to eat or drink.
- The rare cases of persistent vomiting.
- In some specific infections, one or a few injections can be given instead of a prolonged course of oral antibiotics that the patient may stop too early (for example, streptococcal tonsillitis).

NEVER give unnecessary injections

- Many children suffer life-long disability from injection injury to the sciatic nerve.
- Many children develop abscesses and other infections from unclean injections with non-sterile needles and syringes.
- Dangerous infections such as hepatitis, malaria or AIDS can be transmitted by non-sterile injections.
- At least 1/3 of all cases of paralysis from polio-myelitis have been caused by unnecessary IM injections.
- Injections are expensive and drug side-effects can occur rapidly.

Correct prescribing of injections

Make sure it is very clear to the person giving the injection, how much to give. Write on the prescription how many ml of an ampoule to give, or how much of a powdered solution. Also state clearly how to give the injection (SC, IM or IV) and how often.

Injectable drugs lose their effectiveness a few hours after their preparation!

It is important to remember that, once you have opened an ampoule or mixed a vial with water for injection, the drug will lose effectiveness within a few hours after its preparation. Therefore, use each vial within a certain time limit after its preparation, see table below:

Drug	Time within which you must use a solution after its preparation.
Ampicillin	Use within 12 hours after its preparation.
Benzylpenicillin	IM/IV: Use within 24 hours after its preparation. In infusion: use immediately.
Chloramphenicol	Use within 24 hours after its preparation.
Procaine benzylpenicillin	Use within 12 hours after its preparation.
Streptomycin	Use within 1 hour after its preparation.

Other important remarks about injection solutions

- Adrenaline (epinephrine): do not use if the solution that is usually clear has turned pink or brown.
- Gentamicin: do not mix with other drugs in the same syringe or infusion.

Infusion solutions

Glucose 5% (Dextrose 5%)

Glucose 5% is used as a medium when a drug has to be given slowly over a certain time. Examples of drugs that - when used IV - must be given by infusion are aminophylline or quinine. Sometimes benzylpenicillin is also given by infusion. Always write clearly on the infusion bottle if you add a drug to it!

NOTE: You cannot use glucose 5% solution to replace fluid loss (for example, in shock or dehydration). It is a wrong belief that a dextrose infusion could give a weak person strength and new energy.

Polygeline (Haemacel)

Polygeline, or alternatively dextrane, is used to treat shock (for example from blood loss). For shock from severe dehydration, use ringer-lactate.

Ringer-lactate (Hartmann's solution)

Ringer-lactate is the "first choice" to treat severe dehydration. It can also be used to treat shock from bleeding or other causes if polygeline is not available.

Sodium chloride 0.9%

Sodium chloride is used as a medium to give drugs by infusion if dextrose is not available. It is also used to replace fluid losses or treat shock if ringer-lactate or polygeline are not available. It is an isotonic solution that is also suitable for cleaning wounds.

Combinations of sodium chloride + glucose

Different combinations of sodium chloride and glucose are available. Half strength saline (0.45%) + glucose 5% is very suitable as a maintenance fluid for children. Some solutions contain potassium chloride (KCl). These should not be used as a medium to give medicines because if potassium is given too fast IV it can cause cardiac arrhythmias and death.

Procedures - how to give injections or infusions

When you give injections or insert a cannula, remember that all body fluids are potentially dangerous. If you keep that in mind, you will protect yourself against hepatitis B or other dangerous diseases. If blood or other body fluids get on your skin, wash the fluid off immediately. Dispose used needles safely so that they cannot be found by playing children or people sorting through rubbish. Collect used needles separately from ordinary waste. For example, dig a deep hole and throw them in there.

Intramuscular injection (IM)

It is important to know where to give IM injections safely:

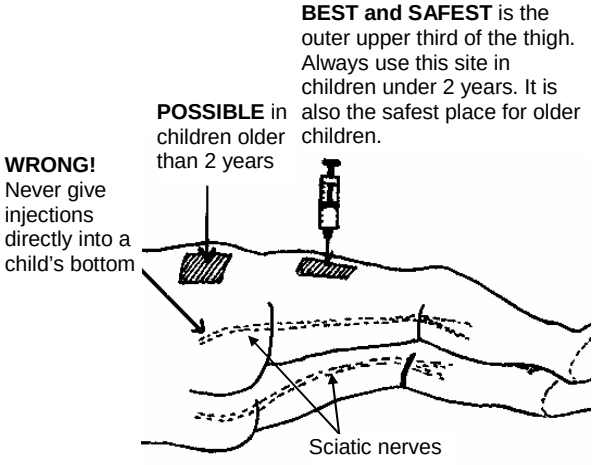


Figure A–2 ***Where to give safe IM injections***.

Subcutaneous injection (SC)

For an injection, the intramuscular or intravenous route is usually chosen. However, adrenaline or, in children under 5 years, chlorphenamine, are usually given subcutaneously (see figure A–3).

Figure A–3 ***Subcutaneous injection***.

Intravenous injection (IV) and infusions

How to find venous access in children

1. First assemble everything you need for the injection or infusion.
2. Wash your hands.
3. If an assistant is available, secure the child.
4. Look for the most suitable place for the injection or infusion, occluding the veins with a tourniquet or the assistant's hand.
5. Clean the skin and insert the needle (in babies and small children use a 21 or 23 gauge needle or Butterfly needle). If you use a Butterfly needle, flush it first with the infusion solution to avoid an airlock before you insert it.
6. If you give drugs IV, release the tourniquet before you inject the drug.
7. For infusions, secure the needle safely with sticking plaster.

Scalp veins

They are an excellent route for children under 2 years. Put an elastic band round the head or use the assistant's thumb to act as a tourniquet.

Hand and foot veins

Use a tourniquet or the assistant's hand to occlude the veins. When you see a suitable vein, cannulation should present no problem. However, it is more important to feel than to look for a vein. In a plump or oedematous child where no vein is visible or palpable, use anatomical landmarks because at certain places the veins of young children are quite constant and large. Once you have decided about the site you are going to try, secure the child's arm or leg in a splint. You can make a splint by using some cardboard with a cloth wrapped round it.

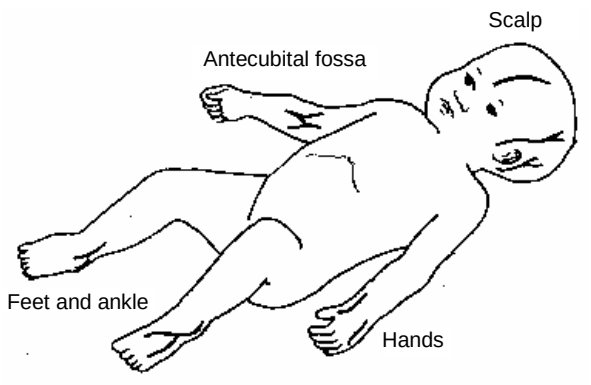


Figure A–4 ***Good places to look for veins***.

Only in life-threatening emergencies

Only in life-threatening emergencies in a shocked child when you cannot find a peripheral vein and the child's life depends on immediate IV-fluids use a subclavian access, the intraossaer route or do a cut-down, depending on your training. Never use these routes for non-emergencies because they can be associated with serious complications (pneumothorax or osteomyelitis). Only use them if access is essential to save a child's life.

Complications of cannulation of veins

IV infusions carry several risks:

- **Infection at the drip site** may lead to phlebitis (inflammation of the vein), septicaemia or osteomyelitis.
- **Fluid overload** if the infusion is given too fast or too much is given. This happens if the infusion is poorly supervised. First sign of fluid overload in children is an increase in the respiratory rate.

How to make infusions safer

1. Only give an infusion when it is clearly indicated (for example, most cases of dehydration can be safely treated with ORS, see page 67).
2. Wash your hands and clean the skin before inserting a cannula or needle.
3. Check the cannula site every day for signs of infection (swelling, pain, redness).
4. Calculate how much you want to give a child over which time. To avoid accidental overhydration, empty the infusion bottle until only the required amount is left. Mark the initial fluid level and write the start time on the bottle. Tell the family to call for help if the level is falling too fast or too slowly (see figure A–5). Remember, 20 drops are usually 1 ml.

Rectal administration of medicines

Rectal administration is as fast acting as IV and is a very useful and simple route for giving diazepam to stop a convulsion. Give diazepam with a syringe without needle into the rectum.

Inhaled medicines

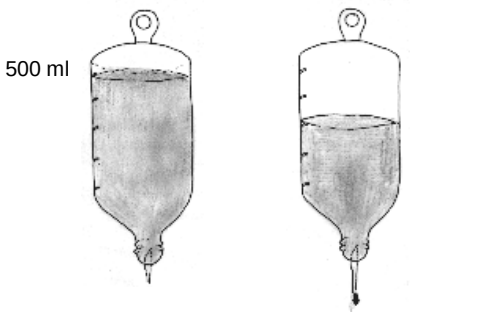
Inhaled medicines, although often expensive, are the best and most effective way to deliver medicines to children with asthma. It is important to know how to

HOW TO MAKE INFUSIONS SAFER

***Example*:**

You want to give to a child 280 ml over 4 hours:

1. Take a 500 ml bottle and disregard 220 ml so that only 280 ml are left:



2. Mark the initial fluid level and the starting time on the bottle. You can use sticking plaster to write on.
3. Mark the target level (the level that should be reached) for each hour. Tell the family to call for help if the level is falling too fast or too slowly.

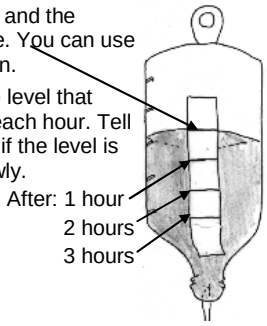


Figure A–5 ***How to make infusions safer***.

use them correctly, because only their correct use can give a good treatment result.

Correct use in young children

You can give inhaled drugs easily to children by using an inhalation device (spacer) that you can make out of paper or one third of a big plastic bottle. (Figure A–6)

1. Shake the inhaler.
2. Attach the inhaler to the inhalation device that must cover mouth and nose of the child.
3. Press the inhaler. If more than 1 puff is required, repeat after 5 seconds.
4. Let the child breathe in and out through the device for 1 minute.

Correct use for older children

1. Shake the inhaler.
2. Breathe out.
3. Put the inhaler to the mouth, press it and take a deep breath in, do not swallow the medicine. If more than 1 puff is required, repeat after 5 seconds.

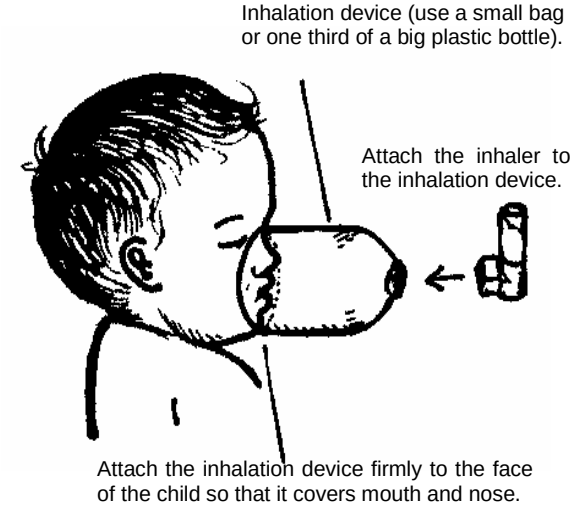


Figure A–6 ***The correct way to give inhaled medicines to a child*.**

4. Keep the mouth closed and hold the breath for 15 seconds.

D. About specific drugs

Drug warnings

The following drugs should not be used because of either severe side-effects or ineffectiveness. Some of them are banned in many countries but are still available in Afghanistan. Be also aware that many fixed drug combinations are irrational and may cause severe problems.

- Anti-diarrhoeal paediatric preparations including kaolin, pectin, Lomotil, loperamide (Imodium)
- Clioquinol
- Metamizol (Analgin, Dipyrone, Noramidopyrine, Novalgin)
- Oxyphenylbutazone, Phenylbutazone

REMEMBER: tetracycline and doxycycline are contra-indicated in children under 12 years.

Antibiotics

There is no other area in medicine with a greater need for rational (logical) prescribing than the prescribing of antibiotics. While the incorrect prescription of other drugs has consequences only for the individual patient, the wrong prescribing of antibiotics has world-wide consequences, because of the development and spread of drug resistant bacteria. Drug resistance is now widespread in many countries. It shows in increased

morbidity and mortality of bacterial diseases. Wrong (irrational) use of antibiotics is largely to blame for this crisis.

Logical prescribing of antibiotics

1. Use an antibiotic only if a disease is caused by bacteria.

   For example, most upper respiratory tract infections are viral and do not need an antibiotic.

2. **Always prescribe "first choice" antibiotics for each condition**. The most likely pathogen for each infectious condition is well known (for example, pneumonia in patients over 5 years: pneumococcus). Therefore, even without the facilities for culture and antibiogram, you can prescribe an antibiotic, called the "first choice" antibiotic, that will cover the most likely pathogens.
3. **Never prescribe a combination of two or more antibiotics unless there is a rational reason to do so.** The great majority of infectious conditions should be treated with one single antibiotic. Adding a second antibiotic increases the risk of bacterial resistance, side-effects and interactions between antibiotics, but does not provide an additional treatment benefit. Costs are also unnecessarily increased, as is the risk that the patient will not complete the full course of antibiotics.

   For example, to combine amoxicillin and co-trimoxazole is irrational.

   The only two rational reasons for the combination of antibiotics are:

   1. One antibiotic alone would not cover all possible pathogens (for example, in abdominal sepsis).
   2. Resistance would develop if only one antibiotic were used (for example, in tuberculosis*).*

4. **Antibiotics should usually be taken for at least 5 days to prevent failure of therapy and the development of resistance**.
5. **Certain newer antibiotics** (for example, ciprofloxacin) **should be reserved for complicated cases that are possibly resistant to the common antibiotics**. If used as "first choice" antibiotics, the newer antibiotics will soon lose their effectiveness through the development of drug resistance.

About newer antibiotics or others not mentioned in previous chapters

Many newer antibiotics can be found in pharmacies. Most of them are not regarded as "essential drugs" and do not provide any significant treatment benefit compared with cheaper essential antibiotics. Sadly, doctors often only receive information about these antibiotics from drug companies who, understandably, want to promote their products and do not always provide sound information.

The following list contains a brief outline about newer antibiotics and about some others that are not mentioned anywhere in previous chapters.

- ***Aminoglykosides***. Gentamicin belongs to this group. Netilmicin and tobramycin have a similar activity. Amikacin has a broader spectrum than gentamicin but there is usually no advantage to prescribe it. Kanamycin has been superseded by the other aminoglykosides.
- ***Cephalosporins***:
  - *1st generation*: cephalexin, cephradine (Velosef), cephalozin (Kefzol). They have been been replaced by newer cephalosporins and provide usually no treatment benefit compared with amoxicillin or co-trimoxazole. Do not use them. Exception may be a urinary tract infection in pregnancy.
  - *2nd generation*: cefaclor (Distaclor), cefuroxime (Zinacef, Zinnat). Infections can usually be treated equally well with cheaper antibiotics (for example sepsis: ampicillin and gentamicin; severe urinary tract infection: ampicillin and gentamicin; severe respiratory infections see chapter 8. "Respiratory problems").
  - *3rd generation*: Cefodizime (Timecef), cefotaxime (Claforan), ceftazidime (Fortum), ceftriaxone (Rocephin). They are only available as injections. Infections can usually be treated equally well and cheaper with other antibiotics (for example, epiglottitis: chloramphenicol; bacterial meningitis: ampicillin and chloramphenicol; ophtalmia neonatorum: benzylpenicillin; severe pneumonia: see chapter 8 "Respiratory problems"; sepsis: ampicillin and gentamicin; typhoid fever: chloramphenicol; severe urinary tract infections: ampicillin and gentamicin).
- ***Clindamycin*** (Dalacin): its use is very limited because of common serious side-effects. Bone or joint infections can equally well be treated, for example, with cloxacillin and ampicillin and gentamicin.
- ***Furazolidone***: Do not use it. It is an out-dated drug that has been superseded by other antibiotics.
- ***Makrolides***. Erythromycin belongs to this group. Newer ones are azithromycin (Zithromax) and clarithromycin (Klaricid). Their activity is quite similar to erythromycin. Higher costs do not justify their use instead of erythromycin when resources are limited.
- ***Penicillins***: co-amoxiclav (Augmentin). This combination of amoxicillin + clavulanic acid is effective in certain penicillinase-producing bacteria that may otherwise be resistant to amoxicillin (for example, staphylococcus bacteria). However, there is no indication for its routine use. In cellulitis, the combination of penicillin V and cloxacillin is often cheaper than co-amoxiclav.

- ***4-Quinolones***. Ciprofloxacin and nalidixic acid belong to this group. Cinoxacin, norfloxacin, ofloxacin are all contra-indicated in children under 12 years.

Corticosteroids

The anti-inflammatory activity of 5 mg prednisolone is similar to that of 0.75 mg dexamethasone or of 20 mg hydrocortisone

How best to give corticosteroids

Always start with a high dose. It is best to give the daily dose as one single morning dose. Only in emergencies or in some cases of asthma it may be necessary to divide it into 3 or 4 doses.

If you give corticosteroids for 5 or less days, you can stop them abruptly. If they are used for more than 5 days, reduce the dose gradually every 3-7 days because of the risk of adrenal failure (for example, reduce prednisolone by 5 mg every 3-7 days).

Contra-indications and side-effects

There are no contra-indications to corticosteroids in acute emergencies. Do not immunise with live vaccines (measles, BCG or polio) during treatment, wait for 2 weeks. Do not start prolonged corticosteroid treatment earlier than 4 weeks after an immunisation with a life vaccine.

Short-term use (up to 5 days) is usually free from side-effects.

Very high dosage or use for more than 5 days can cause reduced body defences with greater risk and severity of infections (including re-activation of an old TB focus), delayed healing of wounds, reduced growth, high blood pressure, oedema, diabetes mellitus, osteoporosis and fractures, psychosis, weight gain, striae, acne, cataract, peptic ulcer, hypokalaemia (low potassium). There is the risk of acute adrenal insufficiency if the treatment is stopped abruptly.

E. Allergic drug reactions

How to find out whether a patient is allergic to a drug

Never do skin testing for penicillin allergy! It is inaccurate and dangerous. It can sensitise a child, meaning the test dose can make him allergic to penicillin. Skin testing can cause death in allergic patients.

The safe and recommended way is to get information from the patient's history. If there is a reason to think the child is allergic to penicillin, give no penicillin of any kind, but use an alternative antibiotic.

Management of allergic drug reactions

Mild or moderate allergic reactions

Mild or moderate allergic reactions can present as rash (urticaria, erythema), generalised itching, angio-oedema, rhinitis (runny nose), nausea, vomiting, abdominal pain or conjunctivitis.

Management

1. **Stop the drug**.
2. ***Anti-histamine*** (chlorphenamine or promethazine) and ***corticosteroid*** (prednisolone) for 3-5 days.

Severe allergic reactions (anaphylaxis)

Severe allergic reactions occur usually within minutes of a drug being given. In addition to any of the symptoms of mild or moderate allergy, a severe allergic reaction is characterised by one or both of the following danger signs:

1. **Breathing difficulty** due to laryngeal oedema (swelling of the larynx) or bronchospasm.
2. **Collapse or loss of consciousness** due to low blood pressure.

Treatment of a severe allergic reaction with breathing difficulty or collapse:

Adrenaline IM

Repeat after 10 minutes if necessary.

For children younger than 5 years dilute 1 ampoule adrenaline 1:1000 with 9 ml sodium chloride 0.9%.

1 month–1 year	0.05 mg	= 0.5 ml diluted solution
1–2 years	0.1 mg	= 1 ml diluted solution
2–5 years	0.2–0.4 mg	= 2–4 ml diluted solution
6–12 years	0.5 mg	= 0.5 ml of ampoule adrenaline 1:1000

Chlorphenamine

1–5 years	2.5–5 mg	SC, not IM or IV
6–12 years	5–10 mg	IM

Alternative: promethazine

Dexamethasone IV/IM

Under 6 years	2–4 mg
6–12 years	4–8 mg
Over 12 years	4–12 mg

Alternative: hydrocortisone

Supportive treatment:

If necessary: Intravenous fluids to treat shock, or salbutamol (or aminophylline) to treat bronchospasm.

References

1. *British National Formulary* Number 35 (March 1998), London: British Medical Association and Royal Pharmaceutical Society of Great Britain 1998.
2. Clements J. Opportunities to immunise. *Child Health Dialogue* 1996; 2: 3-4.
3. Ewan PW. ABC of allergies - Anaphylaxis. *British Medical Journal* 1998; 316: 1442-1445.
4. King M, King F, Martodipoero S. *Primary Child Care*. Book One. Oxford: Oxford University Press 1978.
5. Medecins Sans Frontieres (MSF). *Essential drugs - Practical guidelines*, Paris: Hatier 1993.
6. Phillips JA, Kazembe PN, Nelson EAS, Fisher, JAF, Grabosch E, A *Paediatric Handbook for Malawi*. Revised edition. Lilongwe Central Hospital 1998.
7. Stanfield P, Brueton M, Chan M, Parkin M, Waterston T. *Diseases of Children in the Subtropics and Tropics*. 4th edition. Kent: Edward Arnold. 1991.
8. Stanfield P. *Child Health*. 2nd edition. Nairobi: African Medical and Research Foundation 1997.
9. Werner D. *Where there is no doctor*. Revised edition. London: The Macmillan Press 1993.
10. World Health Organisation. *Model List of Essential Drugs - Tenth Version 1997*. Geneva: WHO 1997.
11. Wyatt HV. Unnecessary injections and poliomyelitis in Pakistan. *Tropical Doctor* 1996; 26:179-180.

List of essential drugs

This drug list only contains the **commonly used doses** as a quick reference. **Specific diseases may require a different dose** and you must check for that in the appropriate chapter of this Paediatric Guide. **Duration of treatment** varies with different indications and you must refer to the appropriate chapter in this Paediatric Guide. For **eye medicines**, see page 159; for **infusion solutions**, see page 203; for **skin medicines**, see page 147.

Drug name and preparations	Route	Common dosages	Indications and remarks
Acetylsalicylic acid (Aspirin) *Tablets 100, 300 and 500 mg*	ORAL	Double the dose for anti-inflammatory effect. 0–5 month Do not use 6–12 months 75 mg (Avoid) 1–5 years 150 mg up to 4 times daily (Avoid) 6–12 years 250–300 mg up to 4 times daily Over 12 years 500 mg up to 4 times daily	**Pain, fever, inflammatory disease** ☞ *In children under 6 years use paracetamol because of risk of Reye's syndrome (acute encephalopathy and liver failure).*
Adrenaline (Epinephrine) *Ampoules (1:1000) of 1 ml, containing 1 mg*	SC/IM IV	For children under 5 years dilute 1 ampoule with 9 ml sodium chloride 0.9% or fluid for injection. 1–12 months 0.05 mg = 0.5 ml diluted solution 1–2 years 0.1 mg = 1 ml diluted solution 2–5 years 0.2–0.4 mg = 2–4 ml diluted solution 6–12 years 0.5 mg Over 12 years 0.5–1 mg	**IM/SC: Asthma, severe allergic reaction** **IV: Cardiac arrest**
Albendazole (Zantel) *Tablets 400 mg*	ORAL	Children over 2 years 400 mg once daily for 3 days **Hydatid disease**, see page 89.	**Helminths, hydatid disease**
Aminophylline *Tablets 100 and 200 mg* *Ampoules of 10 ml, containing 250 mg (=25 mg/ml)*	ORAL IV	12–15 mg/kg/day divided into 3 doses 1–5 years 25–50 mg 3 times daily 6–12 years 50–150 mg 3 times daily Over 12 years 100–300 mg 3 times daily 5 mg/kg in 5 % glucose very slowly over 20 minutes followed by 0.9 mg/kg/hour continuous infusion. *If continuous infusion is not possible*, repeat the initial dose after 8 hours. *If the child took aminophylline in the last 24 hours*, give half the dose.	**Asthma, severe bronchospasm** ☞ *During treatment, watch out for signs of toxicity because the margin between therapeutic and toxic levels is very small, for details see box on page 62.*
Amoxicillin *Tablets/Capsules 250 and 500 mg*	ORAL	Double the dose in severe infections. Newborn: 60–90 mg/kg/day divided into 3 doses 0–1 month 62.5–125 mg 3 times daily Children older than 1 month: 25–50 mg/kg/day divided into 3 doses 2–12 months 62.5–125 mg 3 times daily 1–5 years 125–250 mg 3 times daily 6–12 years 250 mg 3 times daily Over 12 years 250–500 mg 3 times daily	**Pneumonia and other lower respiratory tract infections, otitis media, sinusitis, typhoid fever, urinary tract infections** **Newborn: follow-up of IV/IM ampicillin therapy** ☞ *Contra-indicated in penicillin allergy.*
Ampicillin *Tablets/Capsules 250 and 500 mg* *Vials 500 mg and 1 g*	ORAL IM/IV	50–100 mg/kg/day divided into 3 doses 2–12 months 125–250 mg 3 times daily 1–5 years 250–500 mg 3 times daily 6–12 years 500 mg 3 times daily Over 12 years 500 mg–1 g 3 times daily Newborn: 50–200 mg/kg/day divided into 2-3 doses Under 7 days 200 mg 2 times daily 1–4 weeks 200 mg 3 times daily Children over 1 years: for ***non-severe infection*** give the same dosage as oral. In ***severe infections*** give 200–400 mg/kg divided into 3–4 doses. 2–12 months 250–500 mg 3–4 times daily 1–5 years 500 mg–1 g 3–4 times daily 6–12 years 1 g 3–4 times daily Over 12 years 1–2 g 3–4 times daily	**ORAL: as for amoxicillin and also bacillary dysentery** **IM/IV: sepsis, severe newborn infections, meningitis** ☞ *Contra-indicated in penicillin allergy.* ☞ *For oral use, prescribe amoxicillin instead of ampicillin because of better absorption.* ☞ *In severe newborn infections, always combine with gentamicin.*

Drug name and preparations	Route	Common dosages	Indications and remarks
Anti-tetanus serum (ATS) *Ampoules of 1 ml, containing 1500 IU ATS*	IM	See pages 131 and 189.	**Prevention and treatment of tetanus** ☞ *In children over the age of 1 months, inject after a test dose.*
Ascorbic acid (Vitamin C) *Tablets 50 and 250 mg*	ORAL	100 mg 1-3 times daily	**Vitamin C deficiency (Scurvy)**
Benzathine benzylpenicillin *Vials 2.4 M IU = 1.44 g*	IM only	**Streptococcal tonsillitis**: one single dose **Prevention of rheumatic fever**: once a month 2–12 months 300,000 IU 1–5 years 600,000 IU 6–12 years 1.2 million IU Over 12 years 2.4 million IU	**Streptococcal tonsillitis, prevention of recurrence of rheumatic fever** ☞ *Contra-indicated in penicillin allergy.*
Benzylpenicillin (Penicillin G, Crystalline Penicillin) *Vials 1 and 5 M IU* *(1 M IU = 600 mg)*	IM/IV	100,000–200,000 IU/kg/day (= 60–120 mg/kg/day) divided into 4–6 doses Under 1 week 150,000–200,000 IU every 12 hours 1 week–12 months 200,000–400,000 IU (=120–240 mg) every 6 hours 1–5 years 400,000–750,000 IU (=240–450 mg) every 6 hours 6–12 years 750,000 IU–1.5 M IU (=450–900 mg) every 6 hours Over 12 years 1–4 M IU (= 600 mg–2.4 g) every 6 hours	**Severe acute infections including severe pneumonia, sepsis, meningitis, endocarditis, tetanus** ☞ *Contra-indicated in penicillin allergy.* ☞ *Give IV by slow injection or infusion over 20 minutes.*
Chloramphenicol *Tablets/Capsules 250 mg* *Syrup 125 mg/5 ml* *Vials 1 g*	ORAL IM/IV	50 mg/kg/day divided into 3–4 doses In ***very severe*** infections, start with a high dose of 100 mg/kg/day that you should decrease after 2 days. 0–1 month Do not use 2–12 months 62.5–125 mg 3 times daily 1–5 years 125–250 mg 3 times daily 6–12 years 500 mg 3 times daily Over 12 years 750 mg 3 times daily	**Severe infections including typhoid fever, severe pneumonia, meningitis** ☞ *Only use for life-threatening infections.* ☞ *Do not give for longer than 10 days except in typhoid fever.* ☞ *Always change to ORAL as soon as possible. ORAL is as effective as injections.* ☞ *Feared danger is irreversible aplastic anaemia.*
Chloroquine *Tablets 100 mg base (=150 mg phosphate)* *Tablets 150 mg base (=250 mg phosphate)*	ORAL	Doses are stated for chloroquine base. **Malaria treatment** Day 1+2: 10 mg base/kg; day 3: 5 mg base/kg Day 1+ 2: 2–12 months 50–75 mg base 1–5 years 150 mg base 6–12 years 300 mg base Over 12 years 600 mg base Day 3: 2–12 months 37.5–50 mg base 1–5 years 75–100 mg base 6–12 years 150 mg base Over 12 years 300 mg base	**Malaria** ☞ *Do not give higher than recommended dosages. Toxic dose in children is 25 mg/kg.* ☞ *Never use chloroquine IM injections. They can cause sudden death in children.*
Chlorphenamine (Chlorpheniramine) *Tablets 4 mg,* *Ampoules of 1 ml, containing 10 mg*	ORAL SC/IM IV	1–5 years 1 mg 3 times daily 6–12 years 2 mg 3 times daily Over 12 years 4 mg 3 times daily 1–5 years 2.5–5 mg (SC only, not IV or IM) one single dose 6–12 years 5–10 mg one single dose Over 12 years 10–20 mg one single dose	**Allergy, itching** ☞ *Do not give to children under 1 year.*
Ciprofloxacin *Tablets 250 and 500 mg*	ORAL	Children over 12 years 7.5–15 mg/kg per day divided into 2 doses	**Life threatening multi-drug resistance typhoid fever** ☞ *It may have serious side-effects on bone growth in children under 12 years and is contra-indicated in children except for above indication.*

Drug name and preparations	Route	Common dosages	Indications and remarks
Cloxacillin *Capsules 250 and 500 mg* *It is often only available in combination with ampicillin (Ampiclox)*	ORAL	50–100 mg/kg/day divided into 3-4 doses Under 1 week 125 mg 2 times daily 1 week–12 months 125 mg 3 times daily 1–5 years 250 mg 3 times daily 6–12 years 250–500 mg 3 times daily Over 12 years 500 mg– 1g 3 times daily	**Staphylococcus infections including skin bone and joint infections** ☞ *Contra-indicated in penicillin allergy.*
Codeine *Tablets 30 mg*	ORAL	1–5 years 7.5 mg 3 times daily 6–12 years 15 mg 3-4 times daily Over 12 years 30 mg 3-4 times daily	**Moderate pain** ☞ *Only use for moderate pain, do not use as cough suppressant in respiratory infections because of possible serious side-effects.* ☞ *Do not use in children under 1 year.*
Co-trimoxazole (Sulfamethoxazole + trimethoprim) *Tablets 120, 240 and 480 mg* *Syrup 240 mg/5 ml*	ORAL	48 mg/kg/day divided into 2 doses 0–1 month 60 mg 2 times daily 2–12 months 120 mg 2 times daily 1–5 years 240 mg 2 times daily 6–12 years 480 mg 2 times daily Over 12 years 960 mg 2 times daily Double the dose in acute respiratory infections in children under 5 years.	**Acute respiratory infections, bacillary dysentery, typhoid fever, urinary tract infections** ☞ *Do not use in babies under 6 weeks who are jaundiced or premature.*
Dexamethasone *Ampoules of 1 ml, containing 4 mg*	IM/IV	0.2–0.5 mg/kg per day 0–6 years 2–4 mg one single dose 6–12 years 4–8 mg one single dose Over 12 years 4–12 mg one single dose Repeat after 6-8 hours if necessary.	**Severe allergic reaction, severe asthma, upper airway obstruction, severe typhoid fever** ☞ *Change to oral prednisolone as soon as possible.*
Diazepam (Valium) *Tablets 5 and 10 mg* *Ampoules of 2 ml, containing 10 mg (= 5 mg/ml)*	ORAL	0.2 mg/kg/day divided into 2 doses or once at night 1–5 years 1.25–2.5 mg 2 times daily 6–12 years 2.5–5 mg 2 times daily Over 12 years 2.5–10 mg 2 times daily or once at night	**ORAL: sedation** **IV/ RECTAL**: **convulsions** ☞ *Prolonged use can cause addiction.* ☞ *Rectal administration is as fast acting as IV. Give diazepam with a syringe without needle into the rectum.*
	IV RECTAL	0.25–0.5 mg/kg one single dose 0–1 month 2 mg rectally or 1 mg IV 2–12 months 2.5–5mg 1–3 years 5 mg 4–12 years 10 mg Over 12 years 10–15 mg Repeat after 10 minutes if convulsions continue.	☞ *Give IV very slowly over 4 minutes because of the risk of respiratory depression.*
Digoxin *Tablets 0.25 mg (=250 microgram)*	ORAL	0.01 mg/kg/day (=10 microgram/kg/day) divided into 2 doses Maximum paediatric dose: 0.25 mg/day (= 250 microgram/day)	**Heart failure** ☞ *Look out for signs of overdose, for details see box on page 123.*
Diloxanide *Tablets 500 mg* *It is often only available in combination with metronidazole*	ORAL	20 mg/kg/day divided into 3 doses	**Amoebic liver abscess following metronidazole treatment**
Erythromycin *Tablets 250 and 500 mg* *Syrup 125 mg/5 ml*	ORAL	25–45 mg/kg/day divided into 2-3 doses 0–1 month 62.5 mg 2-3 times daily 2–12 months 125 mg 2 times daily 1–5 years 250 mg 2 times daily 6–12 years 500 mg 2 times daily Over 12 years 500 mg– 1g 2 times daily	**Penicillin allergy, newborn conjunctivitis (chlamydia), whooping cough, atypical pneumonia**
Ethambutol *Tablets 400 mg*	ORAL	See page 39.	**Tuberculosis** ☞ *Always combine with other anti-tuberculosis drugs according to standard guidelines.* ☞ *Do not use in children under 6 years.*
Ferrous sulphate *Tablets 200 mg* *(100 mg ferrous sulphate = 30 mg element iron)*	ORAL	10–25 mg/kg per day divided into several doses 2–6 months 50 mg once daily 7–12 months 50 mg 2 times daily 1–5 years 100 mg 2 times daily 6–12 years 200 mg 2 times daily Over 12 years 200 mg 3 times daily	**Prophylaxis and treatment of iron deficiency anaemia** ☞ *Signs of overdose (very dangerous): heart failure, diarrhoea with blood.*

Drug name and preparations	Route	Common dosages	Indications and remarks
Folic acid *Tablets 5 mg*	ORAL	1 month–12 years 5 mg once daily Over 12 years 10 mg once daily	**Prophylaxis and treatment of folate deficiency anaemia**
Frusemide (Lasix) *Tablets 20 and 40 mg* *Ampoules of 2 ml, containing 20 mg (=10 mg/ml)*	ORAL IM/IV	0.5–2 mg/kg once daily in the morning 0.5–1 mg/kg single dose	**Pulmonary oedema or peripheral oedema caused by heart or renal failure** ☞ *Never use for the oedema of kwashiorkor.*
Gentamicin *Ampoules of 2 ml, containing 40 mg (20 mg/ml) or 80 mg (40 mg/ml)*	IM/IV	Newborn under 1 week: 5 mg/kg once daily 15 mg once daily Children older than 1 week: 7.5 mg/kg in one single daily dose. 1–3 weeks 20 mg once daily 2–12 months 20–60 mg once daily 1–5 years 60–100 mg once daily 6–12 years 100–200 mg once daily Over 12 years 180–360 mg once daily	**Severe infections (gram-negative bacteria), including urinary tract infections, septicaemia, secondary peritonitis, osteomyelitis, severe newborn infections** ☞ *It is important to calculate the gentamicin dose carefully because of serious side-effects, for example deafness, if the dose is too high.*
Glucose (Dextrose) *Ampoules of 10 ml, containing 50% glucose*	ORAL IV	*If a child is conscious and able to swallow, g*ive the solution orally. *If a patient is unable to swallow or unconscious,* give 1 ml/kg of glucose solution 50% IV, diluted to a 10% glucose solution. Give it over 15 minutes, followed by a continuos glucose infusion. Repeat if necessary. How to prepare a 10 % solution, see page 9.	**Hypoglycaemia**
Griseofulvin *Tablets/Capsules 125, 250 and 500 mg*	ORAL	10 mg/kg once a day 2–12 months 62.5 mg once daily 1–5 years 125–190 mg once daily 6–12 years 250–375 mg once daily Over 12 years 500–750 mg once daily	**Fungal infections, except candidiasis**
Hydrocortisone *Vials 100 mg*	IM/IV	2–4 mg/kg one single dose 2–12 months 25 mg one single dose 1–5 years 50 mg one single dose 6–12 years 100 mg one single dose Over 12 years 100–500 mg one single dose	See Dexamethasone
Ibuprofen *Tablets 200 and 400 mg*	ORAL	20 mg/kg per day divided into 3-4 doses Over 12 years 400 mg 3 times daily	**Pain, anti-inflammatory** ☞ *Do not use if a child weighs under 8 kg.*
Isoniazid *Tablets 100 and 300 mg* ***Isoniazid + Thioacetone*** *Combined tablets 100+ 50 mg and 300+ 150 mg*	ORAL	See page 39.	**Tuberculosis** ☞ *For treatment of tuberculosis, always combine with other anti-tuberculosis drugs according to standard guidelines.*
Lidocaine *Vials/Ampoules 1 % (=10 mg/ml) and 2 % (= 20 mg/ml)*		Dose depends on the area to be anaesthetised. Do not give more than 4 mg/kg lidocaine within 2 hours.	**Local anaesthesia** ☞ *The anaesthesia takes about 5 minutes to set in and lasts 1-1.5 hours.* ☞ *Never use a preparation containing adrenaline (epinephrine) for anaesthesia of the penis, fingers, toes, ears or nose.*
Mebendazole (Vermox) *Tablets 100 mg*	ORAL	Children over 2 years 100 mg 2 times daily for 3 days	**Helminths** ☞ *Do not use in children under 2 years.*
Metoclopramide *Tablets 10 mg* *Ampoules of 2 ml, containing 10 mg (= 5 mg/ml)*	ORAL IM/IV	0.3 mg/kg/day divided into 3 doses Under 5 years (Avoid) 6–12 years 2.5–5 mg 3 times daily Over 12 years 5–10 mg 3 times daily	**Vomiting** ☞ *Avoid in young children because of extra-pyramidal side-effects (tremor, abnormal body and face movements).*

Drug name and preparations	Route	Common dosages	Indications and remarks
Metronidazole (Flagyl) *Tablets 200, 250 and 400 mg* *Syrups different strength*	ORAL	**Giardiasis** 40 mg once daily for 3 days or 15 mg/kg/day divided into 3 doses for 10 days. **Amoebic dysentery** 35–50 mg/kg/day divided into 3 doses for 5-10 days. **Amoebic liver abscess** or **anaerobic infection** 20-30 mg divided into 3 doses. Average dose for 20 mg/kg divided into 3 doses (double these doses when treating amoebic dysentery): 0–1 month 25 mg 3 times daily 1–12 months 50 mg 3 times daily 1–5 years 100 mg 3 times daily 6–12 years 200 mg 3 times daily Over 12 years 400 mg 3 times daily	**Amoebic dysentery, amoebic liver abscess, anaerobic infections, giardiasis**
Morphine *Tablets 10 mg* *Ampoules of 1 ml, containing 10 mg*	ORAL SC/IM	2–12 months 0.5–1.5 mg every 4-6 hours 1–5 years 2.5–5 mg every 4-6 hours 6–12 years 5 mg every 4-6 hours Over 12 years 7.5–15 mg every 4-6 hours	**Severe pain** ☞ *Start with the doses given and increase if necessary. As a rule, an ORAL dose is about double the SC/IM dose.*
Nalidixic acid *Tablets 250 and 500 mg*	ORAL	50 mg/kg/day divided into 4 doses 2–12 months 62.5–125 mg 4 times daily 1–5 years 250 mg 4 times daily 6–12 years 500 mg 4 times daily Over 12 years 1 g 4 times daily	**Bacillary dysentery, lower urinary tract infections**
Niclosamide *Tablets 500 mg*	ORAL	Under 2 years 500 mg one single dose 2–12 years 1 g one single dose Over 12 years 2 g one single dose In H. nana, give half of the first dose for 6 more days.	**Tapeworms, including Hymenolepsis nana**
Nystatin *Tablets 100,000; 500,000 IU*	ORAL	100,000–500,000 IU 4 times daily after food	**Oral candidiasis** ☞ *Crush a tablet to give to small children. Older children should suck the tablet.*
Oral rehydration salts (ORS) *ORS package, powder for 1 litre glucose-electrolyte solution*	ORAL	See page 67.	**Prevention and treatment of dehydration**
Paracetamol (Acetaminophen) *Tablets 100 and 500 mg* *Syrup 120 mg/5 ml*	ORAL	40 mg/kg/day divided into 3-4 doses 0–1 month Avoid 2–12 months 50–125 mg up to 4 times daily 1–5 years 125–250 mg up to 4 times daily 6–12 years 250–500 mg up to 4 times daily Over 12 years 500 mg–1 g up to 4 times daily	**Fever, pain** ☞ *Paracetamol has no anti-inflammatory effect.*
Penicillin V (Phenoxymethyl-penicillin) *Tablets 250 mg* *Syrup 125 mg/5 ml*	ORAL	50 mg/kg/day divided into 3-4 doses 2–12 months 125 mg 3 times daily 1–5 years 250 mg 3 times daily 6–12 years 250–500 mg 3 times daily Over 12 years 500–750 mg 3 times daily	**Streptococcal tonsillitis, skin infections** ☞ *Poor absorption, do not use for severe infections.*
Phenobarbital *Tablets 15, 30 50 and 100 mg* *Ampoules of 2 ml, containing 200 mg (= 100 mg/ml)*	ORAL IV	5 mg/kg once daily at night 0–1 month 7.5–15 mg once daily at night 2–12 months 15–45 mg once daily at night 1–5 years 30–100 mg once daily at night 6–12 years 50–150 mg once daily at night Over 12 years 60–up to 300 mg once daily at night **Convulsions** Newborn 25 mg slowly IV one single dose Children over 1 month 15 mg/kg slowly IV	**Convulsions, epilepsy, sedation in tetanus** ☞ *Never stop abruptly.* ☞ *For further details see page 130.*
Phytomenadione (Vitamin K) *Ampoules of 0.5 ml, containing 1 mg*	IM/IV	0–1 month 1 mg one single dose	**Prevention and treatment of haemorrhagic disease of the newborn**

Drug name and preparations	Route	Common dosages	Indications and remarks
Phenytoin *Tablets 25, 50 and 100 mg* *Ampoules of 5 ml, containing 250 mg (= 50 mg/5 ml)*	ORAL IV	3–8 mg/kg/day divided into 2 doses 2–12 months 12.5–50 mg 2 times daily 1–5 years 25–100 mg 2 times daily 6–12 years 50–150 mg 2 times daily Over 12 years 150–300 mg 2 times daily **Convulsions** 10 mg/kg slowly IV (over 15 minutes)	**Convulsions, epilepsy** ☞ *Never stop abruptly.* ☞ *For further details see page 130.*
Prednisolone *Tablets 5 mg*	ORAL	1–2 mg/kg per day, best given as one single morning dose. 2–12 months 5 mg once daily in the morning 1–5 years 5–10 mg once daily in the morning 6–12 years 10–30 mg once daily in the morning Over 12 years 20–40 mg once daily in the morning	**Allergy, severe inflammation, typhoid fever, asthma** ☞ *The doses vary greatly with indication.* ☞ *For further details see under "Corticosteroids" on page 207.*
Procaine benzylpenicillin *Vials 3 M IU* *PPF: Vials 3 M IU+ 1 M IU*	IM only	50,000–100,000 IU/kg once daily 2–12 months 300,000–500,000 IU once daily 1–5 years 1,000,000 (1 Million) IU once daily 6–12 years 1,500,000 IU once daily Over 12 years 1–4 Million IU once daily	**Moderately severe infections including pneumonia, skin infections, lymphangitis, tetanus** ☞ *Never give IV.* ☞ *Procaine penicillin is also available mixed with benzylpenicillin, often called PPF (procaine penicillin forte). This combination has the advantage of combining immediate with delayed action.*
Promethazine (Phenergan) *Tablets 25 mg* *Syrup 5 mg/5 ml* *Ampoules of 2 ml, containing 50 mg (= 25 mg/ml)*	ORAL	1–2 mg/kg per day 1–5 years 2.5–7.5 mg 2 times daily 6–12 years 5–12.5 mg 2 times daily Over 12 years 25 mg 2 times daily For sedation give double of these dosages at one time.	**Allergy, sedation, vomiting** ☞ *Do not use in children under 6 months.*
Propranolol (Inderal) *Tablets 40 mg*	ORAL	0.25–1 mg/kg per day divided into 3 doses	**High blood pressure, migraine prophylaxis**
Pyrantel (Combantrin) *Tablets 125 and 250 mg*	ORAL	10 mg/kg per day as one daily dose 7–12 months 62.5 mg 1–5 years 125 mg 6–12 years 250 mg Over 12 years 500 mg	**Helminths**
Pyrazinamide *Tablets 500 mg*	ORAL	See page 39.	**Tuberculosis** ☞ *Always combine with other anti-tuberculosis drugs according to standard guidelines.*
Pyridoxine *Tablets 25 and 50 mg*	ORAL	Under 12 years 25–50 mg once daily Over 12 years 50–100 mg once daily	**Vitamin B_6 deficiency**
Quinine *Tablets 200 and 300 mg* *Ampoules of 2 ml, containing 300 mg (= 150 mg/ml)*	ORAL IM/IV	For details see page 24.	**Severe malaria**
Retinol (Vitamin A) *Capsules 200,000 IU*	ORAL	0–6 months 50,000 IU 7–12 months 100,000 IU Over 1 year 200,000 IU	**Prevention and treatment of vitamin A deficiency** ☞ *For duration see page 164.* ☞ *Do not give more than the recommended dosage.* ☞ *2 drops of a 200,000 IU capsule are about 50,000 IU and 4 drops are about 400,000 IU.*
Rifampicin *Capsules 150, 300 and 450 mg*	ORAL	**Tuberculosis** see page 39. **Brucellosis** 20 mg/kg once daily	**Tuberculosis, brucellosis** ☞ *Always combine with other anti-tuberculosis drugs according to standard guidelines.*

Drug name and preparations	Route	Common dosages	Indications and remarks
Salbutamol (Ventolin) *Tablets 2 and 4 mg* *Spray 100 microgram/puff* *Syrup 2 mg/5 ml*	ORAL	0.3 mg/kg per day divided into 3 doses 1–5 years 1–2 mg 3 times daily 6–12 years 2 mg 3 times daily Over 12 years 4 mg 3 times daily	**Asthma, bronchospasm** ☞ *It is not always effective in children under 2 years.*
	INH	1–2 puffs when needed	
Spironolactone *Tablets 25 and 50 mg*	ORAL	2 mg/kg per day divided into 2-3 doses 1–5 years 12.5–25 mg once daily 6–12 years 25–50 mg once daily Over 12 years 100 mg once daily Give these doses for 6 days, then reduce them to half.	**Ascites, oedema, especially in liver or renal disease**
Streptomycin *Vials 1 g*	IM only	**Tuberculosis** see page 39. **Brucellosis** 15 mg/kg once daily	**Tuberculosis, brucellosis** ☞ *Do not use for unspecific infections.* ☞ *In tuberculosis, always combine with other anti-tuberculosis drugs according to standard guidelines.*
Sulfadoxine + pyrimethamine (Fansidar) *Tablets sulfadoxine 500 mg + pyrimethamine 25 mg*	ORAL	2 months–4 years ½ tablet one single dose 5–6 years 1 tablet one single dose 7–9 years 1.5 tablets one single dose 10–14 years 2 tablets one single dose	**Chloroquine-resistant malaria**
Vitamin A	see Retinol		
Vitamin B_6	see Pyridoxine		
Vitamin C	see Ascorbic acid		
Vitamin K	see Phytomenadione		

References

1. ACBAR Health Sub-committee. *Report of Working Group on Harmonization and Improving Drug Supply & Use by the Aid Community in Afghanistan*. Workshop held December 1996.
2. *Alder Hey Book of Children's Doses.* 6th edition, Liverpool: Alder Hey's Children's Hospital 1994, with amendment 1996.
3. Barza M, Ioannidis JPA, Cappelleri JC, Lau J. Single or multiple daily doses of aminoglycosides: a meta-analysis. *British Medical Journal* 1996; 312: 338-345.
4. *British National Formulary* Number 35 (March 1998), London: British Medical Association and Royal Pharmaceutical Society of Great Britain 1998.
5. Bunjes R. *Rational Drug Use*. 2nd edition, Werne: Sanavita health care 1995.
6. Medecins Sans Frontieres (MSF). *Essential drugs - Practical guidelines*. Paris: Hatier 1993.
7. von Massow F, Ndele JK, Korte R. *Guidelines to rational drug use.* London: Macmillan 1997.
8. World Health Organisation. *The Use of Essential Drugs - Seventh report of the WHO Expert Committee* (including the revised Model List of Essential Drugs), WHO Technical Report Series 867, Geneva: WHO 1995.
9. World Health Organization. *Model List of Essential Drugs - Tenth Version* 1997. Geneva: WHO 1997.

Index

E

N

T

X

Z

د افغان ماشومانو لپاره د جرمني کمیټې او د هغې له مشر ډاکتر ایروس څخه ډېره مننه کوو چې د دغه کتاب د چاپ لګښت یې ورکړي دي دوی په تیرو کلونو کې هم د ننګرهار د طب پوهنځی د ۴۰ عنوانه طبي کتابونو د چاپ لګښت پر غاړه درلود.

په ځانګړي توګه د جې آی زیت (GIZ) له دفتر او CIM (Center for International Migration & Development) چې زما لپاره یې په تېرو څلور کلونو کې په افغانستان کې د کار امکانات برابر کړی دي هم د زړه له کومې مننه کوم.

د لوړو زده کړو له محترم وزیر ښاغلي پوهاند ډاکترعبیدالله عبید، علمي معین ښاغلي پوهنوال محمد عثمان بابري، مالي او اداري معین ښاغلي پوهنوال ډاکتر ګل حسن ولیزي، د ننګرهار پوهنتون رییس ښاغلي ډاکتر محمد صابر، د ننګرهار طب پوهنځی رییس ښاغلي ډاکترخالد یار، د ننګرهار طب پوهنځی علمي مرستیال ښاغلي ډاکتر همایون چاردیوال، د پوهنتونو او پوهنځیو له ښاغلو رییسانو او استادانو څخه هم مننه کوم چې د کتابونو د چاپ لړۍ یې هڅولې او مرسته یې ورسره کړې ده.

همدارنګه د دفتر له همکارانو احمد فهیم حبیبی، سبحان الله او حکمت الله عزیز څخه هم مننه کوم چې د کتابونو د چاپ په برخه کې یې نه ستړې کیدونکې هلې ځلې کړې دي.

ډاکتر یحیی وردګ، د لوړو زده کړو وزارت
کابل، فبروري ۲۰۱۴
د دفتر ټیلیفون: ۰۷۵۶۰۱۴۶۴۰
ایمیل: textbooks@afghanic.org
wardak@afghanic.org

ننګرهار طب پوهنځی لپاره د ۲۰ نورو طبي کتابونو د چاپ چارې روانې دي. د یادونې وړ ده چې نوموړي چاپ شوي کتابونه د هیواد ټولو طب پوهنځیو ته په وړیا توګه ویشل شوي دي.

ټول چاپ شوی طبي کتابونه کولای شي د www.ecampus-afghanistan.org ویب پاڼې څخه ډاونلوډ کړي.

کوم کتاب چې ستاسې په لاس کې دي زمونږ د فعالیتونو یوه بېلګه ده. مونږ غواړو چې دې پروسې ته دوام ورکړو، تر څو وکولای شو د درسي کتابونو په برابرولو سره د هیواد له پوهنتونو سره مرسته وکړو او د چېټر او لکچر نوټ دوران ته د پای ټکی کېږدو. د دې لپاره دا اړینه ده چې د لوړو زده کړو د موسساتو لپاره هر کال څه نا څه ۱۰۰ عنوانه درسي کتابونه چاپ کړل شي.

د لوړو زده کړو د وزارت، پوهنتونونو، استادانو او محصلینو د غوښتنې په اساس په راتلونکې کې غواړو چې دا پروګرام غیر طبي برخو لکه ساینس، انجنیري، کرهنې، اجتماعي علومو او نورو پوهنځیو ته هم پراخ کړو او د مختلفو پوهنتونونو او پوهنځیو د اړتیا وړ کتابونه چاپ کړو.

له ټولو محترمو استادانو څخه هیله کوو، چې په خپلو مسلکي برخو کې نوي کتابونه ولیکي، وژباړي او یا هم خپل پخواني لیکل شوي کتابونه، لکچر نوټونه او چېټرونه ایډېټ او د چاپ لپاره تیار کړي. زمونږ په واک کې یې راکړي، چې په ښه کیفیت چاپ او وروسته یې د اړوندې پوهنځۍ استادانو او محصلینو په واک کې ورکړو. همدارنګه د یادو شویو ټکو په اړوند خپل وړاندیزونه او نظریات زمونږ په پته له مونږ سره شریک کړي، تر څو په ګډه پدې برخه کې اغیزمن ګامونه پورته کړو.

له ګرانو محصلینو څخه هم هیله کوو چې په یادو چارو کې له مونږ او ښاغلو استادانو سره مرسته وکړي.

د یادونې وړ ده چې د مولفینو او خپروونکو له خوا پوره زیار ایستل شوی دی، ترڅو د کتابونو محتویات د نړیوالو علمي معیارونو په اساس برابر شي، خو بیا هم کیدای شي د کتاب په محتوی کې ځینې تیروتنې او ستونزې وجود ولري، نو له درنو لوستونکو څخه هیله مند یو تر څو خپل نظریات او نیوکې مولف او یا مونږ ته په لیکلې بڼه را ولیږي، تر څو په راتلونکې چاپ کې اصلاح شي.

د درسي کتابونو د چاپ پروسه

قدرمنو استادانو او ګرانو محصلينو!

د افغانستان په پوهنتونونو کې د درسي کتابونو کموالی او نشتوالی له لويو ستونزو څخه ګڼل کېږي. يو زيات شمير استادان او محصلين نوي معلوماتو ته لاس رسی نه لري، په زاړه ميتود تدريس کوي او له هغو کتابونو او چپترونو څخه ګټه اخلي چې زاړه دي او په بازار کې په ټيټ کيفيت فوتوکاپي کېږي.

د دې ستونزو د هوارولو لپاره په تېرو درو کلونو کې مونږ د طب پوهنځيو د درسي کتابونو د چاپ لړۍ پيل او تر اوسه مو ۱۳۶ عنوانه طبي درسي کتابونه چاپ او د افغانستان ټولو طب پوهنځيو او نورو ادارو لکه عامې روغتيا وزارت، د علومو اکادمي، روغتونونو او نورو.... ته استولي دي.

دا کړنې په داسې حال کې تر سره کېږي چې د افغانستان د لوړو زده کړو وزارت د (۲۰۱۰ ـ ۲۰۱۴) کلونو په ملي ستراتيژيک پلان کې راغلي دي چې:

"*د لوړو زده کړو او د نبوونې د نبه کيفيت او زده کوونکو ته د نويو، کره او علمي معلوماتو د برابرولو لپاره اړينه ده چې په دري او پښتو ژبو د درسي کتابونو د ليکلو فرصت برابر شي* د تعليمي نصاب د ريفورم *لپاره له انګريزي ژبې څخه دري او پښتو ژبو ته د کتابونو او درسي موادو ژباړل اړين دي، له دې امکاناتو څخه پرته د پوهنتونونو محصلين او استادان نشي کولای عصري، نويو، تازه او کره معلوماتو ته لاس رسی پيدا کړي*".

د افغانستان د طب پوهنځيو محصلين او استادان له ډېرو ستونزو سره مخامخ دي. نويو درسي موادو او معلوماتو ته نه لاس رسی، او له هغو کتابونو او چپترونو څخه کار اخيستل چې په بازار کې په ډېر ټيټ کيفيت پيداکېږي، د دې برخې له ځانګړو ستونزو څخه ګڼل کېږي. له همدې کبله هغه کتابونه چې د استادانو له خوا ليکل شوي دي بايد راټول او چاپ کړل شي. د هيواد د اوسني حالت په نظر کې نيولو سره مونږ لايقو ډاکترانو ته اړتيا لرو، ترڅو وکولای شي په هيواد کې د طبي زده کړو په نبه والي او پرمختګ کې فعاله ونډه واخلي. له همدې کبله بايد د طب پوهنځيو ته لا زياته پاملرنه وشي.

تراوسه پورې مونږ د ننګرهار، خوست، کندهار، هرات، بلخ او کاپيسا د طب پوهنځيو او کابل طبي پوهنتون لپاره ۱۳۶عنوانه مختلف طبي تدريسي کتابونه چاپ کړي دي. د

د لوړو زده کړو وزارت پیغام

د بشر د تاریخ په مختلفو دورو کې کتاب د علم او پوهې په لاسته راوړلو کې ډیر مهم رول لوبولی دی او د درسي نصاب اساسي برخه جوړوي چې د زده کړې د کیفیت په لوړولو کې مهم ارزښت لري. له همدې امله د نړیوالو پیژندل شویو ستندردونو، معیارونو او د ټولنې د اړتیاوو په نظر کې نیولو سره باید نوي درسي مواد او کتابونه د محصلینو لپاره برابر او چاپ شي.

د لوړو زده کړو د مؤسسو د ښاغلو استادانو څخه د زړه له کومې مننه کوم چې ډېر زیار یې ایستلی او د کلونو په اوږدو کې یې په خپلو اړوندو څانګو کې درسی کتابونه تألیف او ژباړلي دي. له نورو ښاغلو استادانو او پوهانو څخه هم په درنښت غوښتنه کوم تر څو په خپلو اړوندو برخو کې نوي درسي کتابونه او نور درسي مواد برابر کړی څو تر چاپ وروسته د ګرانو محصلینو په واک کې ورکړل شي.

د لوړو زده کړو وزارت دا خپله دنده بولي چې د ګرانو محصلینو د علمي سطحې د لوړولو لپاره معیاري او نوي درسی مواد برابر کړي.

په پای کی د افغان ماشومانو لپاره د جرمنی کمیټی او ټولو هغو اړوندو ادارو او کسانو څخه مننه کوم چې د طبي کتابونو د چاپ په برخه کې یی هر اړخیزه همکاري کړې ده.

هیله مند یم چی نوموړې پروسه دوام وکړي او د نورو برخو اړوند کتابونه هم چاپ شي.

په درنښت

پوهاند ډاکتر عبیدالله عبید

د لوړو زده کړو وزیر

کابل، ۱۳۹۳

د کتاب نوم د ماشومانو د ناروغيو عملي لارښود (انګليسي)
ليکوال ډاکتر مالتې ايل وان بلو مرودر
بريښنالیک iam.med.books@gmx.net
خپرندوی ننګرهار طب پوهنځی
ویب پاڼه www.nu.edu.af
چاپ شمېر ۱۰۰۰
لومړنی چاپ د نړیوال مرستندویه ماموریت (IAM) لخوا ، کال ۱۹۹۹
څلورم چاپ ۱۳۹۳
ډاونلوډ www.ecampus-afghanistan.org
چاپ ځای افغانستان ټایمز مطبعه، کابل

د تدریسي کتابونو د چاپولو لپاره له موږ سره اړیکه ونیسئ:
ډاکتر یحیی وردک، د لوړو زده کړو وزارت، کابل
تیلیفون ۰۷۵۶۰۱٤٦٤۰
ایمیل textbooks@afghanic.org

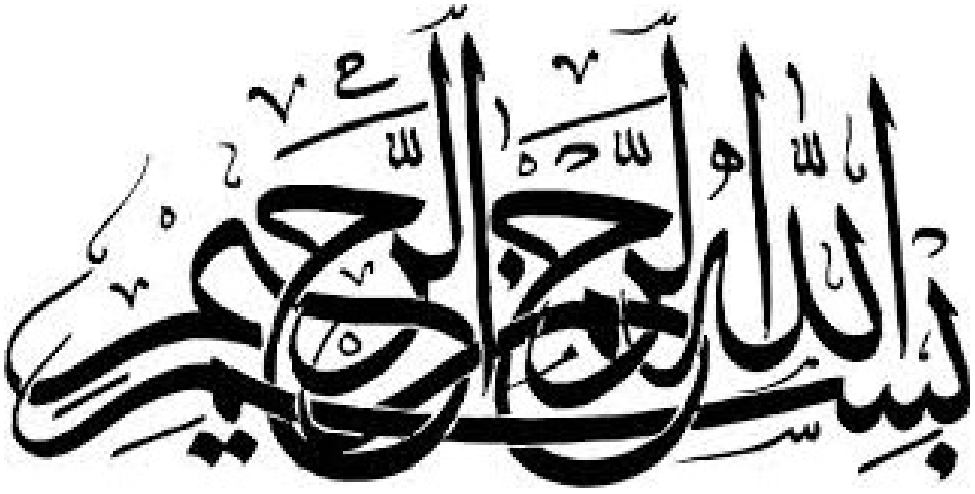
ای اس بي ان ٦ – ۰۲٦ – ۰ – ۹۹٦۹ – ۹۷۸

د ماشومانو د ناروغيو

عملي لارښود

(انګليسي)

ډاکتر مالتې ايل وان بلو مرودر


بسم الله الرحمن الرحيم