

Fever and Rash:
Common clinical syndromes

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Approach to Patient with Fever and Rash

1. Description of Rash
2. Associated Signs and Symptoms
3. Exposures

Describe the Rash

- Timing
- Distribution
 - Where did it start?
 - Where has it spread?
 - Does it move (evanescent) or not (fixed)?
- Symptoms
 - Itching
 - Pain
 - Swelling

Describe the Rash

Characteristics and common terminology

- Type of lesion
 - Macule (flat)
 - Papule
 - Nodule
 - Vesicle
 - Pustule
 - Abscess
 - Plaque
 - Wheal
- Color
 - Erythematous (red)
 - Violacious (purple)
- Vascularity
 - Blanching
 - Petechiae
 - Purpura
 - Ecchymosis
- Arrangement/shape
 - Scattered
 - Grouped
 - Well demarcated
 - Morbilliform
 - Coalescent
 - Linear
 - Annular
 - Serpiginous
 - Targetoid
 - Lacey
- Consistency
 - Desquamation
 - Sandpaper
 - Crust (scab)

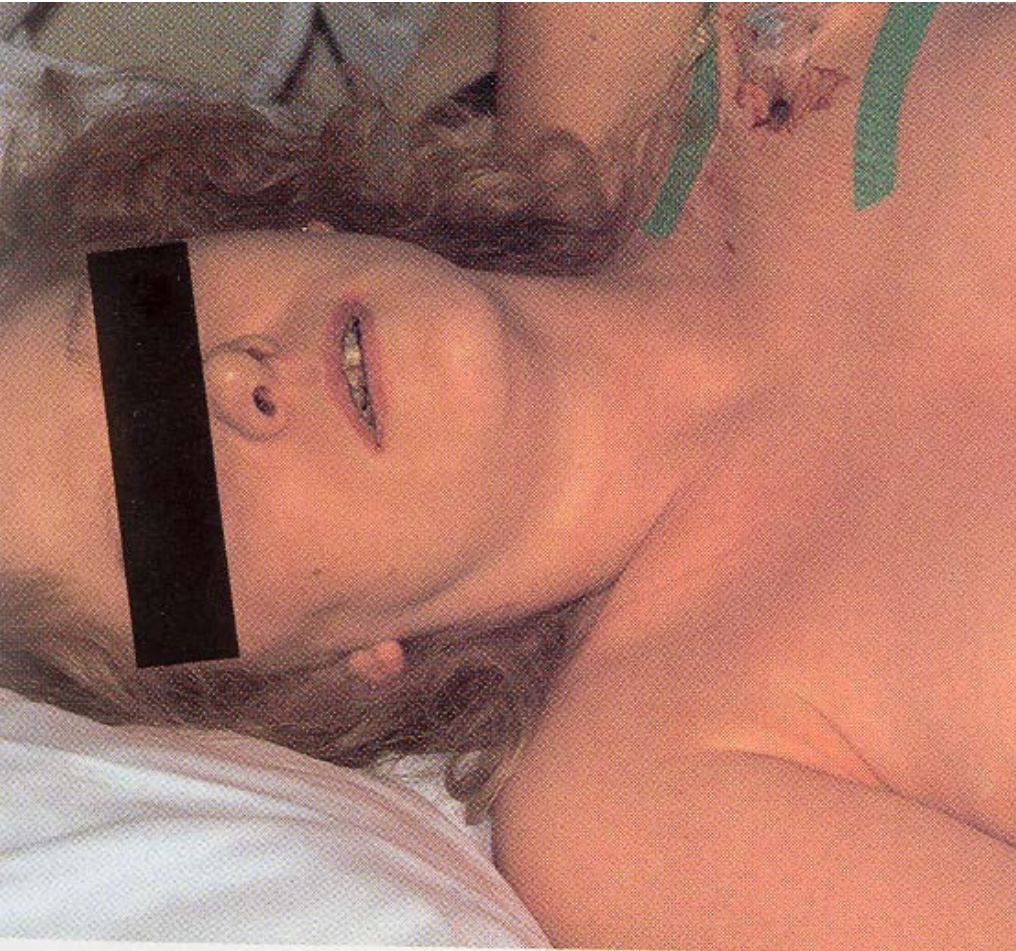
Signs/Symptoms Associated with Rash

- Fever duration and characteristics
- Signs of shock
 - Hypotension, poor perfusion, decreased consciousness
- Irritability
- Headache
- Respiratory symptoms
- Eye changes
- Mucous membrane lesions or pain
- Joint pain or swelling

Exposures

- Sick contacts
- Medications
- Vaccines
 - Recent vaccines?
 - Incomplete suggesting susceptible host?
- Daycare
- Travel
- Season
- Outdoor exposures
 - Ticks, other vectors
- Menses/Tampon use

Case 1



- Diffuse
- Erythematous
- Blanching
- “Erythroderma”
 - Sunburn

Case 1

Associated signs/sxs

- Fever: 40°C, 1 day
- Signs of shock: Yes
- Headache
- Injected bulbar conjunctiva
- Hyperemic mucous membranes:
- Dizziness
- Myalgias
- Vomiting and diarrhea

Exposures

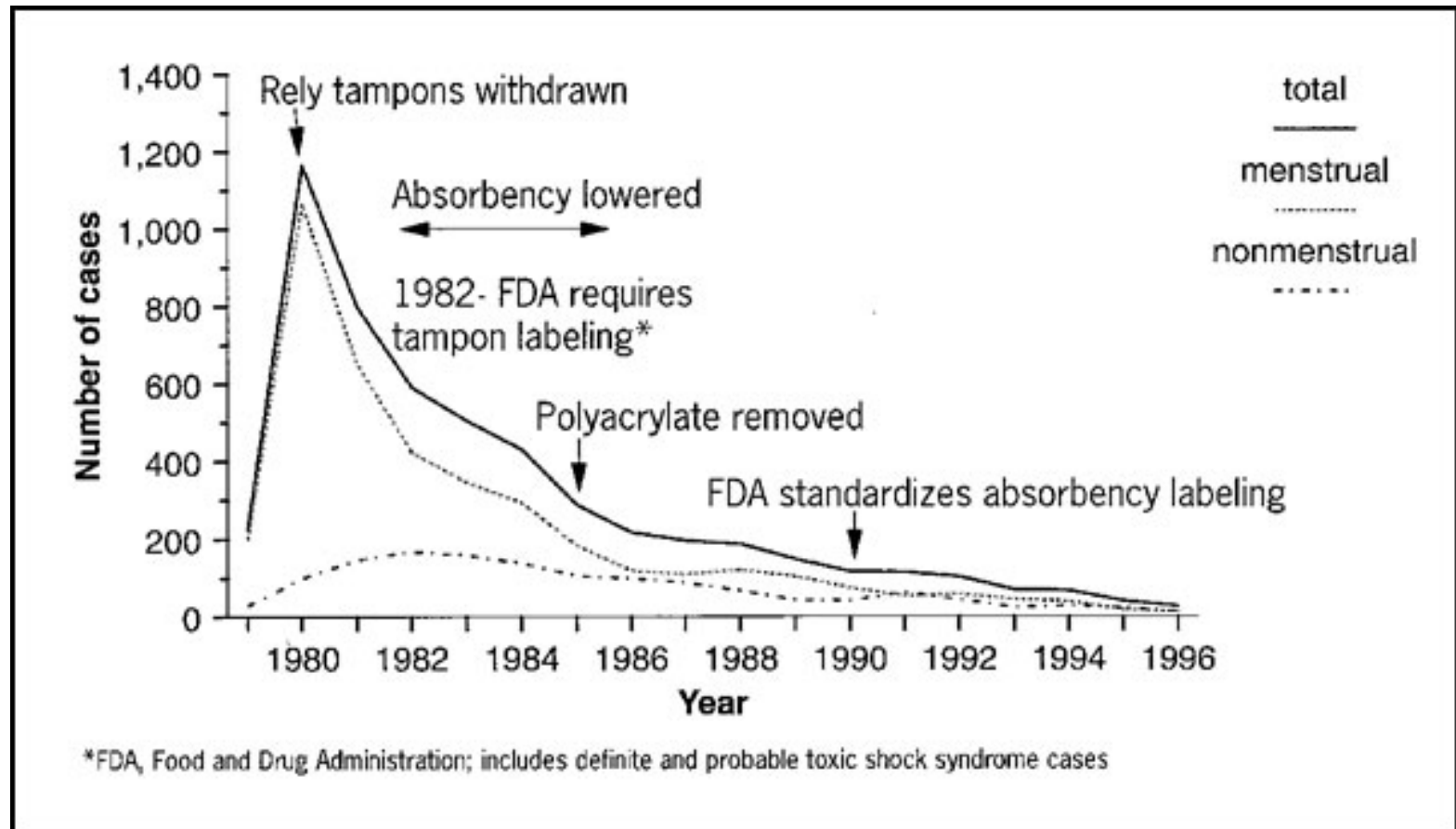
- Menses/Tampon use



Toxic Shock Syndrome

- *Staphylococcus aureus*
 - Menstrual and non-menstrual cases
 - Toxic shock syndrome toxin (TSST) and others
 - Bacteremia uncommon
- *Streptococcus pyogenes*
 - TSS Complicates 1/3 of invasive GAS infections, most commonly necrotizing fasciitis
 - Bacteremia common

Toxic Shock Syndrome in the United States: Surveillance Update, 1979–1996.



- Hajjeh RA, Reingold A, Weil A, Shutt K, Schuchat A, Perkins BA. Emerg Infect Dis [serial on the Internet]. 1999, Dec

Staphylococcus aureus Toxic Shock Syndrome: Clinical Case Definition

Clinical Findings

- Fever: temperature 38.9°C (102.0°F) or greater
- Rash: diffuse macular erythroderma
- Hypotension: SBP \leq 90 for adults; $<$ 5% for children $<$ 16 years of age; orthostatic drop in DBP \geq 15 from lying to sitting; orthostatic syncope/dizziness
- Multisystem organ involvement: **3 or more** of the following:
 - Gastrointestinal: vomiting or diarrhea at onset of illness
 - Muscular: severe myalgia or CPK $>$ twice the upper limit of normal
 - Mucous membrane: vaginal, oropharyngeal, or conjunctival hyperemia
 - Renal: BUN or Cr $>$ twice the upper limit of normal or urinary sediment with \geq 5 WBC
 - Hepatic: total bilirubin, AST, or ALT $>$ twice the upper limit of normal
 - Hematologic: platelet count \leq 100
 - Central nervous system: disorientation or alterations in consciousness without focal neurologic signs when fever and hypotension are absent

Laboratory Criteria

- *Negative* results on the following tests, if obtained:
 - Blood, throat, or CSF; blood culture may be positive for *S aureus*
 - Serologic tests for Rocky Mountain spotted fever, leptospirosis, or measles

Streptococcal Toxic Shock Syndrome: Clinical Case Definition

I. Isolation of group A streptococcus (*Streptococcus pyogenes*)

A. From a normally sterile site (Definite case)

B. From a non-sterile site (Probable case)

II. Clinical signs of severity

A. Hypotension: systolic pressure ≤ 90 adults or $< 5\%$ for age in children

AND

B. **Two or more** of the following signs:

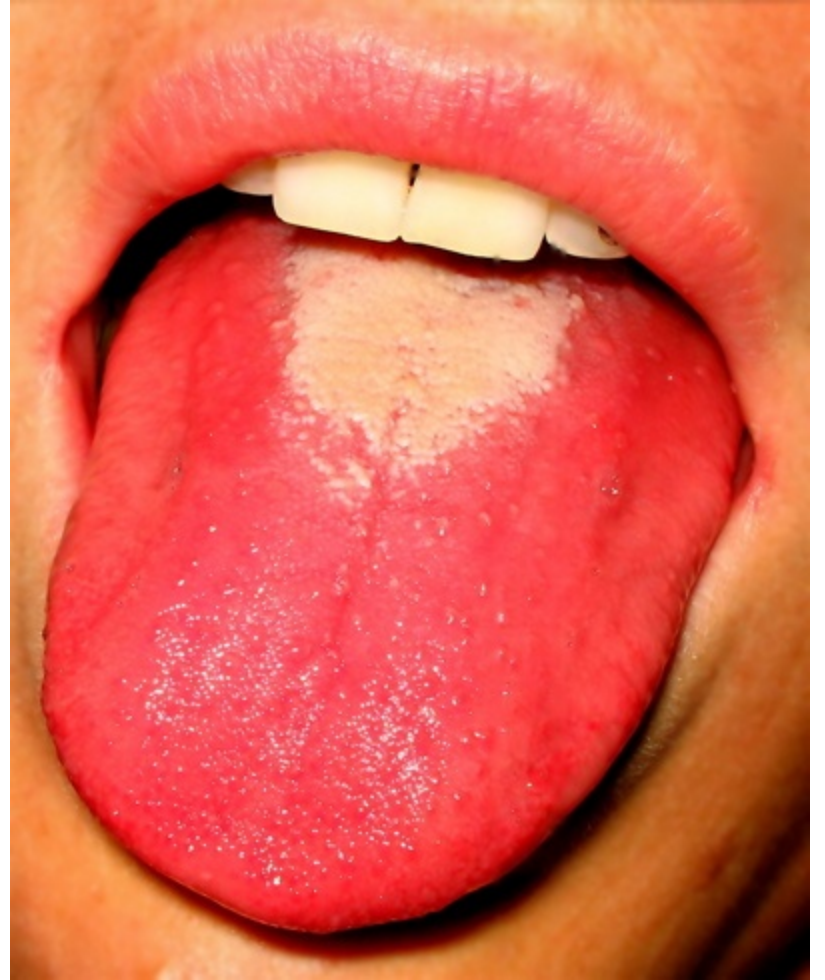
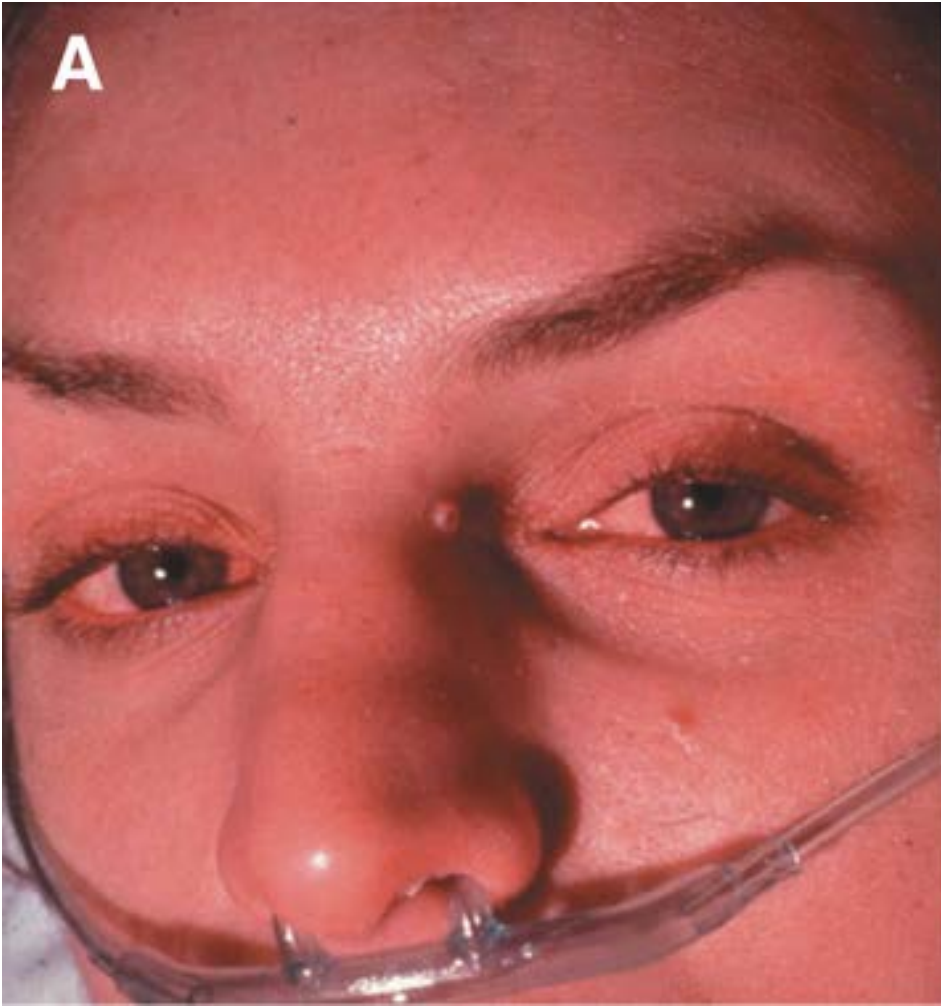
- Renal: Cr ≥ 2 x upper limit of normal for age
 - Coagulopathy: platelet count ≤ 100 or less or DIC
 - Hepatic: total bili, AST, or ALT > 2 x the ULN
 - ARDS
 - Generalized erythematous macular rash
 - Soft tissue necrosis, including necrotizing fasciitis or myositis, or gangrene
-

Table 3.68. Management of Staphylococcal Toxic Shock Syndrome

- **Fluid management** to maintain adequate venous return and cardiac filling pressures to prevent end-organ damage
 - Anticipatory management of multisystem organ failure
 - **Parenteral antimicrobial therapy** at maximum doses
 - Kill organism with bactericidal cell wall inhibitor (eg, **beta-lactamase-resistant antistaphylococcal** antimicrobial agent)
 - Stop enzyme, toxin, or cytokine production with protein synthesis inhibitor (eg, **clindamycin**)
 - **Immune Globulin Intravenous** may be considered for infection refractory to several hours of aggressive therapy, or in the presence of an undrainable focus, or persistent oliguria with pulmonary edema
-

Table 3.71. Management of Streptococcal Toxic Shock Syndrome Without Necrotizing Fasciitis

- Fluid management to maintain adequate venous return and cardiac filling pressures to prevent end-organ damage
 - Anticipatory management of multisystem organ failure
 - Parenteral antimicrobial therapy at maximum doses
 - Kill organism with bactericidal cell wall inhibitor (eg, beta-lactamase-resistant antistaphylococcal antimicrobial agent)
 - Stop enzyme, toxin, or cytokine production with protein synthesis inhibitor (eg, clindamycin)
 - Immune Globulin Intravenous may be considered for infection refractory to several hours of aggressive therapy or in the presence of an undrainable focus or persistent oliguria with pulmonary edema
-





Case 2



- Macular/papular
 - morbilliform
- Begins on face and spreads caudally
- Usually spares palms and soles
- Over time:
 - Confluence
 - Deepening color
 - Desquamation

Case 2

Associated signs/sxs

- Fever: 4th day
- Cough and rhinorrhea
- Conjunctivitis
- Vomiting, loose stools

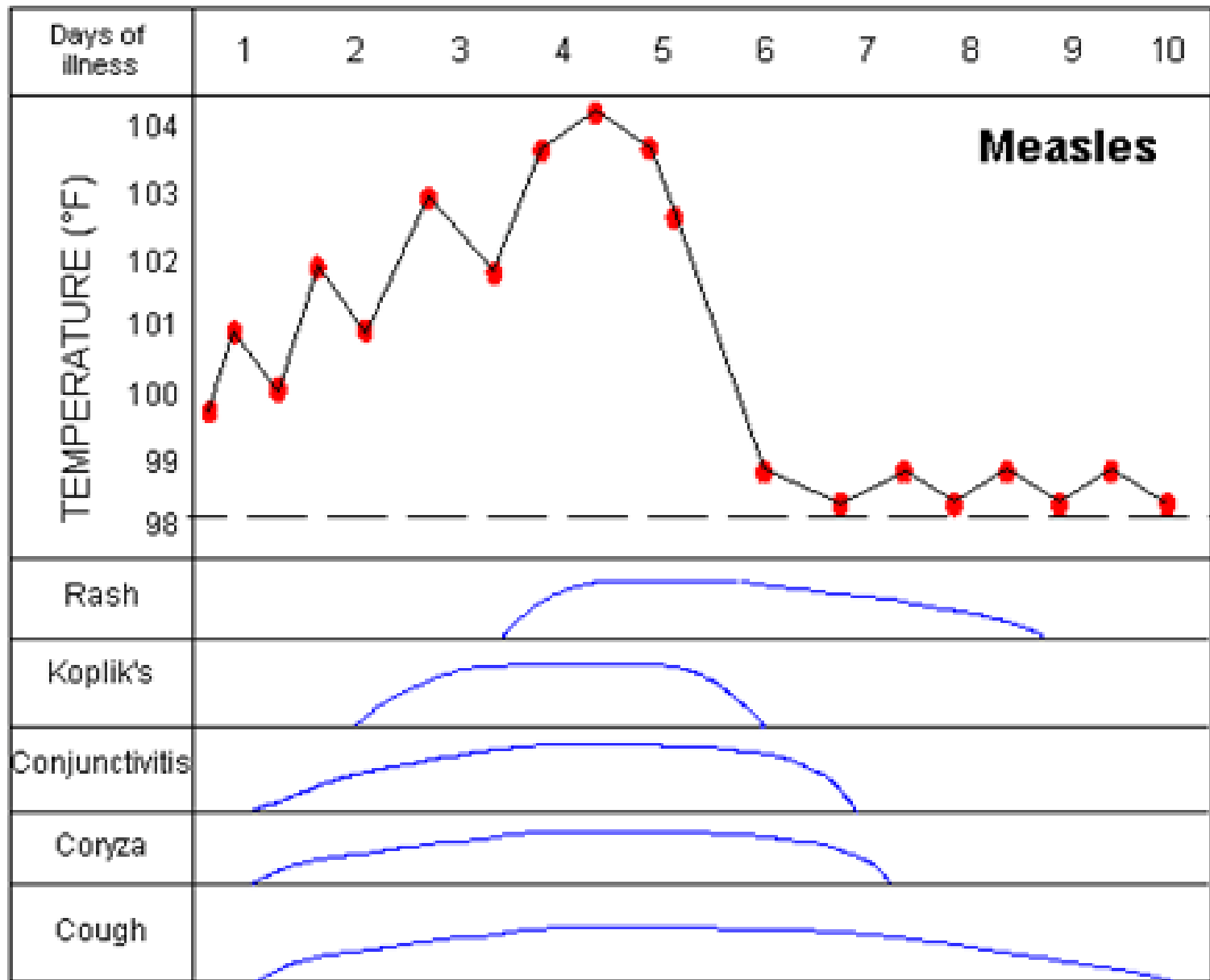
Exposures

- No live vaccines
- France 1 week ago



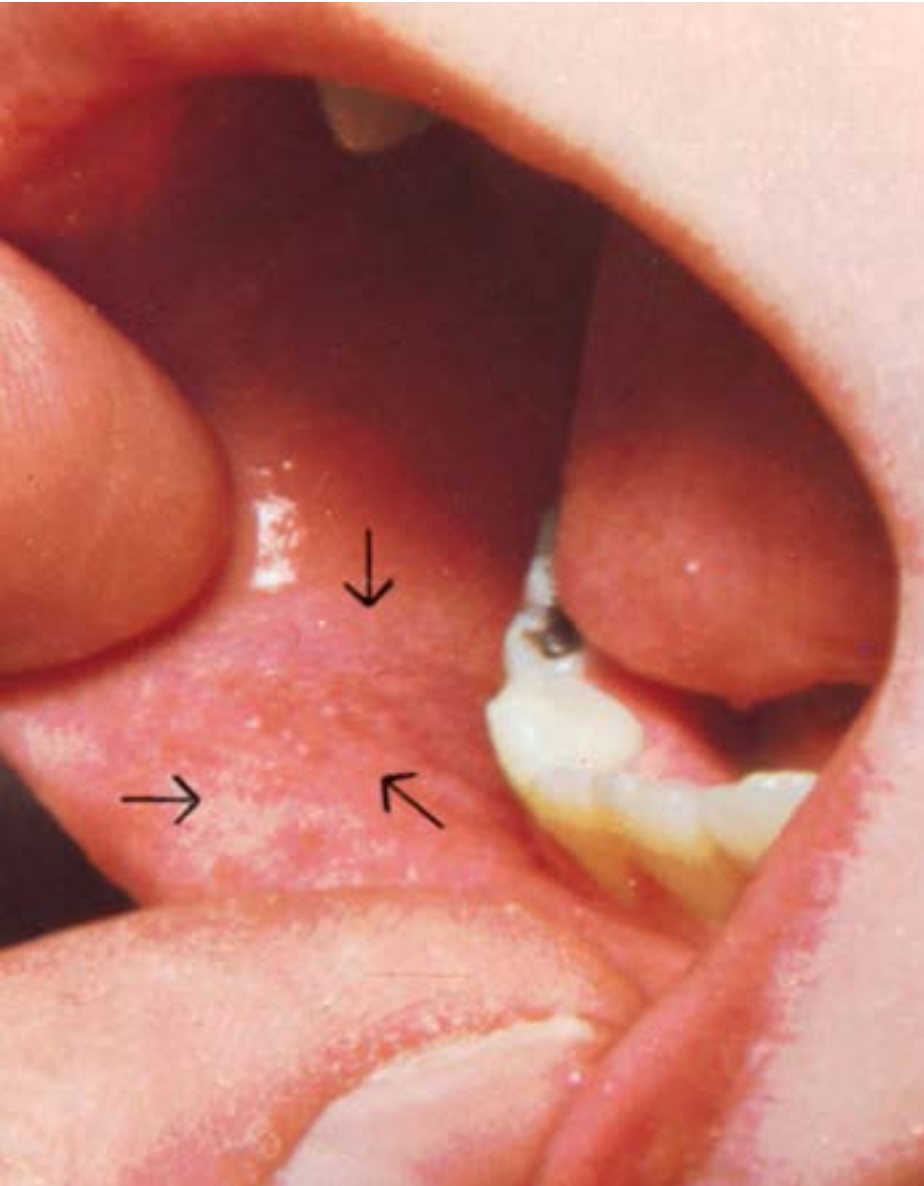
Measles

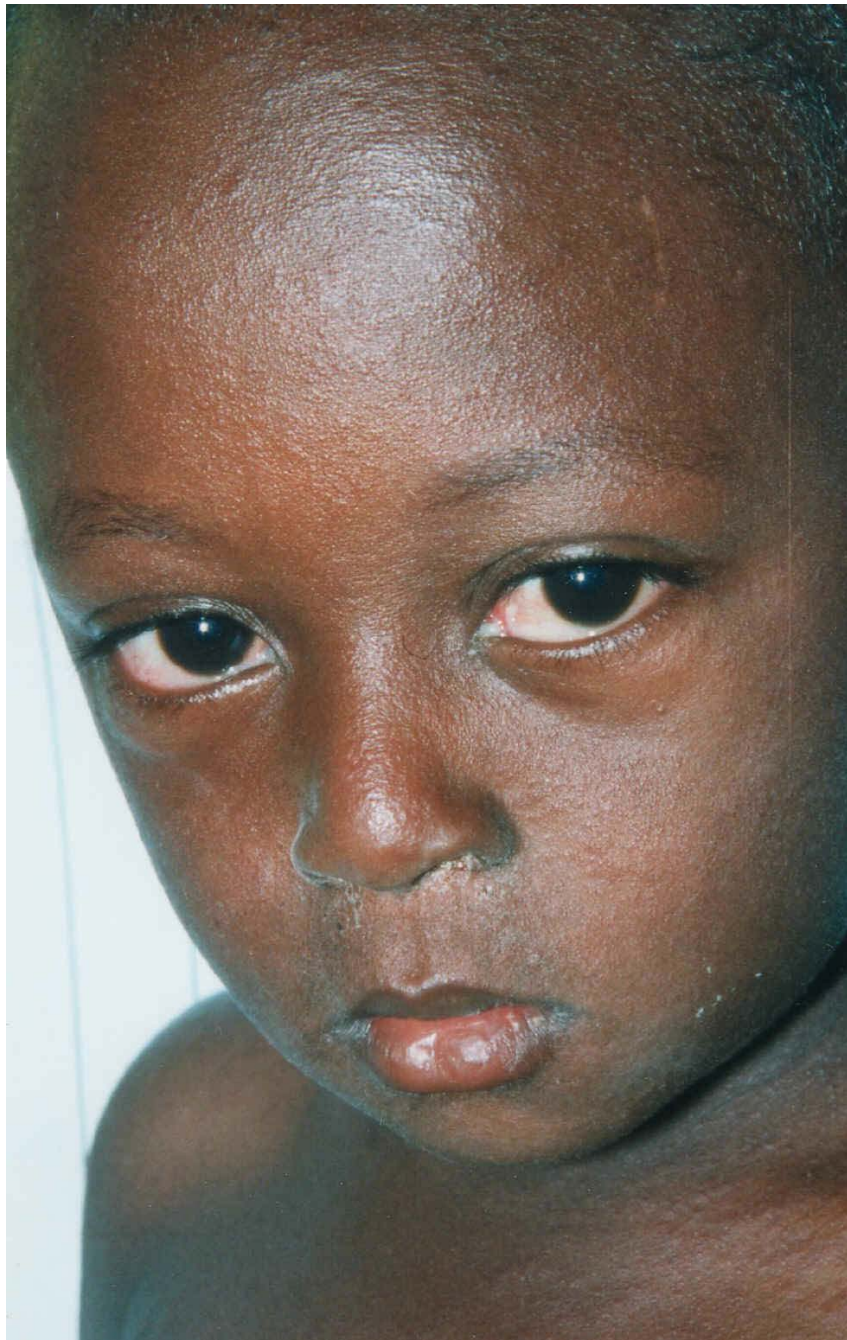
- Rubeola virus
- Transmission: Droplet and Airborne
- Highly contagious



Head
to toe

Koplik Spots: Red with blue/white center

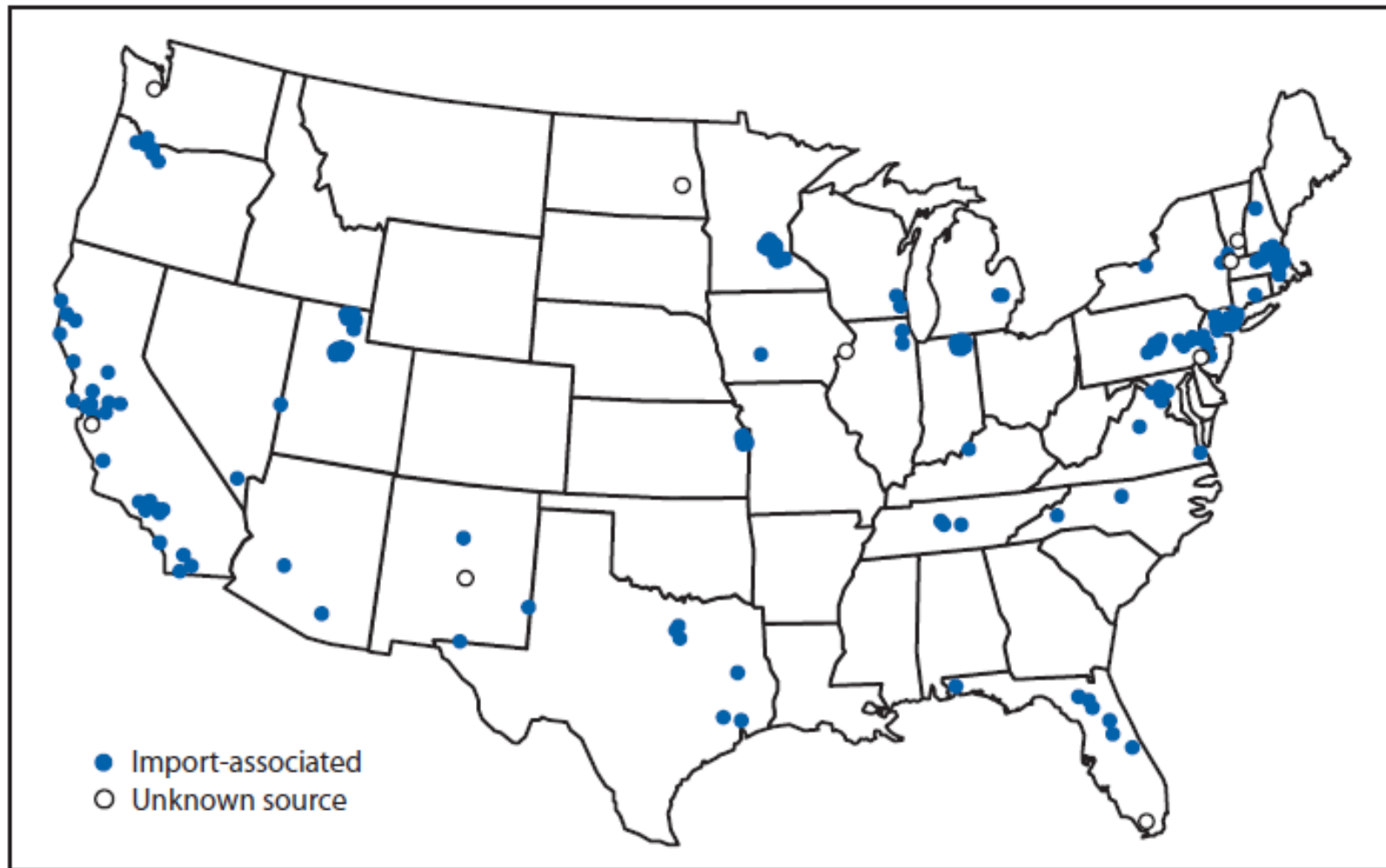




Measles Complications

- Respiratory: pneumonia, otitis media
- CNS: Acute encephalitis 1:1000, SSPE 1:100,000
- GI tract: diarrhea, malnutrition
- Skin: desquamation
- Eyes: corneal ulcer, blindness
- Mouth: stomatitis, cancrum oris
- Heme: Hemorrhage
- Immune: Decreased cell-mediated immunity
 - Activation of latent TB
 - HSV reactivation
- Death
 - Overall low rate but higher in immunocompromised
 - Year 2000: 750K deaths, 5th leading cause < 5 years

FIGURE 1. Origin of reported measles cases (N = 222) — United States, 2011



Centers for Disease Control and Prevention

MMWR

Weekly / Vol. 61 / No. 15

Morbidity and Mortality Weekly Report

April 20, 2012

TABLE. Countries where imported measles was acquired, by World Health Organization (WHO) region, number of cases (n = 72), and genotype — United States, 2011

WHO region	No. of cases	Country	No. of cases	Genotype identified*
African	4	Ethiopia	1	B3
		Kenya	2	B3 (2)
		Nigeria	1	B3
Americas	2	Canada	1	
		Dominican Republic [†]	1	D4
Eastern Mediterranean	3	Jordan	1	D4
		Pakistan	2	
European	33	Bulgaria	1	
		France	13	D4 (5), G3
		France/Germany/Spain [§]	1	
		France/Italy [§]	1	D4
		France/Italy/Spain/Germany [§]	1	
		France/Spain/United Kingdom [§]	1	
		France/United Kingdom [§]	1	D4
		Italy	4	D4 (3)
		Poland	1	
		Romania	1	D4
		Romania/Hungary [§]	2	D4 (2)
		Spain	1	
		United Kingdom	5	D4 (3)
South-East Asia	19	Bangladesh	1	
		India	16	D4, D8 (5)
		Indonesia	2	
Western Pacific	11	China	2	H1
		Malaysia	2	D9 (2)
		Philippines	6	D9 (4)
		Philippines/Vietnam/Singapore/Malaysia [§]	1	

MMR recommendations for travelers

- All persons aged ≥6 months who will be traveling outside the US and are eligible to receive MMR vaccine should be vaccinated before travel. Children aged ≥12 months should receive 2 doses of MMR vaccine separated by at least 28 days, before travel

CDC. Measles, mumps, and rubella—vaccine use and strategies for elimination of measles, rubella, and congenital rubella syndrome and control of mumps: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR 1998;47:(No. RR-8).

Case 3

- Morbilliform
- Blanching and Purpuric
- Targetoid
- Involves palms and soles
- Mucous membrane ulceration



Case 3

Associated signs/sxs

- Fever: 2 days low grade
- Painful conjunctivitis
- Ulcerative Mucous membranes
- Dysuria
- Myalgias

Exposures

- Bactrim

Stevens-Johnson Syndrome

- Idiosyncratic reaction to
 - Medications: sulfa drugs, penicillin, others
 - Infections: HSV, Mycoplasma
- Fever
- Rash
 - Erythematous macules, purpuric, targetoid, burning/painful
 - Bulla formation and necrosis, sloughing of the skin, Nikolsky's sign
 - <10% Body Surface area (BSA)
 - ≥ 2 mucous membranes involved
 - Oral, conjunctival, genital

Erythema multiforme

SJS

SJS/TEN

Toxic Epidermal Necrolysis

No sloughing

0-1 mucous membrane
involved

Infectious triggers more likely
(HSV, Mycoplasma)

Drugs, CA, autoimmune

>30% BSA

EM/SJS



TEN



Case 4



- Petechial
- Purpuric
- Extremities

Case 4

Associated signs/sxs

- Fever: 1 day
- Signs of shock:
- Headache:
- Sore throat
- Myalgias, leg pain

Exposures

- No MCV4

Meningococemia

- 30% of cases without associated meningitis
- Prodrome with fever, myalgias often with non-specific non-petechial rash
 - Associated symptoms can include nausea, vomiting, pharyngitis (non-exudative)
- Petechiae may first appear at pressure points
- Mortality: 10%
- Skin grafting or amputation: 1-5%

Burden of disease

- About 1000 cases annually in the United States during 2005-2010.

FIGURE 1. Rate* of meningococcal disease, by year — United States, 1970–2011†

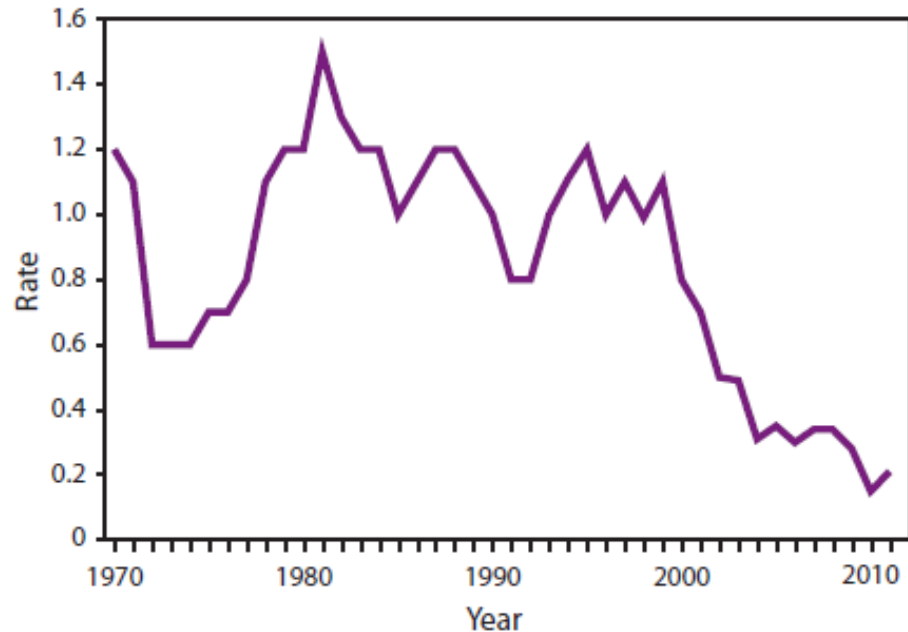
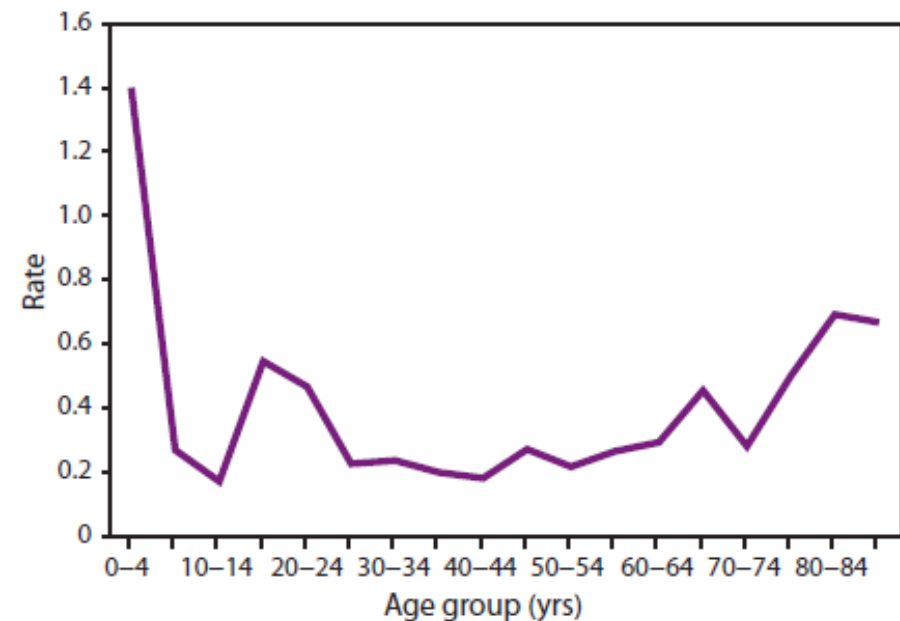


FIGURE 2. Rate* of meningococcal disease, by age group — United States, 2002–2011†





ACIP Recommendations for Infants at Increased Risk for Meningococcal Disease

- Infants at increased risk for meningococcal disease should be vaccinated with a 4-dose series of Hib-MenCY-TT.
- These include infants with recognized persistent complement pathway deficiencies and infants who have anatomic or functional asplenia including sickle cell disease.
- Infant Meningococcal Vaccination: Advisory Committee on Immunization Practices (ACIP) Recommendations and Rationale
 - Morbidity and Mortality Weekly Report 52 MMWR / January 25, 2013 / Vol. 62 / No. 3

Case 5



- Petechial
- Involves palms (and soles)

Case 5

Associated signs/sxs

- Fever: 3 days
- Signs of shock
- Headache
- Myalgias

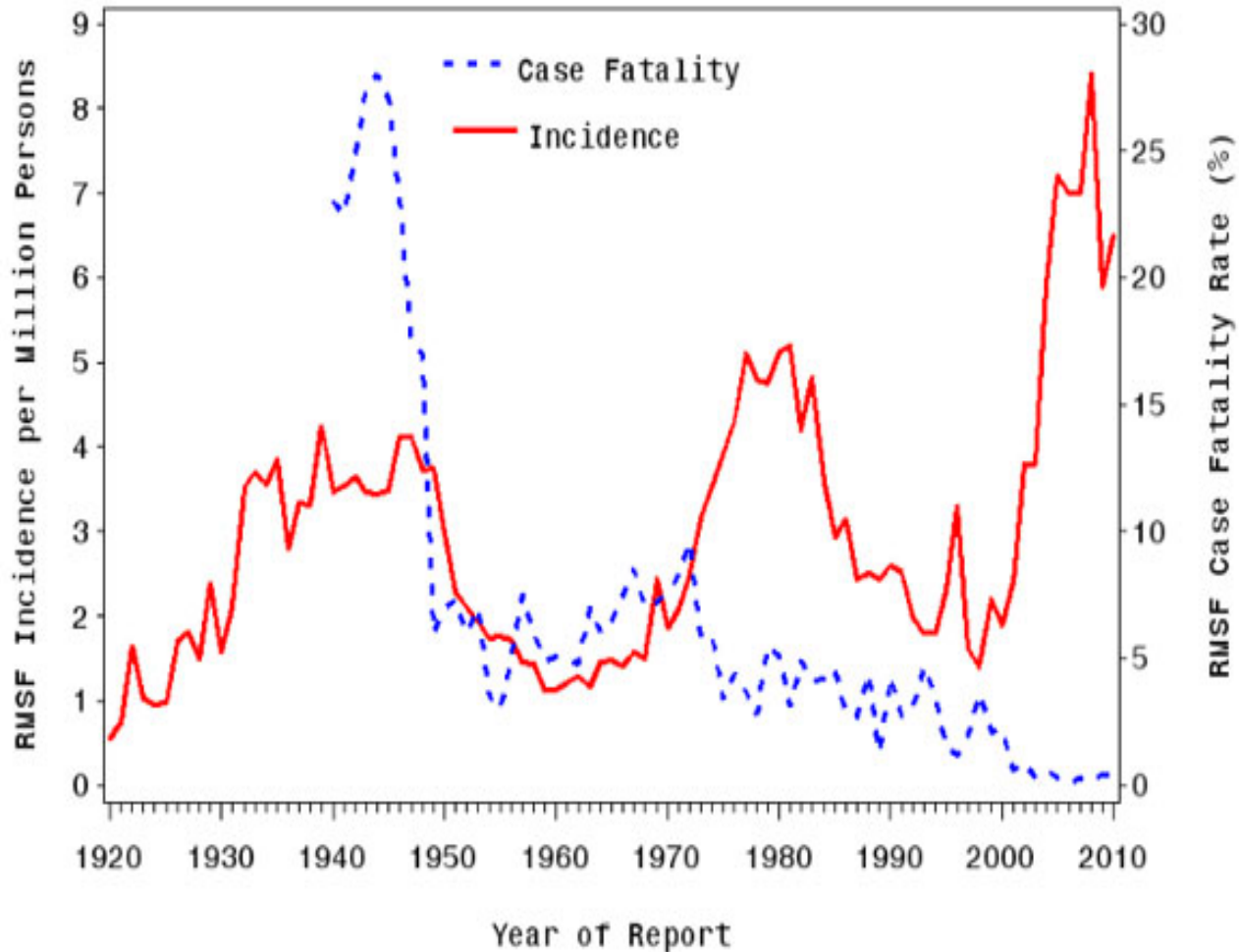
Exposures

- Summer
- Recent camping trip to Webster
- Removed a large tick

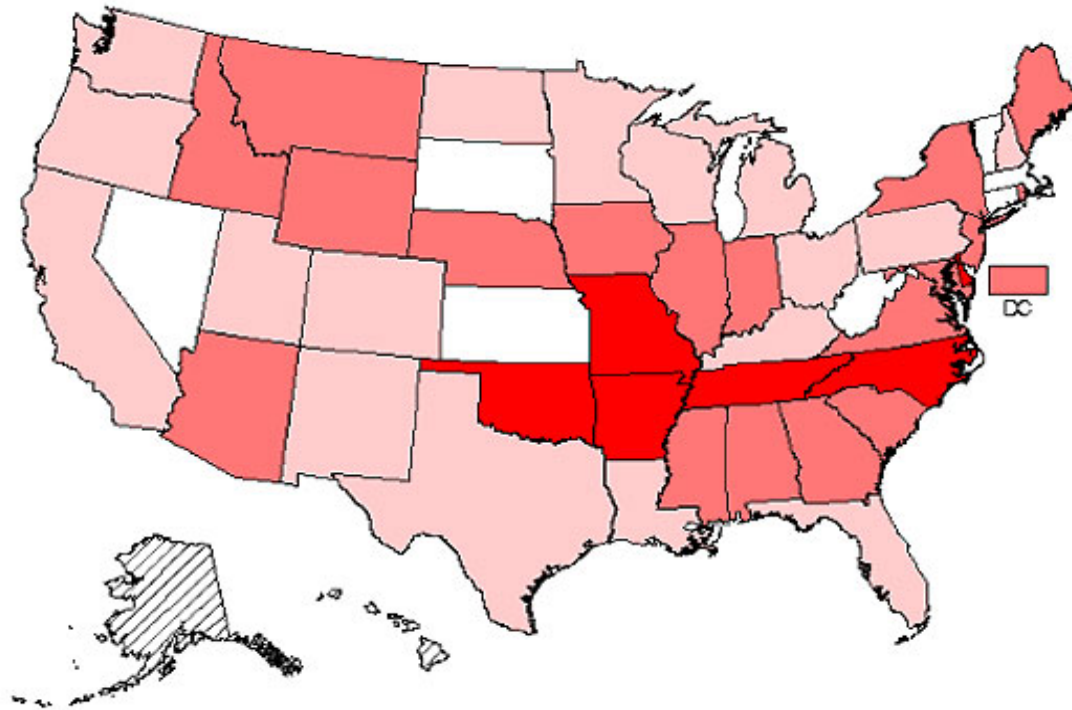
Rocky Mountain Spotted Fever

- *Rickettsia rickettsii*
- Tick borne (American dog, RM wood ticks)
- Rash spreads from wrists/ankles to palms/soles and trunk
- Endemic to East Coast (south and central)

RMSF: Incidence and case fatality from 1920-2010



RMSF



<http://www.cdc.gov/rmsf/stats/index.html#geography>

- CDC-National Notifiable Diseases Surveillance System

Case 6



- Diffuse
- Macular
- Erythematous
- Blanching
- Morbilliform
- Coalescent
- Swollen hands

Case 6

Associated signs/sxs

- Fever: 6th day
- Irritability:
- Bulbar conjunctivitis without exudate
- Cracked lips, beefy red (strawberry) tongue

Exposures

- None

Kawasaki Disease

- **Etiology:**
 - Unknown.
 - An infectious cause has been suspected but none has been identified
- **Epidemiology:**
 - Most cases occur in young children (80% before age 4 years)
 - Males outnumber females 1.6:1.
 - Most common in the winter and spring in the U.S.
 - Any ethnic group, those of Asian ancestry are at highest risk.
- **Clinical**
 - Small/medium-sized vessel vasculitis
 - Acute phase: high fever, rash, conjunctival hyperemia, cervical lymphadenopathy, redness of the oral and pharyngeal mucosa, “strawberry tongue”, and redness and swelling of the palms and soles.
 - Subacute phase >10 days: lower fevers, desquamation of the fingertips, thrombocytosis, arthralgia, and carditis.
 - Cardiac complications: coronary artery vasculitis may lead to aneurysms in 25% of patients, with risk of myocardial infarction and death.

Kawasaki Disease (*continued*)

- **Diagnosis:**

- Clinical diagnostic criteria:
 - a. Fever of 5 or more days' duration
 - b. Four of the following five conditions
 1. Conjunctivitis – bilateral, without exudate
 2. Rash
 3. Cervical Adenopathy >1.5cm
 4. Mucous membrane changes of the upper respiratory tract, such as injected pharynx; injected lips; dry, fissured lips; Strawberry tongue
 5. Changes in the Hands and feet, such as edema and erythema, with desquamation in the healing phase
 - c. Illness not explained by another disease (e.g. measles, TSS)
- Incomplete Kawasaki
- 2-3 clinical findings plus ≥ 3 lab abnormalities
 - WBC >15, anemia, platelets >450, \uparrow ALT, low albumin, sterile pyuria

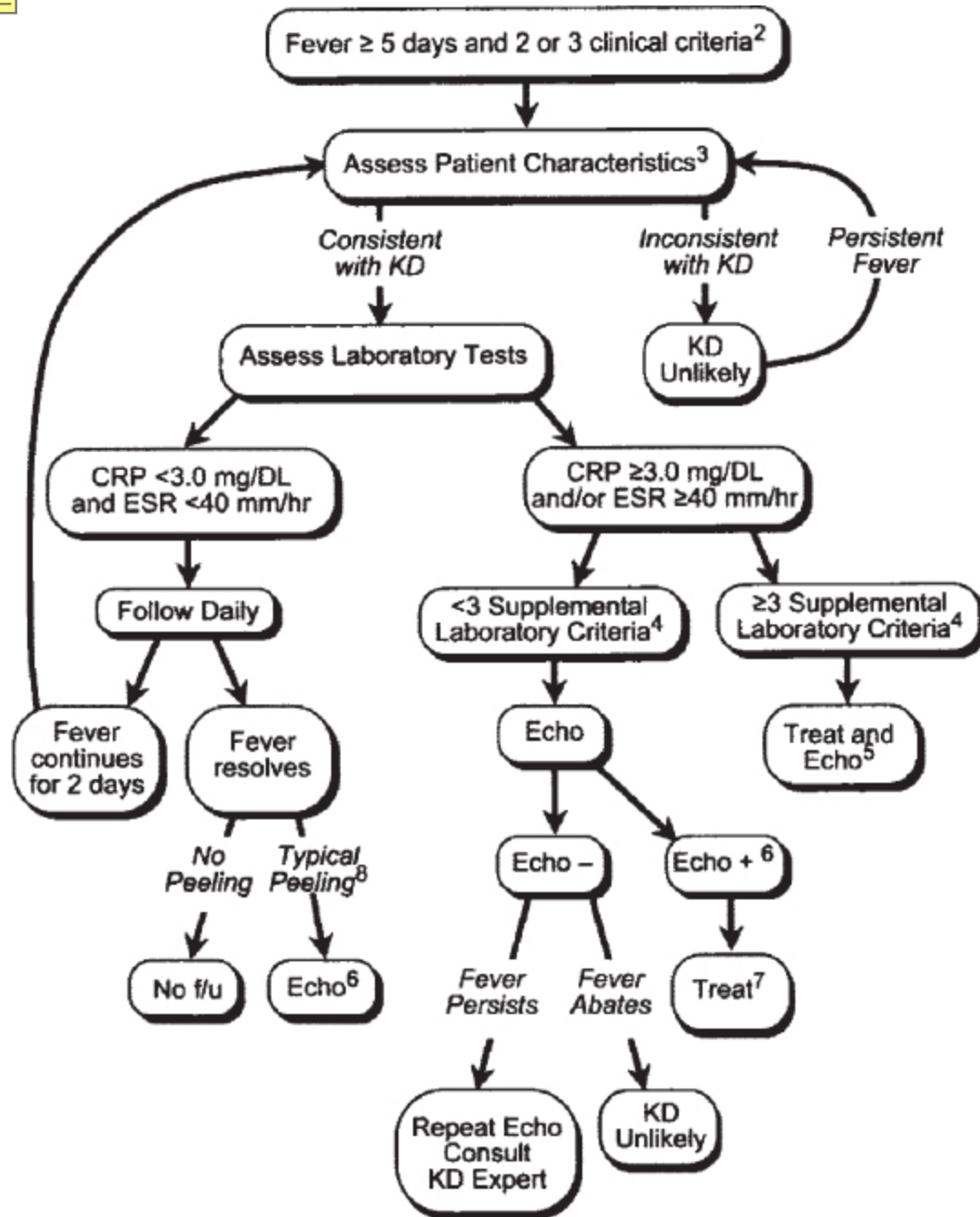
- **Therapy:**

- Intravenous immune globulin (IVIG) prevents coronary aneurysms.
- Aspirin is also given for its anti-inflammatory and anti-platelet effect.



小児皮膚病





- **Evaluation of suspected incomplete Kawasaki disease (KD)**

- (2) Infants ≤ 6 months old on day ≥ 7 of fever without other explanation should undergo laboratory testing and, if evidence of systemic inflammation is found, an echocardiogram, even if the infants have no clinical criteria.

- (4) Supplemental laboratory criteria include

- albumin ≤ 3.0
- anemia for age,
- elevation of ALT
- platelets after 7d > 450
- WBC > 15 000/mm³
- urine WBC > 10

- Reprinted from Newburger JW, et al. *Pediatrics*. 2004;114(6):17058-1733.

Table 1.9. Suggested Intervals Between Immune Globulin Administration and Measles Immunization (MMR or MMRV)

Indications or Product	Route	Dose		Interval, mo ^a
		U or mL	mg IgG/kg	
Tetanus prophylaxis (as TIG)	IM	250 U	10	3
Hepatitis A prophylaxis (as IG)				
Contact prophylaxis	IM	0.02 mL/kg	3.3	3
International travel	IM	0.06 mL/kg	10	3
Hepatitis B prophylaxis (as HBIG)	IM	0.06 mL/kg	10	3
Rabies prophylaxis (as RIG)	IM	20 IU/kg	22	4
Varicella prophylaxis (as VariZIG)	IM	125 U/10 kg (maximum 625 U)	20-40	5
Measles prophylaxis (as IG)				
Standard	IM	0.25 mL/kg	40	5
Immunocompromised host	IM	0.50 mL/kg	80	6
RSV prophylaxis (palivizumab monoclonal antibody) ^b	IM	...	15 mg/kg (monoclonal)	None
Cytomegalovirus Immune Globulin	IV	3 mL/kg	150	6
Blood transfusion				
Washed RBCs	IV	10 mL/kg	Negligible	0
RBCs, adenine-saline added	IV	10 mL/kg	10	3
Packed RBCs	IV	10 mL/kg	20-60	5
Whole blood	IV	10 mL/kg	80-100	6
Plasma or platelet products	IV	10 mL/kg	160	7
Replacement (or therapy) of immune deficiencies (as IGIV)	IV	...	300-400	8
Therapy for ITP (as IGIV)	IV	...	400	8
Therapy for ITP	IV	...	1000	10
Therapy for ITP or Kawasaki disease (as IGIV)	IV	...	1600-2000	11

Case 7



- Sandpapery
- Itchy (pruritic)
- Coalesced in the axilla



Case 7

Associated signs/sxs

- Sore throat
- Headache
- Abdominal pain

Exposures

- Winter

Scarlet Fever

- *Streptococcus pyogenes* (Group A Strep)
 - Delayed type reaction to erythrogenic toxin
- Face to trunk spread of rash
 - Circumoral pallor
 - Strawberry tongue
 - Desquamation



Clinical Practice Guideline for the Diagnosis and Management of Group A Streptococcal Pharyngitis: 2012 Update by the Infectious Diseases Society of America^a

Table 2. Antibiotic Regimens Recommended for Group A Streptococcal Pharyngitis

Drug, Route	Dose or Dosage	Duration or Quantity	Recommendation Strength, Quality ^a
For individuals without penicillin allergy			
Penicillin V, oral	Children: 250 mg twice daily or 3 times daily; adolescents and adults: 250 mg 4 times daily or 500 mg twice daily	10 d	Strong, high
Amoxicillin, oral	50 mg/kg once daily (max = 1000 mg); alternate: 25 mg/kg (max = 500 mg) twice daily	10 d	Strong, high
Benzathine penicillin G, intramuscular	<27 kg: 600 000 U; ≥27 kg: 1 200 000 U	1 dose	Strong, high
For individuals with penicillin allergy			
Cephalexin, ^b oral	20 mg/kg/dose twice daily (max = 500 mg/dose)	10 d	Strong, high
Cefadroxil, ^b oral	30 mg/kg once daily (max = 1 g)	10 d	Strong, high
Clindamycin, oral	7 mg/kg/dose 3 times daily (max = 300 mg/dose)	10 d	Strong, moderate
Azithromycin, ^c oral	12 mg/kg once daily (max = 500 mg)	5 d	Strong, moderate
Clarithromycin, ^c oral	7.5 mg/kg/dose twice daily (max = 250 mg/dose)	10 d	Strong, moderate

IDSA GUIDELINES

IDSA Guideline for GAS Pharyngitis • CID

Case 8



- Macular
- Cheeks
- Blanching
- Lacey (“reticular”)

Case 8

Associated signs/sxs

- Fever: 3 days low grade
- Rhinorrhea
- Vomiting and diarrhea

Exposures

- Daycare
- Spring

Parvovirus B19

- Erythema infectiosum
 - 5th's Disease
 - “Slapped cheeks”
 - Prodrome
 - Fever, rhinorrhea, nausea, vomiting
 - Rash
 - Slapped cheek with circumoral pallor
 - Lacey, reticular rash of trunk and extremities
 - Child improving when it appears
 - Immune mediated
- Aplastic Crisis in Sickle Cell
- Hydrops fetalis (non-immune) with intrauterine infection

- 9-month-old male was referred to the dermatology clinic for a rash involving his hands and feet. His skin eruption was associated with pruritus, and he had had low grade fevers and upper respiratory symptoms for 2 days. Physical examination revealed petechial, erythematous patches of the palms and soles (Figure 2). The remainder of his physical examination was unremarkable, including a normal oral mucosal examination and the absence of lymphadenopathy



- <http://www2.luriechildrens.org/ce/online/article.aspx?articleID=89>



gloves and socks syndrome

- Papular-purpuric gloves and socks syndrome (PPGSS)
- Purpuric erythema involving hands and feet (especially palms and soles) in a “glove and stocking” distribution
- Pruritus, tingling, and pain
- Sometimes oral ulcerative lesions
- Most show IgM antibodies to parvovirus B19
 - HHV6, HHV7, measles and CMV
- Low grade fever common, often developing 2 to 4 days following the onset of the rash

Case 9: Fever... then rash!



- Roseola infantum (exanthem subitum)
- HHV-6 (or HHV-7)
- Rash presents after 3-5 days of high fever
 - Other symptoms include URI, otitis, irritability, GI sx's, and febrile seizures

Case 10



- Scattered papules on erythematous base
- Palms and Soles
- Tender
- Ulcers on tongue and buccal mucosa

Case 10

Associated signs/sxs

- Poor feeding

Exposures

- Summer



Hand Foot and Mouth

- Coxsackie A
 - Picornavirus
 - Enterovirus
 - Polio
 - Non-polio: Coxsackie A and B, Enteroviruses, Echovirus,
- Young children
 - Transmitted via oral/nasal secretions
- Self limited

Severe Hand, Foot, and Mouth Disease Associated with Coxsackievirus A6 — Alabama, Connecticut, California, and Nevada, November 2011–February 2012

MMWR / March 30, 2012 / Vol. 61 / No. 12



Case 11



- Scattered and grouped vesicles
- Diffuse
- Erythematous base
- Crust

Case 11

Associated signs/sxs

Exposures

- Itchy/pruritic rash

- Unvaccinated



Varicella-zoster virus

- Primary infection: Chicken Pox
- Reactivated infection: Zoster
- Other manifestations
 - Meningitis and encephalitis
 - Disseminated disease in neonates/immunocompromised host
 - Hepatitis, pneumonitis
 - Bacterial (GAS) superinfection: Necrotizing Fasciitis and TSS
 - Reye syndrome: ASA use
- Droplet and airborne transmission
- Vaccine: Live attenuated
 - Breakthrough disease is milder with fewer complications
- Treatment: Acyclovir
- Prophylaxis: Acyclovir, VariZIG

Pre-vaccine (1995) Vs Now

- EACH YEAR, >3.5 MILLION CASES, 9,000 HOSPITALIZATIONS, AND 100 DEATHS ARE PREVENTED BY VARICELLA VACCINATION IN THE UNITED STATES.
- VARICELLA INCIDENCE IN 26 STATES, WHICH HAD ADEQUATE AND CONSISTENT REPORTING TO THE NNDSS DECLINED 82% FROM 2000 TO 2010.
- IN PEOPLE <20 YEARS, HOSPITALIZATION RATES DECLINED BY APPROXIMATELY 95%.
- VARICELLA DEATHS DECLINED BY 98.5% IN CHILDREN AND ADOLESCENTS <20 YEARS .
- VARICELLA AMONG HIV-INFECTED CHILDREN DECLINED 63%.
- VARICELLA INCIDENCE AMONG INFANTS, A GROUP NOT ELIGIBLE FOR VARICELLA VACCINATION, DECLINED BY 90%.
- <http://www.cdc.gov/chickenpox/surveillance.html>

Varicella vs. Smallpox



- Vesicles different stages
 - Successive crops appear over 4 days
 - Crust by day 6

Gianotti-Crosti syndrome



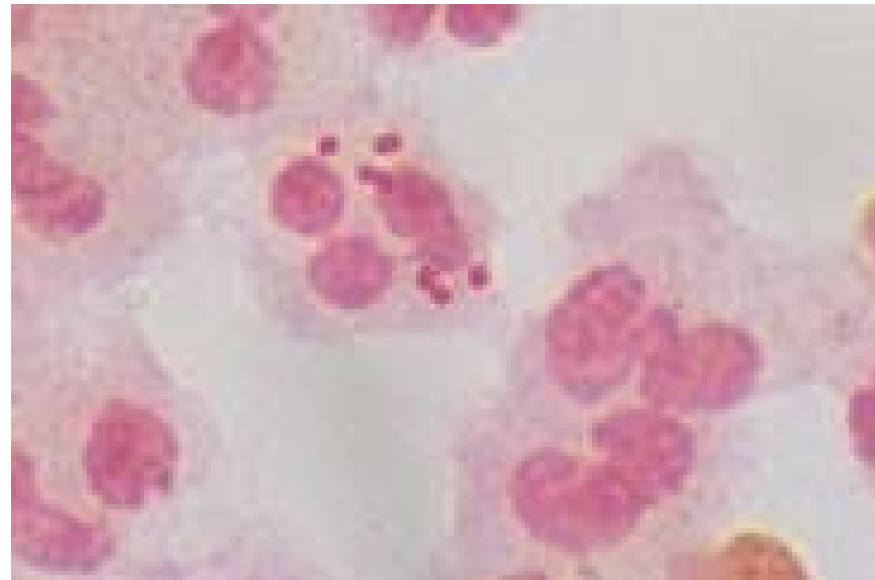
Summary

- Fever and rash syndromes can often be diagnosed by
 - History of Present Illness
 - Past Medical History
 - Exposure History
- Keep a high index of suspicion for life-threatening illnesses which may present early with non-specific findings
 - Meningococemia
 - Toxic Shock Syndrome
 - Rocky Mountain Spotted Fever
- Remember a vaccine history
 - Meningococcus
 - Measles
 - Varicella
- Remember non-infectious syndromes
 - Kawasaki Disease
 - Stevens-Johnson Syndrome

- An 18 yo girl presents to the emergency department with high fever, vomiting, diarrhea, muscle aches, dizziness and a rash covering her stomach and back. Vital signs indicate hypotension. The patient's mother reports that her daughter had a "major allergic reaction" to an antibiotic given around age 2 years for an ear infection. Vigorous administration of intravenous fluids is initiated. What empiric antibiotic(s) are most appropriate for this patient?
- A: Vancomycin
- B: Clindamycin
- C: Doxycycline
- D: Azithromycin
- E: Penicillin

- A 4 yo is brought to your clinic with primary complaint of high fever, runny nose, and general malaise. He also has diffuse rash. His parents report that he has no major medical history. The family emigrated from Vietnam about 5 months ago. The child has not been seen by a health care provider prior to this time. On examination you also note bluish-gray lesions in side the mouth. What is the most common complication associated with this presentation?
 - A: Pneumonia
 - B: Death
 - C: Encephalitis
 - D: Otitis media
 - E: Diarrhea

- A teenager presents to the emergency department complaining of fever, headache, body aches and vomiting. Empiric antibiotics are initiated after blood cultures are drawn. In the lab, the following is noted on a blood smear which has been gram stained.
-
- What is the most common neurologic sequelae of this infection?
- A: Cerebral thrombosis
- B: Ataxia
- C: Blindness
- D: Deafness
- E: Quadraparesis



- A 46 year old male presents to your preceptor's office with complaint of fever and rash. He tells you he was in North Carolina about 10 days ago. After returning from a hike with friends, he noted a tick on his left arm. This was properly removed without any further local symptoms. Over the past 3 days he has had fever, headache and general malaise. Yesterday he woke with a red flat rash across his wrists and ankles. He notes the rash today on his hands and bottoms of his feet. Some of the "early spots" now seem much darker. What is the target cell of the causative organism in this case?
 - A: Vascular endothelium
 - B: Dermal lymphocytes
 - C: Blood monocytes
 - D: Tissue macrophages
 - E: Red blood cells

- A 6 yo female presents to her pediatrician's office with chief complaint of fever. Mom reports that the fever has been ongoing for the past 10 days and recurs as soon as "fever medications" wear off. Mom has also noticed that the child has very red eyes. On examination you note the following:
 - What is a critical test to obtain in the evaluation/management of this patient?
 - A: Chest xray
 - B: Blood cultures
 - C: Lumbar pucture
 - D: Throat culture
 - E: Echocardiogram



- A 32 yo woman presented to her primary care doctor reporting pain and swelling in her hands and feet. This has been ongoing for the past 2 weeks. She does note that there is some decreased ability to move the affected joints. On exam, the swelling is symmetrical in distribution and they are slightly red and swollen. She has not had any other symptoms, except a fever 10 days or so ago, which she attributed to the illness her young children had at the time. What is the most likely symptom her children exhibited at that time?
 - A: Vomiting
 - B: Wheezing
 - C: Red cheeks
 - D: Sore throat
 - E: Cough

- An 8 month old baby girl is brought to her pediatrician's office with mom reporting high fever for the past 3 days. She become alarmed when the baby broke out in a diffuse skin rash today. The child has never had rash like this before.

What is the most likely causative organism responsible for this child's illness?

- A: Adenovirus
- B: HHV6
- C: Parainfluenza
- D: Rotavirus
- E: RSV



- This child is brought to the pediatrician's office with fever and rash. The fever started 2 days ago, then the rash began yesterday and seems to be spreading. The child is quite itchy and fussy, but is eating and drinking well. She does not have many mucosal lesions. No cough or respiratory symptoms otherwise. The child has no medical history otherwise. What treatment is recommended in this situation?
 - A: Acyclovir
 - B: Amoxicillin
 - C: Oseltamivir
 - D: Bactrim
 - E: Supportive care




Erythema marginatum



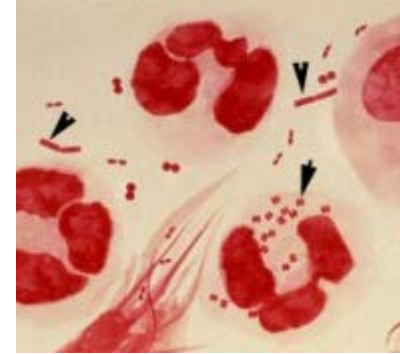


Other non-suppurative complication of GAS

- Toxigenic
 - Scarlet fever and TSS
- Immunologic
 - Rheumatic Fever
 - Mediated by antibody to M-protein
 - J-Joints-Polyarthritis
 - O--Carditis
 - N-Subcutaneous Nodules
 - E-Erythema marginatum
 - S-Sydenham's chorea
 - Glomerulonephritis
 - Anti-streptolysin O (ASO) titers to help diagnose



Neisseria



- Gram negative diplococci

- *N. meningitidis*

- Ferments maltose and glucose
- IgA protease
- Polysaccharide capsule
- Vaccine
- Respiratory/oral secretions
- Meningitis, meningococemia, Waterhouse-Friderichsen syndrome

- *N. gonorrhoeae*

- Ferments glucose
- IgA protease
- No polysaccharide capsule
- No vaccine
- Genital secretions/STI
- Gonorrhea, pelvic inflammatory disease, septic arthritis, neonatal conjunctivitis



Other Rickettsial Diseases

- *R. typhi*
 - Endemic typhus
 - Fleas
- *R. prowazekii*
 - Epidemic typhus
 - Human body louse
- *Ehrlichia*
 - Ehrilichiosis
 - Tick
- *Coxiella burnetii*
 - Q-fever
 - Inhaled aeresols from infected animal
- Diagnosis: Serology
 - Weil Felix Reaction: antirickettsial antibodies cross react with *Proteus* antigen. Negative for Q-fever
- Treatment for all: Tetracyclines (Doxycycline)

Case 12



- Localized
- Red
- Swollen
- Pustule
- Abscess
- Fluctuant
- Tender
- Warm





- Cluster of pustules

Case 12: Associated signs/symptoms

- Fever: Mild
- Signs of shock: No
- Irritability: No
- Headache: No
- Respiratory symptoms: No
- Eye changes: No
- mucous membranes: No
- Joint pain or swelling: No
- Other: **Pain at site**

Case 12: Exposures

- Sick contacts
- Medications
- Vaccines
- Daycare
- Travel
- Season
- Outdoor/vectors
- Menses/Tampon use
- Family member prior abscess
- No
- UTD
- Yes
- No
- Fall
- No
- No



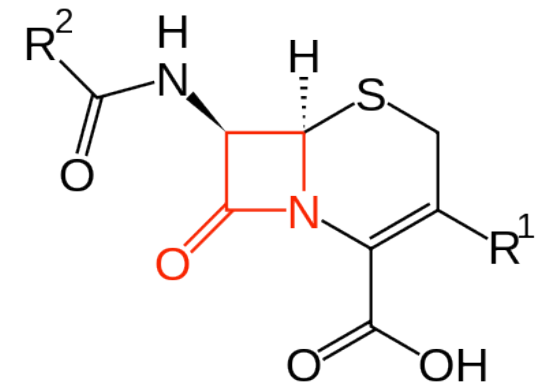
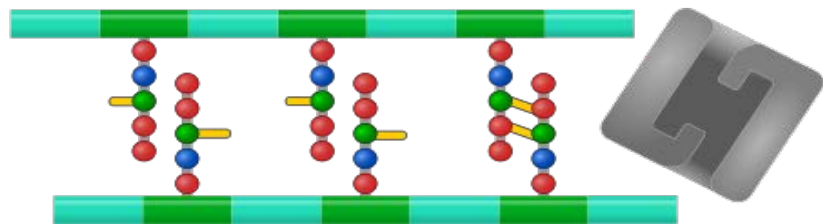
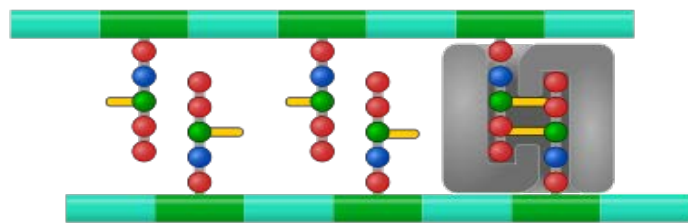
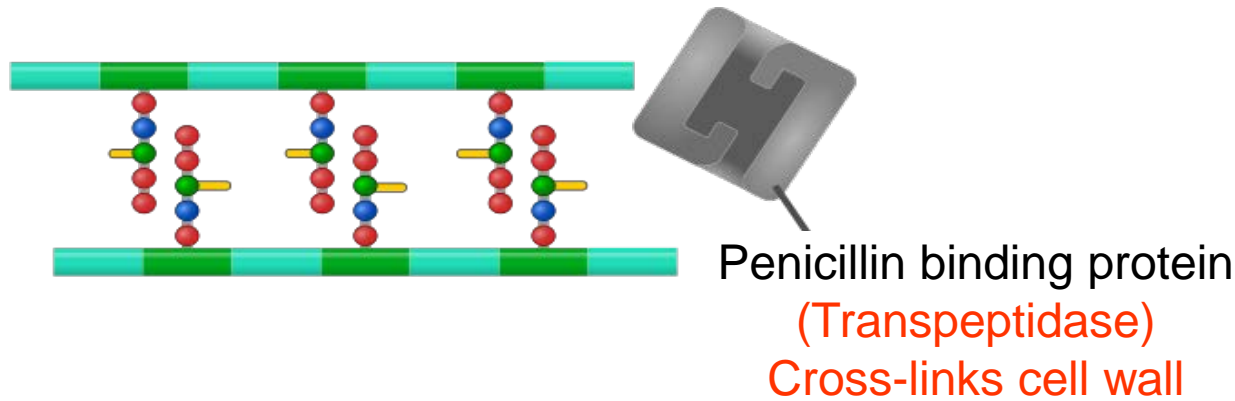
Abscess

Staphylococcus aureus

MRSA

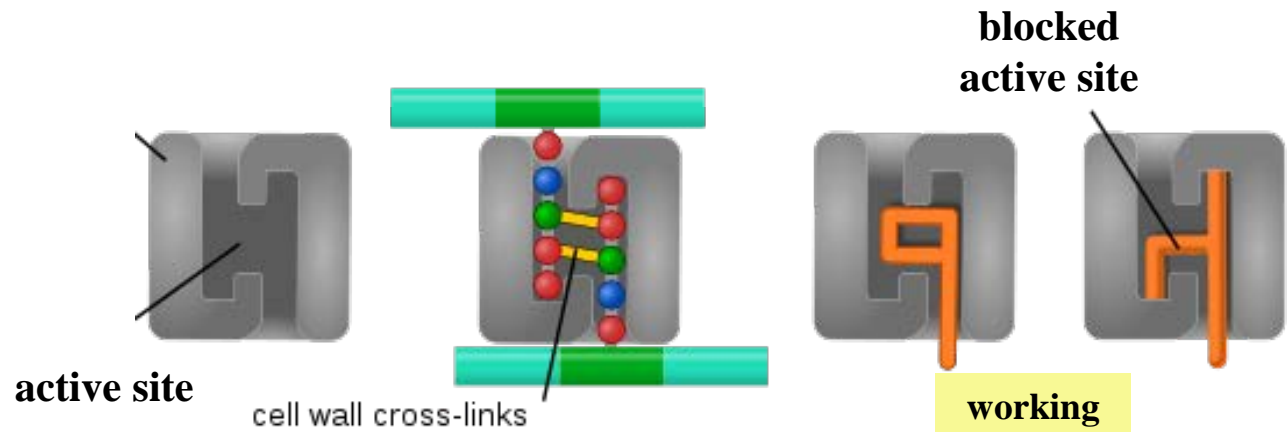
- Penicillin
 - Original β -lactam antibiotic
 - Bactericidal
 - Resistance via Penicillinase
 - Toxicity: Hypersensitivity, hemolytic anemia
- Antistaphylococcal penicillin
 - Penicillinase-resistant, “bulkier” R group
 - Methicillin, nafcillin, dicloxacillin, oxacillin
 - Toxicity: Hypersensitivity, meth – interstitial nephritis

β -Lactams block cell wall synthesis by **blocking penicillin binding protein active site**

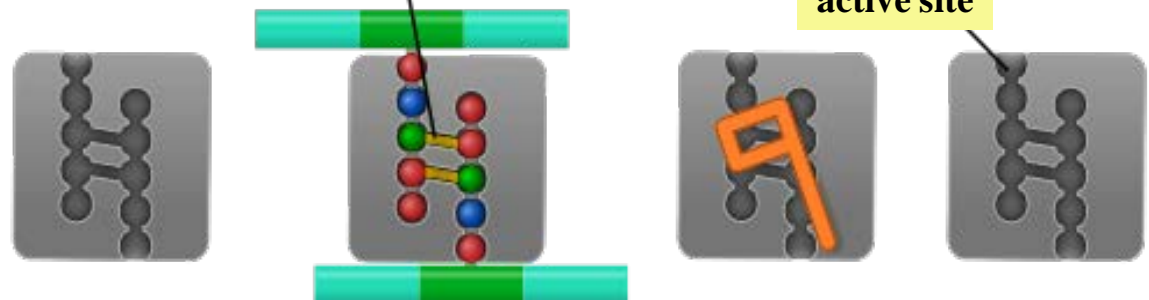


MRSA encodes altered PBP (PBP2a) conferring β -lactam resistance

Wild type
PBP



PBP2a



MRSA

- Resistant to anti-staph PCNs and cephalosporins
- Hospital-acquired
 - Vancomycin
 - Inhibits cell wall mucopeptide by binding D-ala D-ala
- Community-associated
 - Recent epidemic
 - >90%: skin/soft tissue infections
 - Invasive infections
 - Necrotizing pneumonia, bone and joint, bacteremia
 - Susceptible to :
 - Clindamycin: Protein synthesis inhibitor (50S)
 - TMP/Sulfa:
 - Tetracycline: Protein synthesis inhibitor (30S)

