Introduction to Communicable Disease Surveillance and Investigation in North Carolina

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North Carolina Public Health

nc department of health and human services

Invasive Bacterial Diseases

Dr. Zack Moore, NC DHHS, DPH,
Epidemiology Section, Communicable
Disease Branch

North Carolina Public Health

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Learning Objectives

1. Recognize the public health significance of invasive bacterial diseases
2. Be able to locate control measure guidance for these diseases
3. Known which invasive bacteria must be sent to the state lab for serotyping

Conditions Covered

- *Haemophilus influenzae* invasive disease
- Invasive meningococcal disease
- Pneumococcal meningitis
- Group A streptococcal invasive disease / toxic shock syndrome

Invasive Disease

- Isolation from a normally sterile site
  - Blood*
  - CSF*
  - Joint fluid
  - Bone
  - Pleural fluid
  - Pericardial fluid

Meningococcus, Pneumoccocus, Haemophilus: Similarities

- Colonize the upper respiratory tract
- Person to person spread
  - Respiratory droplets, oral secretions
- Vaccine-preventable
- Can invade after viral infection
  - Secondary bacterial infections

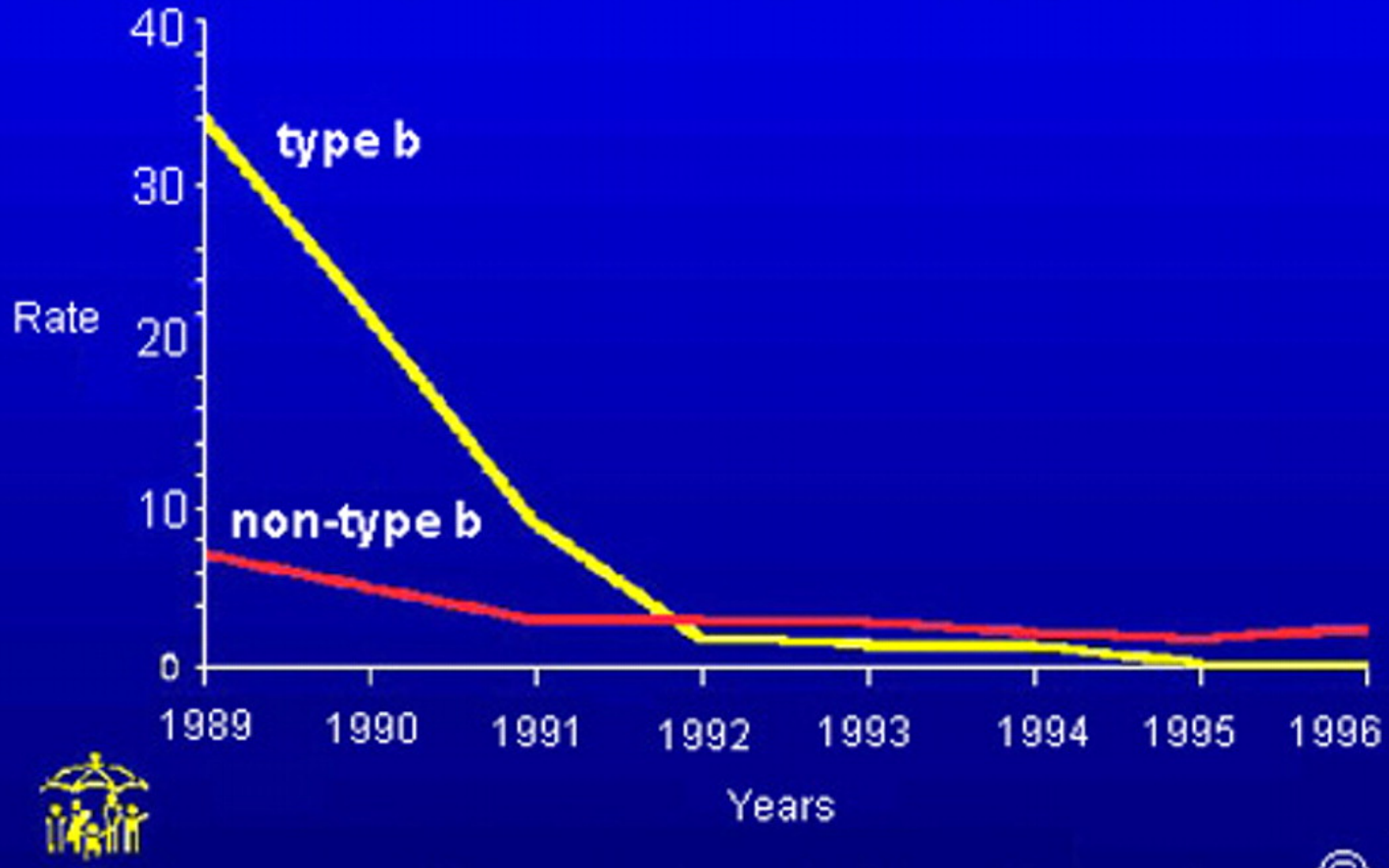
Haemophilus influenzae: Overview

- Clinical syndromes
  - Invasive: Pneumonia, meningitis, etc.
  - Non-invasive: Ear, eye, sinus infections
- Serotypes
  - a-f (capsule)
  - Nontypeable (no capsule)
- All serotypes can cause invasive disease
  - *Haemophilus influenzae* serotype b (Hib) is the most virulent

Haemophilus influenzae Type b

- Leading cause of bacterial meningitis in children < 5 before vaccination
- 4–5% of cases were fatal
- 20% of children had permanent sequelae

Haemophilus influenzae type b (Hib) and non-type Invasive Disease, per 100,000 Population, United States, 1989-1996*



*For children aged <6 years; calculated from four active laboratory-based surveillance areas.

Haemophilus influenzae: Control

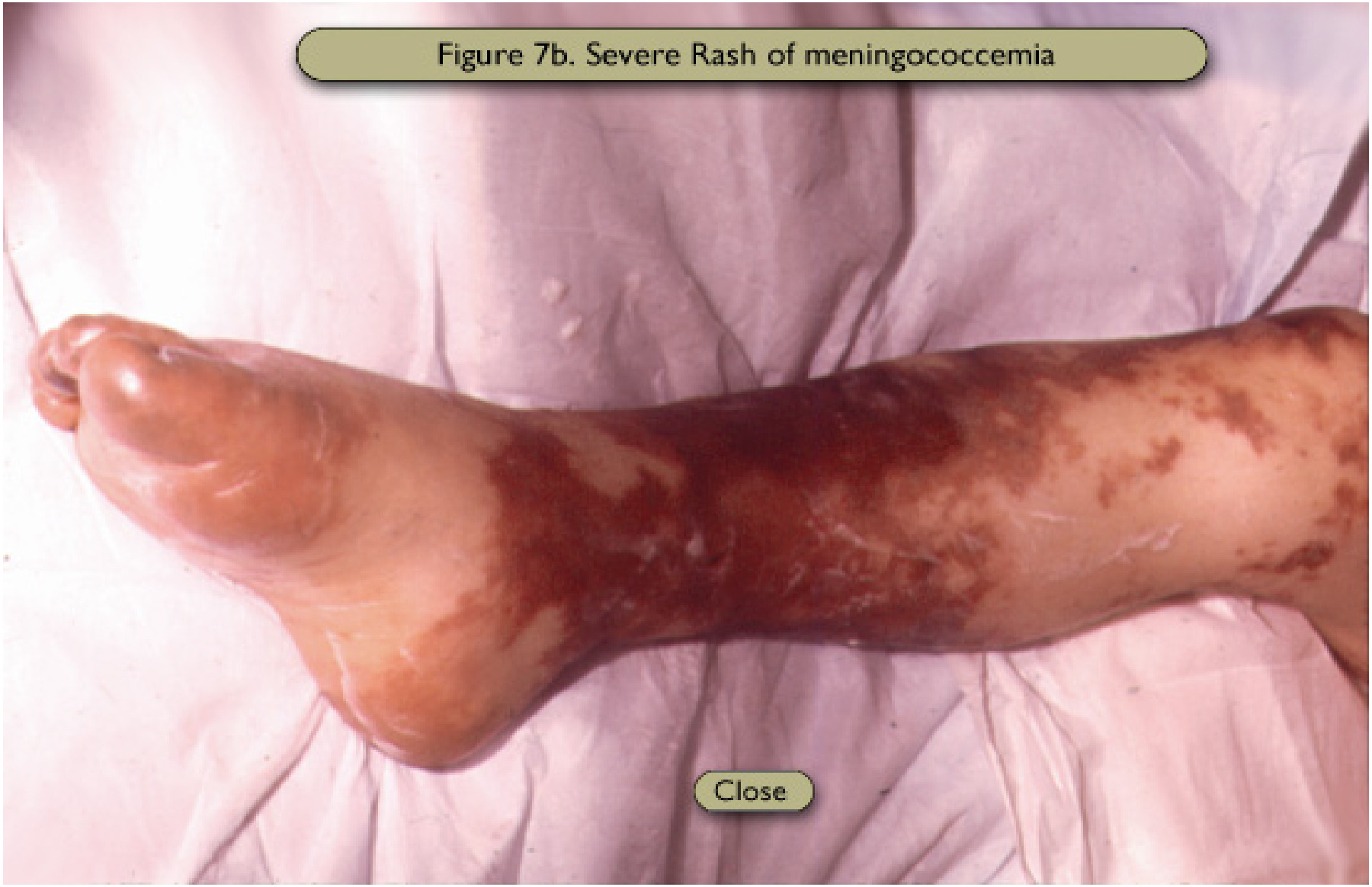
- Hib vaccine
- Antibiotic prophylaxis only for type b (Hib); only recommended for households with
  - Under-immunized child <4
  - Immunocompromised child
- Do not assume type b unless patient at increased risk

Haemophilus influenzae: Reporting

1. H. flu is not influenza
2. All serotypes are reportable (if invasive)
3. All isolates from normally sterile sites must be serotyped
4. Positive latex agglutination tests (CSF) also reportable

Neisseria meningitidis (Meningococcus)

- Several clinical syndromes
  - Meningitis, meningoccemia
- Responsible for sporadic cases and outbreaks
- Many serogroups
  - A, B, C, Y, W-135
- Vaccine available
  - All children 11–18
  - Adults at increased risk



Source: National Foundation for Infectious Diseases, http://www.nfid.org/library/meningococcal/fs_should_know.html

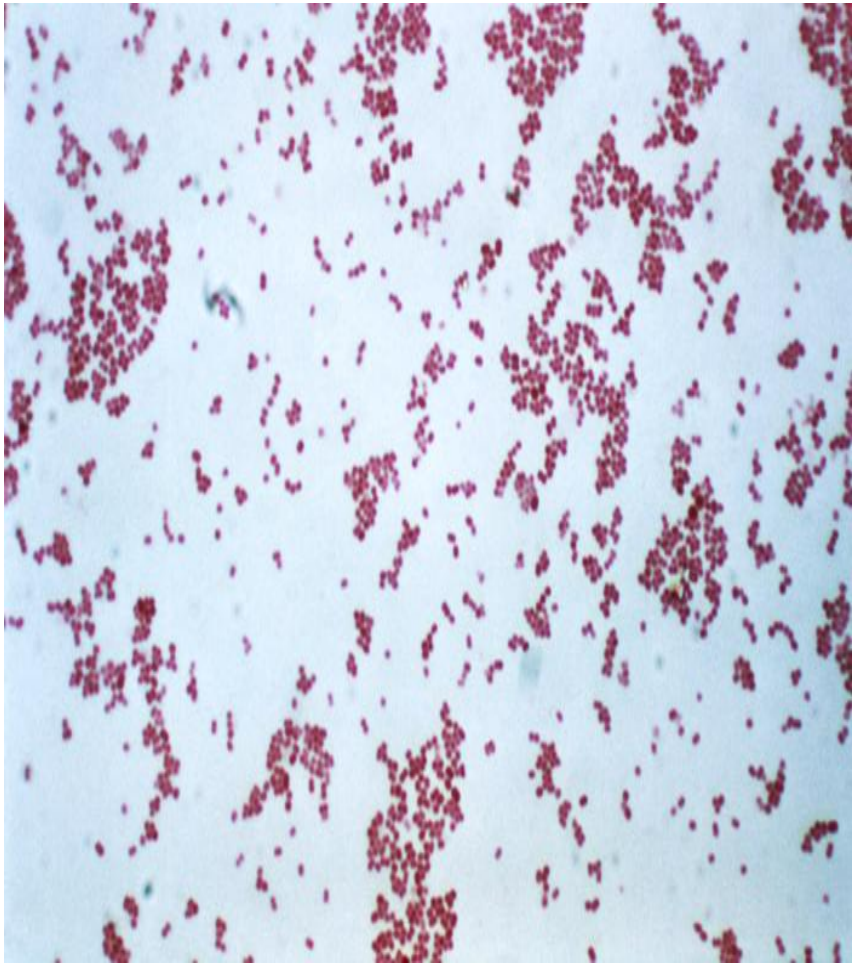
Meningococcal Disease: Control

- Antibiotic prophylaxis for close contacts
  - Household contacts
  - Childcare contacts
  - Direct exposure to oral secretions

- Timing of prophylaxis
  - Infectious 7 days before onset–24 hours after treatment
  - Prophylaxis within 24 hours after identification of index patient if possible; limited value if started >14 days after exposure

Meningococcal Disease: Reporting

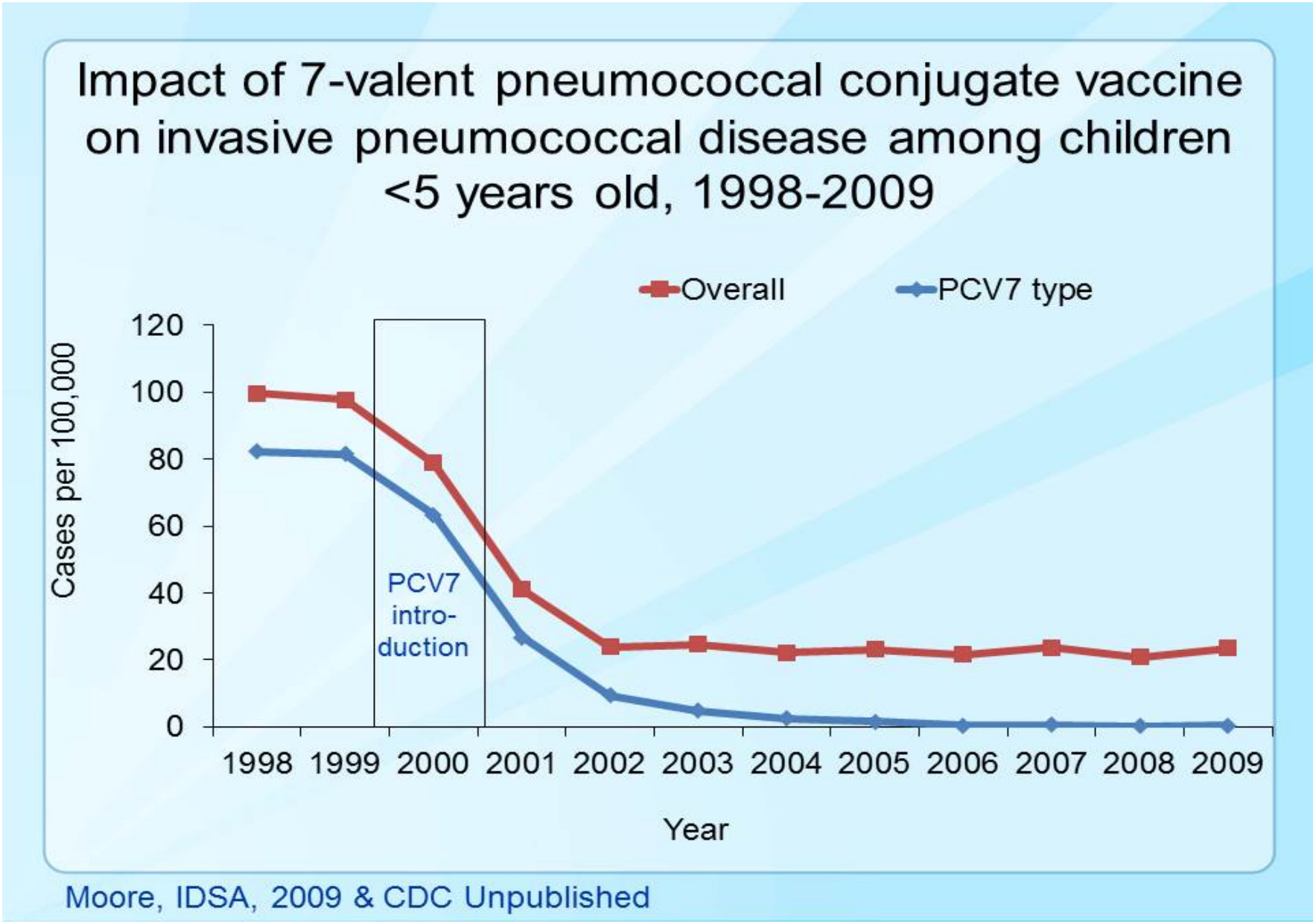
- Reportable without positive culture if
  - Gram negative diplococci from sterile site
  - Purpura fulminans
- Isolates from normally sterile sites must be serogrouped



CDC Public Health Image Library

Streptococcus pneumoniae (Pneumococcus)

- Many clinical syndromes
- Most prevalent during winter months
- High risk populations
  - Children ≤2
  - Adults ≥65
  - Chronic medical conditions
- Many serotypes
- Vaccines
  - PCV13 (Prevnar™)
  - PPSV23



http://www.cdc.gov/pneumococcal/surveillance.html

Pneumococcal Disease: Reporting

- Only one invasive pneumococcal disease reportable in NC: Pneumococcal meningitis

- Antibiotic prophylaxis rarely indicated

Pneumococcal Meningitis: Case Definition

Confirmed:

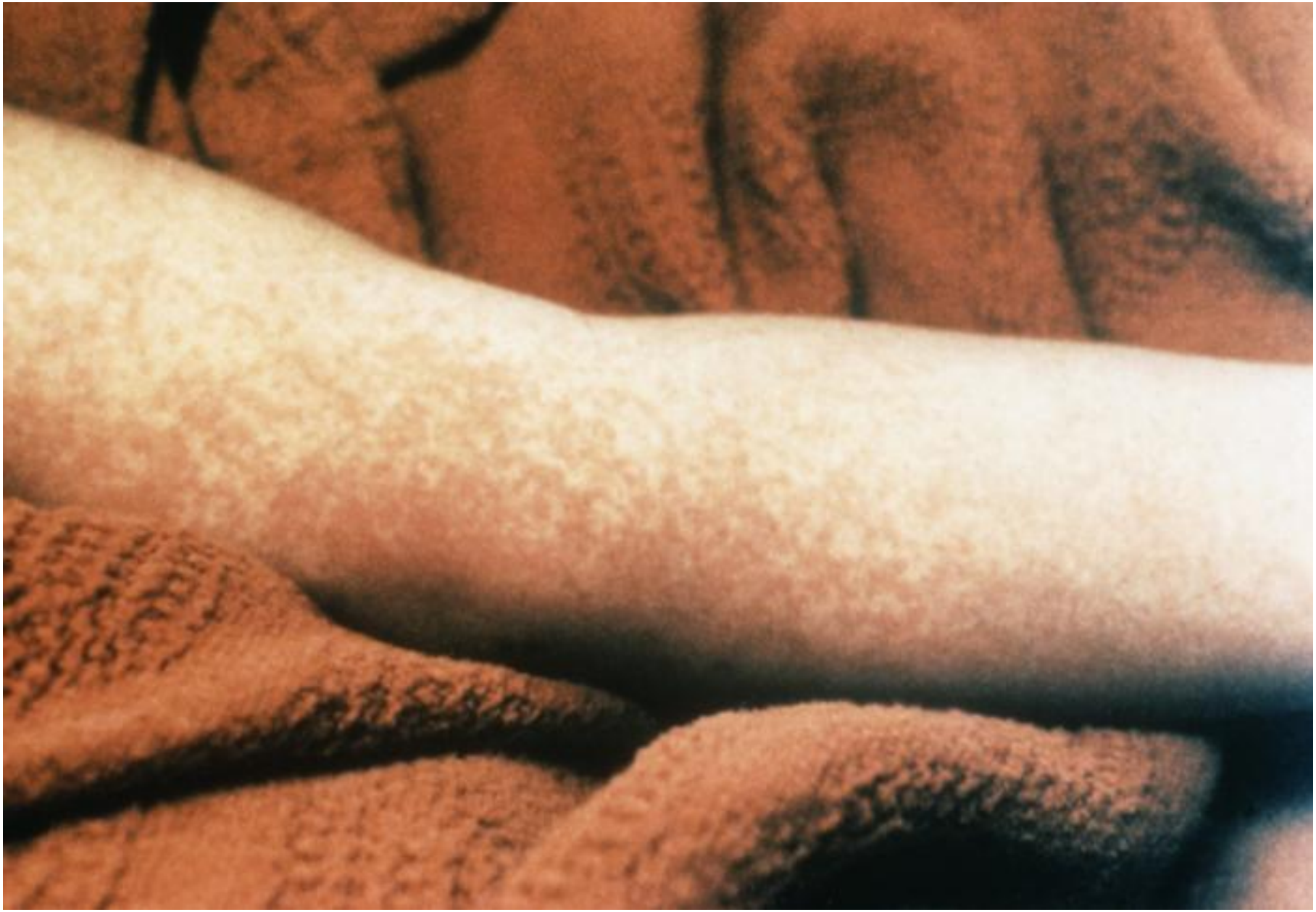
- Isolation of *S. pneumoniae* from cerebrospinal fluid (CSF)

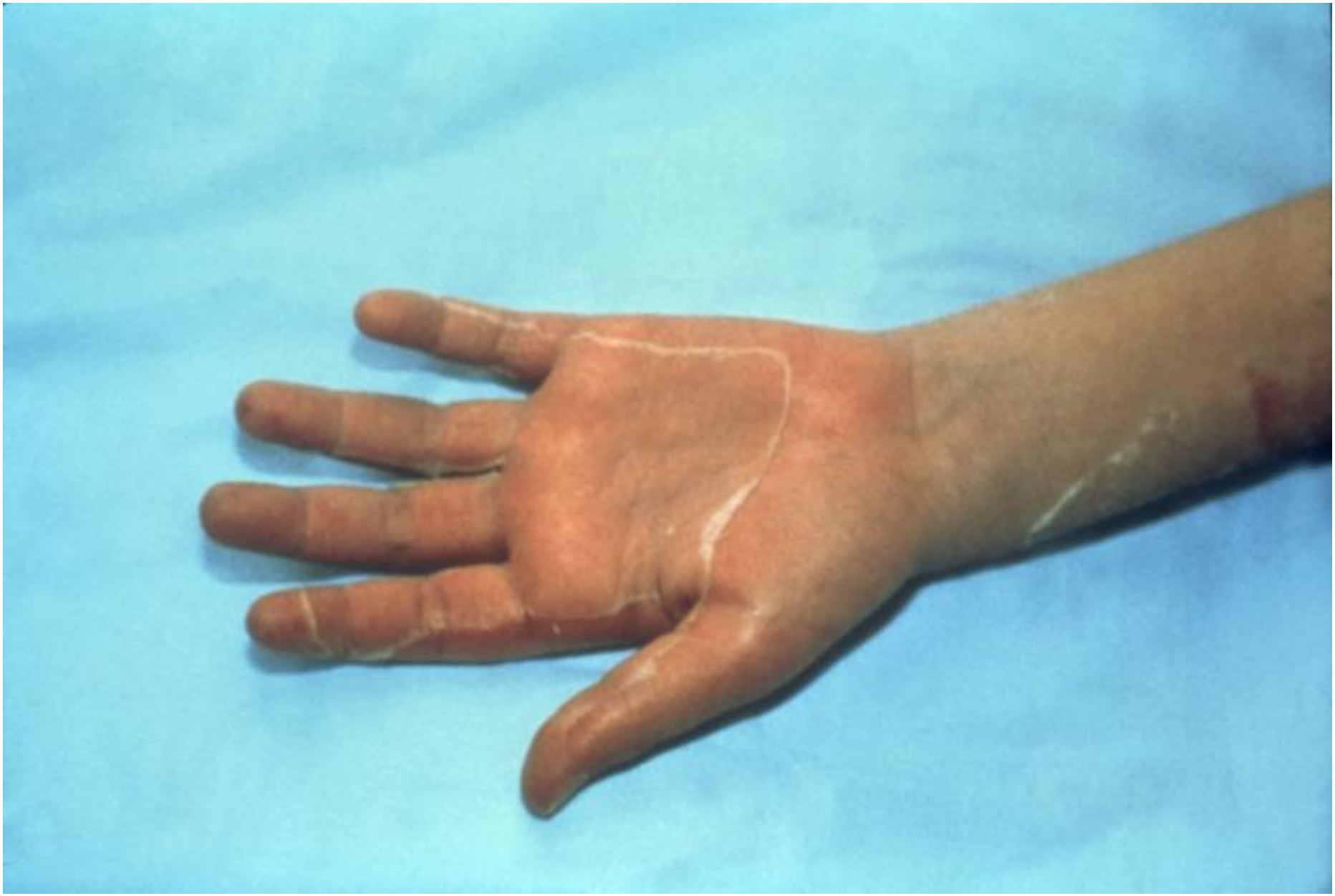
Probable:

- Clinically compatible case with a laboratory-confirmed culture of *S. pneumoniae* from another normally sterile site other than CSF, **OR**
- Clinically compatible case with other supportive laboratory findings and no other specific etiology identified

Group A Strep Invasive Disease

- Streptococcal toxic shock syndrome (STSS)





Group A Strep Invasive Disease

- Streptococcal toxic shock syndrome (STSS)
- Necrotizing fasciitis
- Other clinical syndromes
  - Myositis/muscle infection
  - Bone/joint infections
  - Pneumonia
  - Bacteremia associated with skin/wound infection

Group A Strep: Reporting

- Group A strep = *Streptococcus pyogenes* = Group A beta-hemolytic strep (GABHS)

- Antibiotic prophylaxis not routinely recommended
  - Consider for household contacts at increased risk for invasive disease
  - Outbreak settings

Group A Strep: Special Concerns

- Post-surgical and post-partum infections
  - Surgery or delivery ≤7 days before culture
- Group A strep in long-term care
  - High morbidity and mortality
  - Rapid spread
  - Specific investigation and control measures available from CDB

Conclusions

- Invasive bacterial diseases are an important cause of illness and death
- Public health plays important role in prevention and control
  - Vaccination
  - Education
  - Infection control
  - Prophylaxis

References

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- CDC. Prevention of invasive group A streptococcal disease among household contacts of case patients and among postpartum and postsurgical patients: Recommendations from the Centers of Disease Control and Prevention. Clin Infect Dis 2002;35:950-9.