

Group A Streptococcus (Invasive)

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Invasive disease due to group A streptococcus (GAS) is caused by the bacterium *Streptococcus pyogenes*. More than 100 distinct serotypes have been identified based on antigenic differences in the surface M-protein, which is the major virulence factor for these bacteria. More recently, molecular typing (genotyping) based on sequence analysis of the *emm* gene, which encodes the M-protein, has been used.

B. Clinical Description

Pharyngitis (strep throat) is the most common clinical syndrome resulting from infection with GAS. Skin infections (impetigo or pyoderma) are also common. Infrequently, however, GAS may become invasive and cause more severe illness. Invasive GAS infections may manifest as any of several clinical syndromes, most commonly including: 1) bacteremia in association with skin/soft tissue infection, 2) bacteremia alone, 3) pneumonia, 4) necrotizing fasciitis (colloquially referred to as “flesh-eating bacteria”), and 5) streptococcal toxic shock. The case-fatality rate for invasive GAS infection is approximately 15 percent.

C. Reservoirs

Humans are the only reservoir for *S. pyogenes*.

D. Modes of Transmission

GAS is spread person-to-person through direct contact with respiratory secretions of infected or colonized persons, or through direct contact with skin lesions of infected persons. Asymptomatic pharyngeal carriage occurs among all age groups but is most common among children. Invasive disease may result from penetration of GAS through breaks in skin (e.g. bites, burns, traumatic wounds, varicella lesions) or through penetration of intact mucous membranes. The specific portal of entry is unknown in the majority of cases of invasive GAS disease. Subsequent invasive GAS infections among household contacts of index cases of invasive GAS are rare. In the healthcare setting, colonized (anus, vagina, throat, or skin) healthcare workers may spread GAS to surgical and obstetrical patients.

E. Incubation Period

The incubation period for GAS pharyngitis is usually 2 to 5 days; for impetigo it is believed to be 7-10 days. For invasive GAS disease, the incubation period is variable.

F. Period of Communicability or Infectious Period

Communicability of patients with GAS pharyngitis is highest during acute infection, and in untreated people, gradually diminishes over a period of weeks. Patients are no longer contagious within 24 hours after initiation of appropriate antimicrobial therapy. Among persons with asymptomatic pharyngeal carriage of GAS, the risk of transmission to others is believed to be minimal, but carriage may persist for months. Untreated purulent GAS skin lesions may be contagious for weeks or months.

Colorado Communicable Disease Manual

ISSUED: 3/10/2005

REVISED: 3/10/2005

PAGE: 2

SUBJECT: Group A Streptococcus

G. Epidemiology

Invasive GAS is only reportable in the five-county Denver metropolitan area (Adams, Arapahoe, Denver, Douglas, and Jefferson counties) as part of CDPHE's Emerging Infections Program, active surveillance for invasive bacterial infections. Invasive GAS is reported throughout the year, with slightly fewer cases in the summer months. From 2002 through 2004, a median of 129 cases (range: 128 –132) was reported annually for a rate of 5.8 cases per 100,00 population. Most cases are ≥ 20 years of age.

Colorado invasive GAS statistics are available at the CDPHE website:

www.cdphe.state.co.us/dc/CODiseaseStatistics/index.html

Risk factors for invasive GAS include: older age, cancer, heart disease, diabetes mellitus, HIV infection, injection drug use, and recent varicella infection.

2) CASE DEFINITION

Clinical Description

Invasive GAS infections may manifest as any of several clinical syndromes, most commonly including: 1) bacteremia in association with skin/soft tissue infection, 2) bacteremia alone, 3) pneumonia, 4) necrotizing fasciitis (colloquially referred to as "flesh-eating bacteria"), and 5) streptococcal toxic shock.

Postpartum invasive GAS:

Isolation of GAS during the postpartum period, from either a sterile site or a wound infection, in association with a clinical postpartum infection (e.g., endometritis). The postpartum period of interest includes all inpatient days and the first seven days after discharge.

Postsurgical invasive GAS:

Isolation of GAS during the hospital stay or the first seven days after discharge, from a sterile site or a surgical wound, in a postsurgical patient for whom the indication for surgery was not a preexisting GAS infection.

Laboratory Criteria for Diagnosis

Isolation of GAS (*S. pyogenes*) from a normally sterile site (e.g., blood or cerebrospinal fluid or, less commonly, joint, pleural, or pericardial fluid).

Case Classification

Probable: A clinically compatible postpartum or postsurgical case in which GAS is isolated from a wound (and not from a normally sterile site).

Confirmed: A clinically compatible case that is laboratory confirmed.

3) REPORTING CRITERIA

What to Report to the Colorado Department of Public Health and Environment (CDPHE) or local health agency

- Confirmed invasive GAS cases from Adams, Arapahoe, Denver, Douglas, and Jefferson counties.

Colorado Communicable Disease Manual

ISSUED: 3/10/2005

REVISED: 3/10/2005

PAGE: 3

SUBJECT: Group A Streptococcus

- Invasive GAS cases should be reported within 7 days of diagnosis.
- Cases should be reported using the Colorado Electronic Disease Reporting System (CEDRS), or fax or telephone to CDPHE or local health departments. See below for phone and fax numbers.
- Suspected invasive GAS outbreaks should be reported to CDPHE or local health departments within 24 hours.

Purpose of Surveillance and Reporting

- To monitor epidemiologic characteristics and trends in disease incidence
- To identify potential outbreaks and hospital-acquired infections

Important Phone Numbers and Web Resources

- CDPHE Communicable Disease Epidemiology Program
 - Phone: 303-692-2700 or 800-866-2759
 - Fax: 303-782-0338
 - After hours: 303-370-9395
- CDPHE Microbiology Laboratory: 303-692-3480
- Communicable Disease (CD) Manual website:
http://www.cdphe.state.co.us/dc/epidemiology/dc_manual.html

4) STATE LABORATORY SERVICES

Laboratory Testing Services Available

- Diagnostic testing for invasive GAS is typically performed by clinical laboratories.
- For outbreak investigations, the CDPHE laboratory can perform culture isolation and identification of GAS from contacts tested to assess GAS carriage.
- For outbreak investigations, the CDPHE laboratory can perform Pulsed-Field Gel Electrophoresis (PFGE) testing (i.e., molecular typing) of human GAS isolates.
- For more information or assistance with testing for GAS, contact the CDPHE Microbiology Laboratory.
- Note: Authorization from the CDPHE Communicable Disease Program is required before submitting specimens to the CDPHE Microbiology Laboratory for GAS culture or submitting GAS isolates for PFGE analysis.

5) CASE INVESTIGATION

Sporadic Cases

Individual cases of invasive GAS do NOT need to be routinely interviewed.

Invasive GAS is only reportable in the five-county Denver metropolitan area (Adams, Arapahoe, Denver, Douglas, and Jefferson counties) as part of CDPHE's Emerging Infections Program (EIP) active surveillance for invasive bacterial infections. CDPHE staff routinely perform medical record reviews for reported cases of invasive GAS and complete the EIP case report form (ABCs form) and extended record in CEDRS.

Postpartum / Postsurgical GAS

Even one case should prompt an epidemiologic investigation by the hospital's infection control personnel due to the potential for prevention of additional cases if a source colonized health care

Colorado Communicable Disease Manual

ISSUED: 3/10/2005

REVISED: 3/10/2005

PAGE: 4

SUBJECT: Group A Streptococcus

worker (HCW) can be identified and treated. In response to a single identified case, surveillance in the hospital should be enhanced and GAS isolates saved. Enhanced surveillance should involve review of microbiology records from the previous six months, consultation with obstetricians/surgeons and review of medical records to identify other possible cases, and encouraging active culturing for all suspected new cases. Current guidelines state that screening of HCWs for GAS colonization may be considered for one identified case but is strongly recommended for two or more cases identified within a 6-month period.

If an outbreak or hospital-acquired infection is suspected, please contact CDPHE for assistance.

A. Case Investigation / Forms

No routine case investigation. CDPHE staff routinely perform medical record reviews for reported cases of invasive GAS in the five county Denver metropolitan area and complete the EIP case report form (ABCs form) and extended record in CEDRS.

B. Identify and Evaluate Contacts

In general, not applicable except as part of an outbreak investigation. Routine screening and chemoprophylaxis are not recommended for household contacts of index patients; see Section 6 (B).

C. Reported Incidence Is Higher than Usual/Outbreak Suspected

If the number of reported cases of invasive GAS in your jurisdiction seems higher than expected or an outbreak is suspected, consult with the CDPHE Communicable Disease Program. CDPHE can assist local public health agencies with the investigation of clusters and outbreaks of invasive GAS, and determine a course of action to prevent further cases.

6) DISEASE CONTROL MEASURES

A. Treatment

High-dose parenteral antimicrobial therapy is required for invasive GAS infections. GAS is universally susceptible to penicillin. For more severe cases, including toxic shock syndrome, clindamycin is also used and intravenous immune globulin may be used.

B. Prophylaxis

- Routine chemoprophylaxis is not recommended for household contacts of index patients.
- Health care providers may choose to offer chemoprophylaxis to household contacts who are at increased risk for invasive GAS infection (e.g., older age, HIV infection, diabetes, cancer, heart disease) or of subsequent death once infected (age \geq 65 years). Providers who choose to prescribe chemoprophylaxis for a high-risk member of a household should prescribe chemoprophylaxis for all members of that household, since clustering of asymptomatic carriage of GAS within households is common.
- If chemoprophylaxis is prescribed, recommended regimens include:
 - Clindamycin: 20 mg/kg/day (max. 900 mg) in 3 divided doses x 10 days
 - Azithromycin: 12 mg/kg/day (max. 500 mg) in single dose x 5 days
 - benzathine penicillin plus rifampin (see references – Clin Infect Dis. 2002)

Colorado Communicable Disease Manual

ISSUED: 3/10/2005

REVISED: 3/10/2005

PAGE: 5

SUBJECT: Group A Streptococcus

C. Education

If appropriate, families and close contacts of sporadic cases may be educated about signs and symptoms of GAS infections, about persons at increased risk for invasive GAS, and about varicella vaccination as a means of preventing invasive GAS as a complication of chickenpox.

D. Managing Special Situations

1. Child Care/Pre-school

One case of invasive GAS in a child care or pre-school setting is not usually a cause for alarm, although it may cause anxiety among staff and parents.

- Recommend that all classmates and classroom staff with symptoms of pharyngitis or active skin lesions be cultured by their usual medical provider for GAS infection.
- Exclude symptomatic culture-positive children and staff from the facility until 24 hours after beginning antibiotic treatment.
- Recommend that all children \geq 12 months of age who are susceptible to varicella (i.e., no history of chickenpox and no varicella vaccination) receive varicella vaccination.

A second case of invasive GAS in the same facility within a several month time period should be considered a possible outbreak and warrants an epidemiologic investigation and more aggressive disease control measures. Please contact CDPHE for assistance.

2. School

Refer to section 6 (D.1) above.

3. Long-Term Care Facilities

One case of invasive GAS should prompt enhanced surveillance by the facility for other possible cases of GAS infection. The identification of additional cases may require more rigorous epidemiologic investigation and disease control measures. Please contact CDPHE for assistance.

E. Environmental Measures

No specific measures for sporadic cases.

Colorado Communicable Disease Manual

ISSUED: 3/10/2005

REVISED: 3/10/2005

PAGE: 6

SUBJECT: Group A Streptococcus

REFERENCES

American Academy of Pediatrics. *2003 Red Book: Report of the Committee on Infectious Diseases, 26th Edition*. Illinois, Academy of Pediatrics, 2003.

Case Definitions for Infectious Conditions Under Public Health Surveillance.

www.cdc.gov/epo/dphsi/casedef/

CDC Website: www.cdc.gov → click on “Diseases and Conditions”.

Heymann, DL, ed. *Control of Communicable Diseases Manual, 18th Edition*. Washington, DC, American Public Health Association, 2004.

Prevention of Invasive Group A Streptococcal Infections Workgroup Participants. Prevention of invasive group A streptococcal disease among household contacts of case patients and among postpartum and postsurgical patients: recommendations from the Centers for Disease Control and Prevention. *Clin Infect Dis*. 2002;35:950-959.