**Section 1**

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH GUIDE TO SURVEILLANCE, REPORTING, AND CONTROL

Invasive Group A Streptococcal Disease

**ABOUT THE DISEASE**

**A. Etiologic Agent**

Invasive group A streptococcal disease (GAS) is caused by the bacterium *Streptococcus pyogenes*. There are over 100 serologically distinct types of *S. pyogenes* within group A*.*

**B. Clinical Description**

Pharyngitis (strep throat) is the most common infection with group A streptococcus. Skin infections (impetigo or pyoderma) are also common. In some cases, the bacteria may become invasive and may cause more severe illness. Invasive GAS infection may manifest as any of several clinical syndromes including: 1) pneumonia, 2) bacteremia in association with cutaneous infection, 3) deep soft tissue infection (i.e., necrotizing fasciitis—colloquially referred to as “flesh-eating bacteria”), 4) meningitis, 5) peritonitis, 6) osteomyelitis, 7) septic arthritis, 8) postpartum sepsis (i.e., puerperal fever), 9) neonatal sepsis, 10) bacteremia alone, and 11) streptococcal toxic shock syndrome (STSS). Case-fatality rates for some of these syndromes can range from 10–70%.

**C. Vectors and Reservoirs**

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

**D. Modes of Transmission**

The modes of transmission of GAS are large respiratory droplets and person-to-person spread through direct contact with infected individuals or carriers. Indirect person-to-person spread through objects can sometimes transmit GAS as well. Nose, throat, skin, anal, and vaginal carriers can all serve as sources of GAS infection.

**E. Incubation Period**

The incubation period for GAS pharyngitis is usually short: 1–5 days and rarely longer. The incubation period for invasive GAS disease is variable and depends on the type of infection.

**F. Period of Communicability or Infectious Period**

In untreated, uncomplicated GAS disease, the infectious period starts several days before onset of symptoms and lasts from 10–21 days. If purulent discharge is present, the infectious period may be extended from weeks to months. Persons with untreated GAS pharyngitis may carry and transmit the bacteria for weeks or months, with contagiousness sharply decreasing 2–3 weeks after onset of illness.

**G. Epidemiology**

Estimates of the annual incidence rates of invasive GAS disease in the United States from 2011-2015 range from 3.4–4.8 cases per 100,000 of population. Of the estimated 11,000−13,000 cases of invasive GAS infection in the U.S. each year, between 1100 and 1600 cases are fatal. Surveillance studies have suggested that 85% of invasive GAS infections occur sporadically in the community; 10% are hospital-acquired; 4% occur in long-term care facilities; and 1% occur after close contact with a case. Healthcare-associated outbreaks and cases of invasive GAS infection have been traced to health care workers who were throat, skin, and or vaginal carriers of GAS. In Massachusetts, over the past several years, an increase in invasive GAS infections has been observed in individuals with a history of intravenous drug use. In addition, since 2016, an increase in invasive GAS cases among residents of long term care facilities has also been seen, including several facility-specific outbreaks.

Invasive GAS disease occurs year-round, with a peak incidence from December through March. In the United States, the incidence of invasive GAS infections is highest in infants and the elderly. Fatal cases in children are not common. People who have chronic cardiac or pulmonary disease, diabetes mellitus or HIV infection, or who inject drugs or abuse alcohol are at higher risk for invasive GAS infection. Before use of varicella vaccine, varicella was the most commonly identified predisposing factor for invasive GAS infection. Infection with GAS may be followed by the non-infectious complications of rheumatic fever (characterized by arthritic, cardiac, and/or neurologic signs and symptoms) or glomerulonephritis (inflammation of the kidneys that affects kidney function). One goal of treating cases (with at least ten days of antibiotic therapy) is to prevent these sequelae.

**H. Bioterrorist Potential**

This pathogen is not considered to be of risk for use in bioterrorism.

**Section 2**

**REPORTING CRITERIA AND LABORATORY TESTING**

**A. What to Report to the Massachusetts Department of Public Health (MDPH)**

Report any of the following:

* Identification of GAS (*S. pyogenes*) from a normally sterile site (e.g., blood or cerebrospinal fluid [CSF] or, less commonly, joint, pleural, or pericardial fluid);
* Identification, during the post-partum period, defined as all inpatient days, and the first 7 days after discharge, of GAS in association with a clinical post-partum infection, such as endometritis, or from a wound infection;
* Identification, during the hospital stay or the first 7 days after discharge, of GAS from a surgical wound in a post-surgical patient for whom the indication for surgery was not a pre-existing GAS infection;
* Cases of necrotizing fasciitis associated with GAS infection; and
* Case of toxic shock syndrome (TSS) with GAS identified from ANY site.

*Note: See Section 3C for information on how to report a case.*

**B. Laboratory Testing Services Available**

The MA SPHL will accept isolates of GAS for further testing for surveillance purposes when associated with an outbreak. The Epidemiology Program at 617-983-6800 should be consulted before specimens or isolates are submitted. For more information about testing, call the MA SPHL Microbiology Laboratory at (617) 983-6607.

**Section 3**

**REPORTING RESPONSIBILITIES AND CASE INVESTIGATION**

**A. Purpose of Surveillance and Reporting**

* To identify close contacts of cases in order to provide recommendations for appropriate preventive measures, and to thus prevent infection and complications in the contacts as well as further spread of infection.
* To identify if the case is living in a long term care facility, and if there are any other cases of invasive or non-invasive GAS in the long term care facility.
* To identify clusters or outbreaks of disease promptly in order to initiate appropriate prevention and control measures. If an outbreak of invasive GAS disease is identified in a community or in an organization such as a daycare center, varicella vaccination might be recommended if cases are associated with chickenpox, or prophylactic antibiotics might be recommended to certain groups, depending on the number of cases and the community or organization involved.
* To identify potential post-surgical or post-partum infections that may be traced to carriers involved in direct patient care.
* To provide information about the disease, its transmission, and methods of prevention.

**B. Laboratory and Health Care Provider Reporting Requirements**

Invasive GAS infection is reportable to the local board of health (LBOH). MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of invasive GAS infection, as defined by the reporting criteria in Section 2A.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of invasive GAS infection shall report such evidence of infection directly to the MDPH within 24 hours.

**C. Local Board of Health (LBOH) Reporting and Follow-Up Responsibilities**

*Reporting Requirements*

MDPH regulations (105 CMR 300.000) stipulate that invasive GAS infection is reportable to the LBOH and that each LBOH must report any case of invasive GAS infection or suspect case of invasive GAS infection, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Infectious Disease and Laboratory Sciences, Epidemiology Program at 617-983-6800. Cases will be captured in the Massachusetts Virtual Epidemiologic Network (MAVEN), usually through electronic laboratory reporting..

The most up-to-date reporting requirements can be found at:

<http://www.mass.gov/eohhs/gov/departments/dph/programs/id/epidemiology/rdiq/reporting-diseases-and-surveillance-information.html>

*Case Investigation*

It is the responsibility of the LBOH to complete questions in each of the question packages in MAVEN by interviewing the case and others who may be able to provide pertinent information. Some of the information can be obtained from the healthcare provider

Calling the provider

Invasive GAS cases are usually very ill. If the case was hospitalized (i.e. reporting facility is a hospital), call infection control at the named hospital. A list of infection preventionists can be found in the help section of MAVEN. If the case was seen at a clinician’s office, ask to speak to a nurse working with the ordering provider. You should confirm that the patient was notified of the diagnosis and let them know that you will be calling the case for further information.

Calling the case or parent/guardian of the case

Before calling the case, review the disease fact sheet by clicking on the Help Button located in MAVEN and all the information in this chapter. The call may take a few minutes, so in order to maximize the chance of getting the information needed, it might be good to note the potential length of the call with your contact, and offer the opportunity to call back when it is more convenient. If the case is too ill to respond to questions, ask to speak with a family member or other proxy to obtain the needed information. Asking questions about how the case or child is feeling may get the case or parent talking. If you are unable to answer a question they have, don’t hesitate to call the Division of Epidemiology and Immunization at 617-983-6800 for assistance, and call the case back with the answer later. People are often more than willing to talk about their illness, and they may be very happy to speak with someone who can answer their questions.

*Using MAVEN*

Administrative Question Package

Monitor your “Online LBOH Notification for Immediate Disease” workflow in MAVEN for any new cases of invasive GAS. An MDPH Epi-of- the-Day (EOD) will review all new cases and request immediate follow up for invasive GAS, post-partum GAS, and post-surgical GAS. Once a new event appears in this workflow, open the Administrative Question Package (QP) and under the “Local Health and Investigation” section, answer the first question “**Step 1** - LBOH acknowledged” by selecting “Yes”. The “LBOH acknowledged date” will then auto populate to the current day. Completing this first step will move the event out of this workflow and into your “Online LBOH notified but Case Report Forms (CRF) are pending” workflow. Note the date you started your investigation by answering “**Step 2** – Investigation started” as “Yes” and then note the date where shown. Record your name, agency, and phone numbers where shown in “**Step 3** - LBOH/Agency Investigator.”

Demographic Question Package

Please enter all relevant demographic and employment information. It is particularly important to complete the Race/Ethnicity and Occupation questions.

Clinical Question Package

Complete the “Diagnosis/Clinical Information” section. Accurately record clinical information, including date of symptom onset, whether hospitalized (and associated hospital information and dates), and other medical information, including any underlying illness. Indicate the type of infection caused by GAS (e.g., bacteremia, cellulitis, necrotizing fasciitis, meningitis, osteomyelitis, etc.). Indicate the type of specimen from which GAS was isolated/identified (e.g., blood, CSF). Note the date of the first positive culture. Determine whether this is a post-surgical infection. The post-surgical time period includes all inpatient days after a surgical procedure and seven days after discharge. Determine whether the infection occurred post-partum. The post-partum time period includes all inpatient days after the delivery of a baby and seven days after discharge.

Risk Exposure/Control & Prevention Question Package

Indicate whether or not the case attends or is employed at a daycare center, school, or long-term care facility. Ask if the case injected drugs not prescribed by a doctor during their incubation period.

If the case attends or is employed at a daycare center, school, or long-term care facility, follow the instructions in Section 4 for controlling further spread.

*Completing your Investigation*

1. If you were able to complete a case investigation and follow-up is complete, mark “**Step 4** – Case Report Form Completed” as “Yes” and then choose Local Board of Health (LBOH) –Ready for MDPH review for the Completed by variable.
2. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please complete “**Step 4** - Case Report Form Completed” as “No” and then choose a primary reason why the case investigation was not completed from the choices provided in the primary reason answer variable list.
3. If you are not online for MAVEN you may submit a paper case report form. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked “Confidential”) to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to obtain a copy of the case report form and to confirm receipt of your fax.

The mailing address is:

**MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)**

**305 South Street, 5th Floor**

**Jamaica Plain, MA 02130**

**Fax: (617) 983-6813**

**Section 4**

**CONTROLLING FURTHER SPREAD**

**A. Isolation and Quarantine Requirements *(105 CMR 300.200)***

None

*Minimum Period of Isolation of Patient*

None

*Minimum Period of Quarantine of Contacts*

None

**B. Protection of Contacts of a Case**

Depending on the number of cases of invasive GAS infection and the situation, recommendations may include antibiotic prophylaxis for potential carriers, varicella vaccination for susceptible children, and/or throat cultures for contacts of cases. See Section 4C for more information.

**C. Managing Special Situations**

*Reported Incidence Is Higher Than Usual/Outbreak Suspected*

If the number of reported cases of invasive GAS infection in your city/town is higher than usual or if you suspect an outbreak in a school, daycare, hospital, or long-term care facility, please contact the MDPH Epidemiology Program at (617) 983-6800 as soon as possible. This situation may warrant an investigation of clustered cases to determine a course of action to prevent further cases. MDPH can also perform surveillance for cases across town lines, which would otherwise be difficult to identify at the local level.

*Daycare*

One case of invasive GAS infection in a daycare is not usually an indicator of an ongoing problem. However, to determine the extent of the situation, the following questions should be asked:

* Have additional cases of invasive GAS among children or staff been identified in the daycare?
* Have any cases of pharyngitis or impetigo been reported at the daycare in the previous two weeks? If so, how many and what were the dates of onset?
* Was the case’s illness preceded by varicella infection?
* Have any varicella cases been reported in the daycare in the previous two weeks? If so, how many and what were the dates of onset?

The recommendations for control will depend on the answers to these questions. Please contact the MDPH Epidemiology Program at (617) 983-6800 to report suspect or confirmed cases in a daycare or any other setting. An epidemiologist will work with you to ensure all contacts are identified and notified.

In addition, surveillance data are necessary to determine the presence of an outbreak or cluster of cases of disease.

*School*

As described above for the daycare setting, one case of invasive GAS infection in a school is not necessarily an indicator of an ongoing problem. While GAS is much more likely to spread in a daycare setting, you still need to determine how many cases of invasive or non-invasive (e.g., pharyngitis or impetigo) are occurring in the school. As in a daycare, the recommendations for control will depend on the answer to this question. An MDPH epidemiologist will work with you to determine the best prevention and control measures to implement and will provide information on how to respond to one or more cases of GAS infection.

*Hospital*

GAS is an unusual cause of surgical site or post-partum infections. The bacterium is only isolated from <1% of surgical-site infections and 3% of infections after vaginal delivery. Since most transmission in healthcare is traced to carriers involved in direct patient care, even one case of post-operative or post-partum GAS infection should be vigorously investigated. Usually, the infection preventionist (IP) or hospital epidemiologist will investigate to find a possible carrier. Investigations usually consist of medical and laboratory record reviews, further testing of the GAS isolates, and screening healthcare workers, which may involve screening multiple body sites. An MDPH epidemiologist should be consulted in these situations.

*Long Term Care*

Cases of invasive GAS infection in long-term care facilities are becoming more common. When a case is identified in a long term care facility, steps should be taken to rule out the possibility of a more widespread problem. Surveillance should be done to identify any other cases of invasive or non-invasive GAS infection occurring among staff or residents. An MDPH epidemiologist will review surveillance data to see if there have been any additional cases of invasive GAS occurring in the facility in the past six months. If there have been no additional cases within that time period, the facility should continue surveillance for cases among residents or staff. As always, any staff identified with pharyngitis must be tested and treated immediately, as appropriate.

Additional cases of GAS infection among residents in the facility would require a more vigorous response. An MDPH epidemiologist will work with you to determine the best prevention and control measures to implement, as well as how to proceed with a more rigorous investigation. This typically includes screening of healthcare workers (typically, collection of throat swabs) in the facility. This type of response is usually led by the director of nursing in the facility, but assistance may be requested from the LBOH. The number of healthcare workers included in this recommendation depends on the situation, and can be limited to one unit or may be expanded to the entire facility. If a healthcare worker is found to be positive for GAS, they must be treated with an appropriate antibiotic immediately. They should be re-screened following the completion of the antibiotic to ensure clearance. Certain situations have required multiple rounds of screening among healthcare workers (including screening of expanded body sites) in the facility due to evidence of ongoing transmission. This type of follow-up is time intensive and requires expertise from MDPH staff.

**D. Preventive Measures**

*Environmental Measures*

Advise daycare centers to clean toys daily using an approved disinfectant (an EPA-registered sanitizing solution safe for use in the daycare setting) and to discourage the use of play food, which facilitates the transmission of not only this bacterium but many others as well.

*Personal Preventive Measures/Education*

To avoid future exposures, advise individuals to:

* Practice good hygiene and frequent hand washing;
* Avoid sharing food, beverages, cigarettes, or eating utensils; and
* Receive varicella vaccine if susceptible to varicella (see the Chickenpox and Shingles chapter for more information).

A Group A Streptococcal Disease Public Health Fact Sheet is available from the MDPH Epidemiology Program or on the MDPH website at http://www.mass.gov/eohhs/gov/departments/dph/programs/id/epidemiology/factsheets.html.

**ADDITIONAL INFORMATION**

The case definition for MDPH is not the same as the formal CDC surveillance case definition for invasive GAS. Massachusetts will consider a positive PCR laboratory report confirmatory as long as symptoms are compatible with invasive GAS disease. In the case of a PCR+ laboratory result and a negative culture, the case will be considered confirmed if the symptoms are compatible with invasive GAS disease and antibiotics were administered before specimens were obtained.

*Note: The most up-to-date CDC case definitions are available on the CDC website at* <https://wwwn.cdc.gov/nndss/case-definitions.html>

***Chemoprophylaxis***

No controlled trials have evaluated the effectiveness of chemoprophylaxis in preventing invasive GAS in household contacts of invasive GAS cases. However, if household contacts do receive chemoprophylaxis, the CDC recommends the following chemoprophylaxis regimens. In addition, the same treatment regimens should be used for healthcare workers and their colonized household contacts. For drug regimens effective for secondary prophylaxis of patients who have documented history of acute rheumatic fever and patients who have documented evidence of rheumatic heart disease refer to the appropriate chapter and tables in the Report of the Committee on Infectious Diseases of the American Academy of Pediatrics (The Red Book). The Red Book also includes a table describing the recommended duration of prophylaxis for these cases.

**Recommended regimens for chemoprophylaxis against group A streptococcal infection\***

|  |  |  |
| --- | --- | --- |
| Drug | Dosages | Comments |
| Benzathine penicillin G plus rifampin | BPG: 600,000 U IM in one dose for patients weighing <27 kg or 1,200,000 U IM in one dose for patients weighing 27 kg; rifampin: 20 mg/kg/day PO (max. daily dose, 600 mg) in 2 divided doses for 4 days | Not recommended for pregnant women. Rifampin my affect reliability of oral contraceptives, alternative contraceptive measures should be considered while rifampin is being administered. |
| Clindamycin | 20 mg/kg/day PO (max daily dose, 900 mg) in 3 divided doses for 10 days | Preferred for HCWs who are rectal carriers of GASa |
| Azithromycin | 12 mg/kg/day PO (max. daily dose 500 mg/day) in a single dose for 5 days | Pregnancy category B: human data reassuring (animal positive) or animal studies show no riska |
| Note: All regimens are acceptable for nonpregnant persons who are not allergic to penicillin, BPG, benzathine penicillin G; max., maximum |
| aPregnancy category B (No evidence of risk in humans. Adequate, well-controlled studies in pregnant women have not shown increased risk of fetal abnormalities despite adverse finding in animals, or, in the absence of adequate human studies, animal studies show no fetal risk. The chance of fetal harm is remote, but remains a possibility.)1 Clindamycin or azithromycin is acceptable for persons allergic to penicillin. If administered to health care workers implicated in an outbreak or to their colonized household contacts, susceptibility testing should be performed.  |

1Package insert.

\*Table from: The Prevention of Invasive Group A Streptococcal Infections Workshop 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, CID, 2002; 35:950-9.

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