Invasive Group A Streptococcus Investigations: Acute Care, Long Term Care, and Beyond

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Learning Objectives

• Provide an overview of group A strep (GAS) infections
• Review trends in invasive GAS infections in MA
• Discuss steps in case investigation for LBOHs and MDPH epidemiologists
• Review more complicated investigations
  – Post-surgical
  – Post-partum
  – Long term care facilities (LTCF)
• Highlight additional GAS resources
Overview of Group A
Streptococcus Infections (GAS)
What is GAS?

- Group A Streptococcus or *Streptococcus pyogenes*
  - Gram-positive, cocci bacteria found in throat and on skin
- Can cause invasive and noninvasive disease
  - Noninvasive disease, such as strep throat or impetigo, is more common
- Can colonize without causing symptoms
  - Carriage can be as high as 15%

How does GAS Spread?

- Spread by direct contact with nose and throat secretions or infected skin lesions.
- The risk of spread is greatest when an individual is symptomatic, such as with strep throat or an infected wound.
- Individuals who carry the bacteria but have no symptoms (colonized) are much less contagious.
• The incubation period for GAS pharyngitis is usually short: 1–5 days

• Invasive GAS incubation period: The incubation period is generally 2-5 days but can be longer
  – For post-surgical and post-partum infections, we would consider all inpatient days and up to 7 days post-discharge as infections possibly related to the healthcare facility where the procedure/birth took place.
• Appropriate antibiotic treatment for at least 24 hours is sufficient to end the individual’s infectious period.

• Infectious period for **untreated** individuals:
  
  – In untreated, uncomplicated GAS disease, the infectious period starts several days before onset of symptoms and lasts 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 the illness.
Invasive GAS Infection

• Invasive disease occurs when bacteria get past defenses and invade normally sterile parts of the body, such as the blood, deep muscle, fat tissue, or the lungs.

• Infection may occur when a person has sores or other breaks in the skin (such as cuts, or surgical wounds) that allow the bacteria to get into the tissue.

• Although healthy people can get invasive GAS disease, people with chronic illnesses such as cancer, diabetes, and end stage renal disease, and those who require dialysis or use medications such as steroids, are at higher risk.

• Injection drug use is also a risk factor for invasive GAS.

• Some strains of GAS are more likely to cause severe disease than others.
  – The reason why some strains may cause more severe illness is not entirely clear but may involve the production of toxins that cause shock and organ damage and enzymes that cause tissue destruction.
Clinical Presentations of Invasive GAS Infection

- Invasive GAS infection may manifest as any of several clinical syndromes, including:
  - Pneumonia
  - Bacteremia
  - Necrotizing Fasciitis (NF)
  - Peritonitis
  - Osteomyelitis
  - Septic Arthritis
  - Toxic Shock Syndrome (TSS)
  - Post-partum Sepsis (i.e., puerperal fever)
GAS Infection Data in the U.S.

- In 2019 there were 25,050 cases of invasive GAS disease in the U.S.
  - Translates to ~ 7.63/100,000 population
- Death occurs in ~11% of all invasive cases, 30-70% of Streptococcal Toxic Shock Syndrome (STSS) and 33% of Necrotizing Fasciitis (NF) cases.
  - Organ system failure can occur in cases with STSS.
  - Amputation may be necessary in cases of NF.

Total Number of Reported Invasive GAS Infections in Massachusetts from 2008-2021

*Data are current as of May 9, 2022 and may be subject to change*
Confirmed Invasive GAS in Massachusetts from 2008-2021 by Sex

*Data are current as of May 9, 2022 and may be subject to change.
Invasive GAS Infections identified as Healthcare Associated Infections (HAI) in Massachusetts from 2014-2021

*Data are current as of May 9, 2022 and may be subject to change*
Confirmed Invasive GAS Cases by Intravenous Drug Use (IDU) Status

Invasive GAS Cases by Year and History of IDU or HCV in Massachusetts

*Data are current as of 12/31/21 and may be subject to change*
Invasive GAS Cases by Year and History of Homelessness in Massachusetts

*Data are current as of 12/31/21 and may be subject to change*
Steps in GAS Case Investigation
When to Investigate GAS

Cases should be investigated if they meet one of the following criteria:

1) GAS isolated from a sterile site (e.g., blood, joint fluid, CSF)

2) GAS isolated from a wound in at least one of the following scenarios:
   a. necrotizing fasciitis is noted,
   b. a patient during the post-partum period,
   c. a patient within 7 days of surgery, or

3) Toxic shock syndrome with GAS cultured from ANY site.
### Sterile and Nonsterile Site Examples

<table>
<thead>
<tr>
<th>Specimen Source</th>
<th>Sterile?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peritoneal fluid</td>
<td>Yes</td>
</tr>
<tr>
<td>Abscess</td>
<td>Maybe</td>
</tr>
<tr>
<td>Ascites</td>
<td>Yes</td>
</tr>
<tr>
<td>Bile</td>
<td>No</td>
</tr>
<tr>
<td>Blood</td>
<td>Yes</td>
</tr>
<tr>
<td>Bronchial aspirate</td>
<td>No</td>
</tr>
<tr>
<td>Cerebrospinal fluid</td>
<td>Yes</td>
</tr>
<tr>
<td>Cyst</td>
<td>Maybe</td>
</tr>
<tr>
<td>Joint Fluid</td>
<td>Yes</td>
</tr>
<tr>
<td>Oropharynx</td>
<td>No</td>
</tr>
<tr>
<td>Pleural fluid</td>
<td>Yes</td>
</tr>
<tr>
<td>Sputum</td>
<td>No</td>
</tr>
<tr>
<td>Synovial fluid</td>
<td>Yes</td>
</tr>
<tr>
<td>Wound</td>
<td>No</td>
</tr>
</tbody>
</table>
Initial GAS Case Notification

- All suspect invasive GAS infections are reported via electronic laboratory reporting (ELR) to MAVEN or by phone.

- The assigned MDPH epidemiologist reviews and confirms the case if it meets investigation criteria.
  - If the specimen source is not a sterile site or a surgical/post-partum wound, the case should be revoked.

- Once the case is confirmed by the assigned MDPH epidemiologist, it will go into LBOH workflow.
  - Please note that the LBOH is not able to view a GAS event in MAVEN until the case classification is changed to ‘confirmed’.

- The assigned MDPH epidemiologist and the LBOH coordinate case investigation.
• Some infection preventionists (IPs) have access to the IP module in MAVEN.
  – 24 acute care facilities are currently participating.
  – Only the assigned MDPH epidemiologist can share the case with the IPs. The MDPH epidemiologist will leave the LBOH a note indicating that the event has been tasked to the hospital IP and additional LBOH follow up will be determined once the case is completed by the IP.
  – IPs can document case information directly in MAVEN using the IP wizard.

• If the IP does not have access to MAVEN, the LBOH or MDPH epidemiologist should call the hospital IP directly.
  – There is a list of IP phone numbers in the MAVEN Help section.
Routine GAS Investigation

- LBOH and/or MDPH epidemiologist leading the investigation should ensure that relevant demographic, clinical, and risk question packages are completed in MAVEN. (Please utilize the IP wizard!)

  1. Did the GAS infection occur after a recent surgical procedure or within the post-partum period (within 7 days after birth) (Include as a MAVEN note, and complete the following variables in the IP Wizard)?

  2. Is the case a resident at or employed by a long-term care facility (Risk/Exposure/Control & Prevention section of the IP Wizard)?

  3. Did the case inject drugs not prescribed by a doctor during the incubation period (2 weeks prior to onset) (Risk/Exposure/Control & Prevention section of the IP Wizard)?
• If the answer to Questions 1 or 2 is **yes**, then the case is considered healthcare-associated:
  – **LBOHs** should contact the assigned epidemiologist to discuss next steps

• If the answer to Questions 1 and 2 is **no**, the investigation is complete!
  – Leave a MAVEN note saying the case is not healthcare associated and follow up is complete.
  – Ensure the variables in the IP Wizard are as complete as possible, including variables documenting the case’s race and ethnicity.

  ![Race selection](image)

  – Complete Steps 1-5 in the Administrative QP.
If the Case is Healthcare-associated

- Only invasive GAS infections that are healthcare-associated need to be investigated further.
  - Cases that occur within 7 days of discharge after a surgical procedure or childbirth, or cases that reside or spend their entire incubation period in a LTCF or other healthcare facility, warrant follow-up.
  - For clusters/outbreak situations we want to prevent further transmission and identify and eliminate a reservoir if it exists (i.e., eliminating carriage).
  - Control measures may include culturing of healthcare workers and other exposed individuals, antibiotic treatment of positive individuals, reinforcement and auditing of hand hygiene practices as well as environmental cleaning and disinfection processes.

- Note: The assigned MDPH epidemiologist typically leads case/cluster investigations that are healthcare-associated.
  - The LBOH can be very helpful in investigating cases in LTCFs, since many have existing relationships with facility staff.
• The MDPH epidemiologist will request isolates from all cases that may be post-partum, post-surgical, or associated with any type of healthcare facility (including LTC) within 2-3 days of case notification.
  – Laboratories typically discard samples within 5-7 days of the final culture result.
  – If the LBOH is unable to initiate the investigation immediately, the assigned MDPH epidemiologist should take the lead to determine if the case is potentially healthcare-associated and request the isolate.

• Each isolate will be banked at the MA State Public Health Laboratory (MA SPHL). If more than one case is identified from the same facility, the MA SPHL will conduct whole genome sequencing (WGS) testing to determine relatedness.
LBOH Role in Review for Routine GAS Investigations

- Conduct the routine GAS investigation and reach out to the MDPH epidemiologist if the case is healthcare-associated.
- Information should be collected from the ordering provider or hospital infection preventionist. There is no need to contact the patient.
- Routine GAS investigation should be completed within 48 hours.
  - A MDPH epidemiologist will lead the investigation if the LBOH has not initiated follow up within 24 hours.
- The following slides provide background information on HAI GAS cases, with the goal of building capacity within LBOHs.
Investigating Post-partum or Post-surgical GAS Infections
• HCW can shed bacteria through the respiratory tract, anally or vaginally.
  – This can occur in both symptomatic HCWs (i.e., strep throat infection) or in colonized HCWs.
  – Colonized HCWs can unintentionally infect their patients.

• If the LBOH determines that a GAS infection is post-partum or post-surgical, contact the tasked MDPH epidemiologist listed in the 'Administrative' question package in MAVEN for assistance.

Photo Source
Post-partum and Post-surgical GAS Infections

• Recommendations for healthcare-associated cases may include but are not limited to:
  – Isolate submission to the MA SPHL for possible further testing
  – Retrospective surveillance
  – Enhanced prospective surveillance for additional cases
  – Rigorous handwashing and ensuring alcohol-based hand sanitizer (ABHS) contains at least 60% alcohol and is not expired
  – Reinforce effective environmental cleaning and disinfection of shared medical equipment

• Some acute care facilities will screen staff with just one healthcare-associated case. If there are two or more cases found to be highly-related through WGS, staff screening is recommended:
  – Screen HCW who were present during birth or in the operating room during surgery or who changed wound dressings.
  – If positive HCW are identified through screening, additional recommendations will be made.
Investigating GAS Infections in Long Term Care Facilities (LTCF)
Initial Steps for One Invasive GAS in a LTCF

• The assigned MDPH epidemiologist contacts the LTCF to ask if there have been additional cases of invasive or non-invasive GAS in the facility (among residents or staff).
  – MDPH epidemiologist can train LBOH and allow LBOH to shadow these discussions.

• Recommend retrospective review of medical charts and laboratory results to determine if there have been any other cases of invasive or non-invasive GAS infection among residents or staff (providing direct patient care) within the previous 6 months.
  – Also recommend enhanced surveillance for the next 6 months.

• If any staff or residents have symptoms such as sore throat, tonsillar inflammation, cervical lymphadenopathy, skin infections including pyoderma and impetigo or wounds, then obtain appropriate cultures.
  – If any cultures are positive, then treat as appropriate or as prescribed by a health care professional.
One Case of Invasive GAS in a LTCF

• Provide facility with MDPH LTCF GAS Memo.

• Request that the isolate be sent to the MA SPHL where it will be banked if future testing is required.

• Reinforce rigorous hand hygiene.

• Reinforce effective and appropriate environmental cleaning.

• Ensure that ABHS contains at least 60% alcohol, and that product is not expired.

Link to memo: MAVEN Online Help (maventrainingsite.com)
Two Cases of Highly-Related GAS in LTCF within Six Months

• When two cases of GAS are found to be highly-related through WGS, intensive follow up is lead by MDPH epidemiologists with the help of LBOH.

• Identify the exposed group (both residents and HCW) and collect throat and wound (if present) cultures of those exposed regardless of symptom status.

• Subsequent positive culture isolates will be sequenced at the MA SPHL to identify any genetic relatedness with other facility isolates.

• Positive staff and residents should be treated appropriately.

• Positive staff members with highly-related GAS isolates should have follow-up cultures obtained 7-10 days after completion of therapy.
  – If follow-up cultures in staff members with highly-related GAS isolates remain positive after completion of therapy, MDPH epidemiologists may ask for LBOH assistance in recommending that household contacts of the colonized staff members be cultured and treated if positive.
Infection Control Guidance for LTCF with a GAS Cluster

- Reinforce rigorous hand hygiene.
- Ensure ABHS contains at least 60% alcohol and is not expired.
- Reinforce effective environmental cleaning.
- Discuss the importance of cleaning and disinfection of reusable medical equipment (BP cuffs, bladder scanners, etc.).
- Recommend the facility conduct routine hand hygiene, cleaning and disinfection of medical equipment, and wound care audits. If the facility has an outside wound care provider, have facility staff audit the wound care technique.
  - Hand hygiene audit tool (on Page 12 of the Infection Control and Assessment Response (ICAR) tool)
  - Wound dressing change audit tool (on page 15 of the ICAR tool)
https://www.cdc.gov/infectioncontrol/pdf/icar/ltcf.pdf
https://www.cdc.gov/handwashing/faqs.html
• If three or more GAS cases are found to be highly-related in a LTCF, follow up is lead by MDPH epidemiologists with the help of the LBOH.

• As recommended when there are two highly-related LTCF cases, identify the exposed group (both residents and HCP) and collect throat and wound (if present) cultures on those exposed regardless of symptom status.
  – Timely collection and testing of specimens is important!

• Research indicates that there is enhanced sensitivity in determining GAS carriage through additional testing, which includes culturing of the vagina and rectum of HCP.
  – The decision to perform additional testing should be made in consultation with a MDPH epidemiologist.

• Subsequent positive cultures will be sequenced at the MA SPHL to identify any genetic relatedness with other facility isolates.

• Follow infection prevention and control guidance for two or more related cases (previous slide).
• For healthcare-associated cases, the LBOH is not expected to lead follow up at this time.

• The MDPH epidemiologist will train the LBOH and allow the LBOH to shadow the investigation to build capacity for future investigations.
• CDC GAS Disease: https://www.cdc.gov/groupastrep/index.html
• MDPH GAS Fact Sheet: https://www.mass.gov/doc/group-a-strept.pdf
• CDC audit tool: https://www.cdc.gov/infectioncontrol/pdf/ltcf.pdf
Questions?