PUBLIC HEALTH RESPONSE TO INVASIVE GROUP A STREPTOCOCCUS

LONG-TERM CARE, POSTPARTUM, AND POST-SURGICAL CASES

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Background

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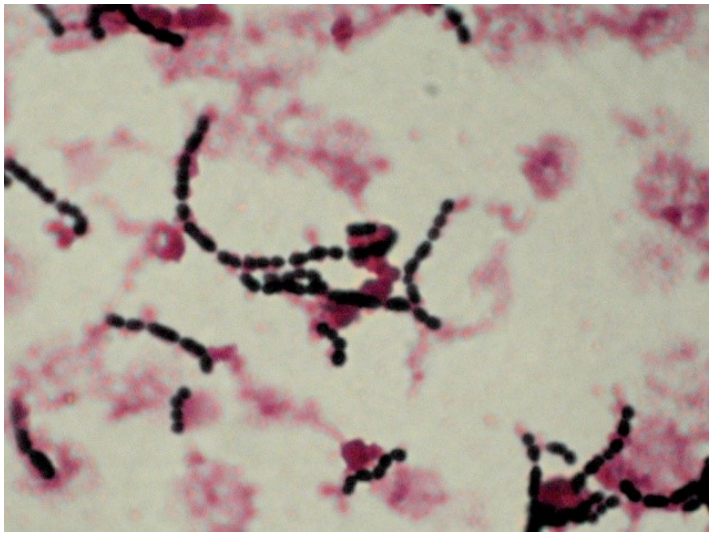
Group A *Streptococcus* (GAS)

- Also known as *Streptococcus pyogenes*
- Gram-positive coccoid-shaped bacteria
- Tend to grow in chains



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Characteristics of GAS

- Transmitted by respiratory droplets or direct contact
- Variety of clinical presentations
  - Non-invasive
  - Invasive
- Antibiotics typically cure most cases of GAS

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Non-Invasive Group A Streptococcal Disease

Case-finding method	Isolation from non-sterile site (throat, wound)
Clinical syndromes	Pharyngitis (“strep throat”) Impetigo
Epidemiology	Several million cases annually. Mostly school-aged children

http://en.wikipedia.org/wiki/Streptococcal_pharyngitis

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Invasive Group A Streptococcal Disease

Case-finding method	Isolation from normally sterile site (blood, CSF, pleural fluid) Toolkit: Normally sterile sites
Clinical syndromes	Sepsis Pneumonia Streptococcal toxic shock Necrotizing fasciitis
Epidemiology 2016 CDC estimates	18,500 infections 1,850 deaths

Reportable in PA

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Rare, but Deadly

- Streptococcal toxic shock syndrome (TSS)
  - Rapidly progressing infection
  - Usually infects people in their 20s or 30s
  - Causes blood pressure to fall rapidly and organs to fail

- Necrotizing fasciitis
  - "Flesh-eating bacteria"
  - Quickly spreading infection of flesh/muscle
  - Caused by toxins released by *S. pyogenes*

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Risk Factors for Invasive GAS Disease

- Age: 65 years old and older
- Underlying medical conditions
  - Heart disease
  - Diabetes mellitus
- Skin breakdown
- Crowded living conditions/confined settings
  - Includes long-term care (LTCF)

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Invasive GAS in LTCF Residents

- Burden
  - Incidence: 3–8 times higher
  - Mortality: 1.5 times higher
    - Compared to community members of same age (65 years of age and older)

- Single cases require public health action

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GAS Transmission in Long-term Care

- Outbreaks typically occur in winter and spring (parallel to flu season)
- Typically staff to resident transmission
  - GAS carriage
  - Staff working while sick
- Inadequate infection control
  - Improper hand hygiene
  - Poor wound care technique

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Carriage

- Prolonged presence of GAS in respiratory tract without evidence of infection (asymptomatic)
- 5–15 percent in general population
- If organism invades vulnerable tissues or hosts, acute infection can occur

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Public Health Response

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Epi Manual

- **Quick guide and case investigation**

QUICK GUIDE: GROUP A STREPTOCOCCUS, INVASIVE
(Invasive Group A Strep [iGAS])

GENERAL INFORMATION AND COURSE OF DISEASE

Infectious Agent: *Streptococcus pyogenes*, a gram-positive coccus
Mode of Transmission: Large respiratory droplets or person-to-person transmission by direct

CASE INVESTIGATION

- Initiate investigation within 1 day of report
- Print the PA-NEDSS template questionnaire
- Contact provider or infection preventionist to obtain information for the PA-NEDSS questionnaire
  - Determine if the patient is a resident of a long-term facility (LTCF, e.g., nursing home, skilled nursing facility, personal care home).
    Note: If patient resides in a LTCF, request that the clinical lab save his/her GAS isolate, even if this is the only case of iGAS at the facility; further laboratory testing may be performed on the isolate. Also, consider asking local lab to look retrospectively for positive GAS specimens (invasive & non-invasive) for residents from the same LTCF identified within past month.
  - Determine if the patient delivered a baby in the past 30 days.
  - Contact Bureau of Epidemiology for guidance, if either of the above criteria apply to case being investigated

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PA-NEDSS Review/Risk Assessment

Were the following risk factors present?

Is the patient a resident of a nursing home or other chronic care facility, or was he/she recently transferred from such a facility?	◯ Yes ◯ No ◯ Unknown
Does the patient have any chronic conditions?	◯ Yes ◯ No ◯ Unknown
Does the patient have any wounds (i.e. postsurgical, pressure related) or documented trauma?	◯ Yes ◯ No ◯ Unknown
Has the patient had surgery in the past 30 days?	◯ Yes ◯ No ◯ Unknown
Did the patient deliver a baby in the past 30 days?	◯ Yes ◯ No ◯ Unknown
Does the patient require indwelling devices (catheter, feeding tube, etc.)?	◯ Yes ◯ No ◯ Unknown
Other	◯ Yes ◯ No ◯ Unknown

- If yes, begin single-case investigation
- Contact facility
  - Obtain resident details (e.g., demographics, other PA-NEDSS risk questions)
  - Advise them to contact regulatory agency
- PADOH staff: email Epi List Serve
- Instruct testing lab to save isolate for 3 months

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GAS LTCF Toolkit Components

- GAS investigation algorithm*
- Single case letter* (send after personalized & signed)
- Transmission-based precautions for GAS
- Two-case letter template* (send after Epi review)
- How to collect a throat swab
- Bacterial Throat Culture Shipping Guidance Bureau of Laboratories (BOL)

*Items marked with an * are designed for public health use only and should not be shared with facilities.*

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GAS LTCF Toolkit Components

- GAS antibiotic recommendations for decolonization
- Wound care observation checklist
- Line list template* (for Epi)
- Surveillance symptom tracker
- Normally sterile site list
- Training power point*
- Links to GAS resources

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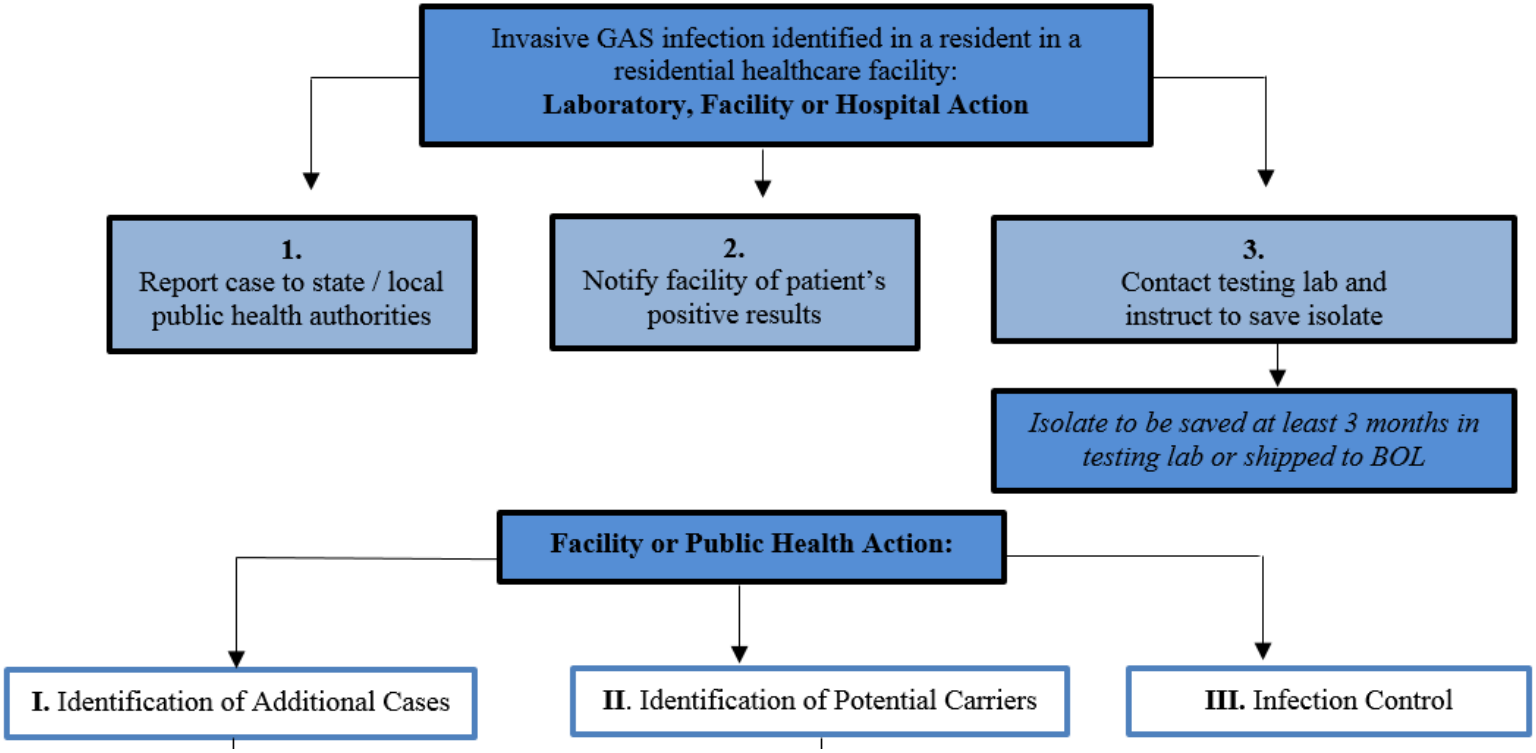
Investigation Algorithm

Investigation of One Culture-Confirmed Invasive Group A Streptococcus (GAS) Infection

Given the potential severity of GAS in residential healthcare facilities, **even one case of invasive GAS** should prompt an epidemiological investigation by the facility and the health department.



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Single Case Investigations

- Important to prevent additional cases
- Standard recommendations
  - Identification of additional cases
  - Identification and decolonization of potential carriers
  - Infection control

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Identification of Additional Cases

- Retrospective chart review
  - 1 month prior
  - All cultures (e.g., throat, blood, wound)
- Monitor residents daily for symptoms of invasive and non-invasive GAS
  - 3 months from onset of most recent case
  - Culture symptomatic residents
  - Toolkit: Surveillance symptom tracker
- Monitor healthcare workers (HCWs) for symptoms
  - Culture or refer to personal providers

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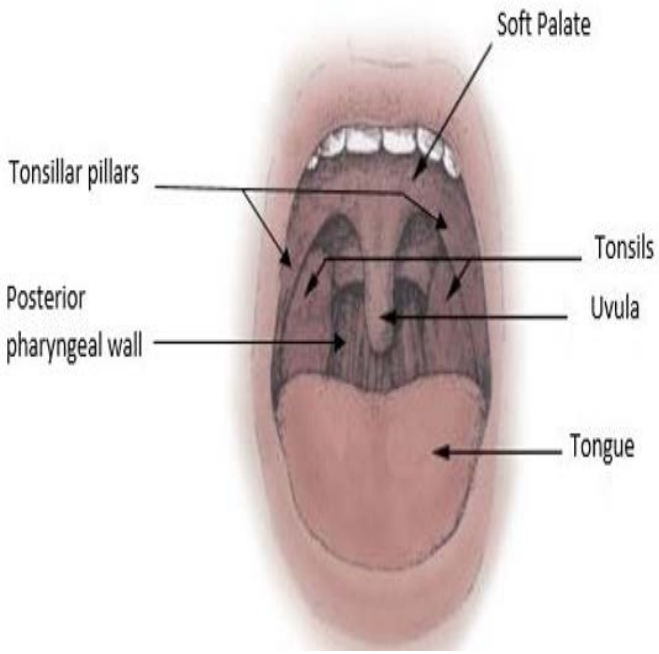
Carrier Identification

- Culture close contacts (roommates, sexual contacts) for GAS carriage
  - Increased risk of disease when a roommate has GAS disease or carriage
- Sites to culture
  - Throat, all wounds and lesions
  - Indwelling catheters (when skin breakdown, redness, irritation is present)
- Toolkit: How to collect a throat swab
- Swab typically sent to local reference lab



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Carrier Decolonization

- Treat identified GAS carrier
- Toolkit: Antibiotic recommendations for decolonization
  - Benzathine penicillin G + rifampin –or-
  - First generation cephalosporins PO (cephalexin, cephadroxil, cephradine)
- Test of cure 2 weeks after completion

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Infection Control

- Review hand hygiene
- Review wound aseptic technique
- Institute transmission-based precautions, as applicable
  - Until 24 hours after initiation of effective antimicrobial therapy
- Toolkit: Transmission-based precautions

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Toolkit: Single Case Letter

- **ERA prepares letter, sends to central office to obtain signature from Sharon Watkins, Bureau Director and emails the signed copy to facility**
- **Central office mails original**

xxxxxxxxxxxx, 2017

xxxxxxxxxxxx
xxxxxxxxxxxx
xxxxxxxxxxxx
xxxxxxxxxxxx

Dear xxxxxxxxxxxx,

The Pennsylvania Department of Health recently became aware of one case of invasive group A *Streptococcus* (GAS) in a resident at your facility. Although most GAS infections cause mild illness, the bacteria do have the potential to cause severe, life-threatening disease. **It is important to understand that a single case of invasive GAS requires public health action.** The purpose of this letter is to provide you with some recommendations and emphasize the importance of infection control practices to reduce the potential for additional cases of GAS and other transmissible infections.

These recommendations included:

1. Identification of additional cases:

- Conduct a retrospective chart review of facility residents over the previous month (this is to look

Two Case Investigations

Investigation of Two Culture-Confirmed Cases of GAS Infection

As outlined in the investigation of a single culture-confirmed case, the laboratory or hospital identifying the positive culture result should inform the facility as well as the health department.

S*ave all GAS isolates* to send to public health laboratory

SETTING:
Identification of 2 invasive cases
OR
1 invasive case + 1 noninvasive case
(Symptom onset of second case occurs within 3 months of the first case)

I. Identification of Additional Cases

A.
- Monitor residents daily for symptoms of *invasive* **OR** *noninvasive* cases for **3** months from onset of most recent GAS case

B.
- Re-survey (not culture) HCWs for symptoms of GAS infection
- **Culture symptomatic** HCWs
- Treat positive cultures as clinically indicated

Sites to Culture:
Pharynx, skin lesions

II. Identification of Potential Carriers

A.
- **Culture *all*** residents, including those beginning treatment ≥1 month ago*
- Treat positive cultures with antibiotics recommendations for decolonization of asymptomatic persons

Sites to Culture:
Pharynx, skin lesions & indwelling catheter sites**

**Only include indwelling catheter sites if evidence of skin breakdown, redness, or irritation is present

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Additional Components

- Instruct lab to hold isolate or send to BOL
  - If 2 isolates available Department of Health (DOH) will arrange for strain relatedness testing (at CDC)
- Re-survey HCWs for symptoms
  - Culture symptomatic HCWs and treat positives as clinically indicated
- Site visit to facility
- Culture ALL residents
- Toolkit: Line list template (Epi)

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Facility Site Visit

- Tour and staff interviews
- Infection control observations
  - Emphasis on hand hygiene, wound care, respiratory care
  - Toolkit: Wound care observation checklist
- Consider chart abstraction to look for epi links
- CDC's Infection Control Assessment and Response (ICAR) LTCF tool

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Culture All Residents for GAS

- Culture recommendations with input from BOE after site visit
  - Epi evidence might support targeted culturing (wing or floor-based)

- Samples to collect:
  - Throat and open wounds, lesions
  - Indwelling catheter sites (excluding Foleys) only if evidence of skin breakdown, redness, irritation

- Typically sent to BOL

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Coordination with BOL

- BOL preferred, unless extenuating circumstances
  - Free for facility, assures culture quality
  - The department can monitor results
- BOE will obtain approval to use BOL for swab kits and culturing
- Bureau of Community Health Systems (BCHS) or BOE will coordinate delivery
- Batches of less than or equal to 50, preferably collected on Monday and Tuesday
- Toolkit: BOL throat culture collection procedure

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3 or More Cases

Investigation of Three or More Culture-Confirmed Cases of GAS

Continue steps outlined in algorithms for one or two cases: **1)** notify facility of patient **2)** notify health department of **all** new cases **3)** *save all GAS isolates* to send to public health laboratory

SETTING:
Identification of: ≥3 invasive cases
OR
2 invasive cases + 1 noninvasive case
(Symptom onset of third case occurs within 3 months of the first case)

I. Identification of Additional Cases

A.
- Monitor residents daily for symptoms of *invasive* **OR** *noninvasive* cases for **3** months from onset of most recent GAS case

II. Identification of Potential Carriers

A.
- **Culture *all*** HCWs, including those who completed treatment ≥14 days prior to identification of third case
- Treat positive cultures with antibiotics recommendations for decolonization of asymptomatic persons
- Exclude from workplace until antibiotic administered for ≥ 24 hours.

Sites to Culture:
Pharynx, skin lesions

B.
- Re- culture ***all*** residents, including those who completed treatment ≥14 days prior to identification of most recent case*
- Treat positive cultures with antibiotics recommendations for decolonization of asymptomatic persons

Sites to Culture:
Pharynx, skin lesions & indwelling catheter sites**

**Only include indwelling catheter sites if evidence of skin breakdown, redness, or irritation is present

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Additional Components

- Prospective monitoring resets to date of most recent case
- Culture all healthcare workers
- Consider re-culturing residents
- Facility should consider:
  - Hiring external infection control consultant
  - Cohorting patients and staff
  - Restricting visitors

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Culture All Healthcare Workers

- Culture recommendations with input from BOE
  - Staff with direct patient contact
  - Samples: throat and open, exposed wounds (fingers, hands, forearms, etc.)
  - Epi evidence might support targeted culturing (e.g., wound care team)

- Exclude colonized workers from patient care until 24 hours of antibiotics completed
  - Could do non-patient care tasks

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Toolkit: Two+ Case Letter Template

- Send to facility after site visit
- Infection prevention and control recommendations will vary based on observations made during the visit
  - Letter includes examples

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Toolkit: Two+ Case Letter Template

[DATE], 2018

[Contact person name]
[Facility Name]
[Facility address]
[Facility address]

Dear [Facility Contact Person],

In [Month, year], a single case of invasive Group A streptococcal (GAS) infection was identified in a resident of [Facility Name]. Since then, [#] additional case[s] of GAS have been identified. Because of the severity of GAS infections, and the high likelihood of person-to-person transmission, cases of invasive GAS in a nursing care setting require immediate and comprehensive action.

Investigators from the PA Department of Health (DOH) performed a site visit at the [Facility Name] on [Date of Site Visit]. We reviewed infection control practices and made recommendations for improvement. The purpose of this letter is to reiterate our recommendations and provide infection control guidance to reduce the potential for additional cases of GAS and other transmissible infections.

Our recommendations include:

1. Monitoring for additional symptomatic cases
   - Monitor residents daily for symptoms of invasive (i.e. blood or other sterile sites) and non-invasive (i.e. wound or throat) infections for 3 months following the last case identified. Staff should check residents daily for symptoms consistent with GAS (particularly pharyngitis and possible wound infections), and maintain a record of symptom checks, and culture anyone with symptoms consistent with a GAS infection. This should include residents of all units. Treat residents with positive cultures as clinically indicated.

Toolkit: Two+ Case Letter Template

3. Infection prevention and control recommendations

- A certified wound ostomy care nurse (WOCN) or an infection preventionist with expertise in wound care should be available to provide training and education for all staff who perform wound care (including care for minor wounds) and to thoroughly assess wound care practices and policies.
- Develop a facility-specific hand hygiene policy that emphasizes preferred use of alcohol based hand rub (ABHR) over hand washing according to CDC guidelines (http://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf).
- Perform monthly hand hygiene audits on each floor or unit. If possible, consider a "secret shopper" approach so that staff do not necessarily know they are being observed. Audits should occur during day, night and weekend shifts.
- Ensure standard precautions during resident care are being followed, particularly during wound care. Gloves should be changed and hand hygiene performed when moving from dirty to clean wound care activities (e.g., removal of soiled dressings, before handling clean supplies). Reinforce the idea that standard precautions include wearing a gown and gloves whenever contact with body fluids might occur.
- Consider implementing surgical mask use during all wound care. GAS is a common pathogen for intermittent pharyngeal colonization, often without symptoms. Furthermore, GAS is spread by droplet transmission, which can occur from a distance up to 3 feet.[1] This means that wound care staff could be colonized with and transmit GAS even when they do not have symptoms. This recommendation is important and will provide additional protection in preventing potential severe diseases caused by GAS and GAS transmission.
- Ensure only those with appropriate training are performing wound care. Verify that aseptic technique is maintained throughout wound care procedures by performing routine audits of wound care dressing changes and other procedures.

These recommendations will vary based on the facility and the observations made on the site visit. Although we have included several examples that we commonly use for LTCF, they should be modified to suit the investigation

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CDC Strain Typing

- BOE obtains approval to send isolates to CDC, and Epi will communicate findings
- T-typing completed first
- If indicated (based on epi)
  - *emm* typing and whole genome sequencing (WGS)
- T-typing and *emm* typing suggest relatedness
- WGS can more precisely indicate intrafacility transmission

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Personal care homes

- Handled on a case by case basis
  - Given more flexibility
- Typically recommend discussion with facility
  - To understand capacity and epidemiologic need to meet single case recommendations
- Examples (BOE can assist)
  - Apartment type living with outpatient medical care: prospective surveillance only, as able
  - In-house medical staff or wound care team: follow LTCF recommendations

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Postpartum (PP) GAS

- PA case definition
  - GAS isolation from a normally sterile site or wound within 30 days of giving birth
  - Symptom onset during the postpartum period which includes all inpatient days and the first 7 days after discharge.
  - Differs from CDC case definition
  - Assess on a case-by-case basis to determine likelihood of healthcare-associated transmission

- Incidence: approximately 0.06 cases/1000 live births

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Sequelae: Postpartum

- Wound infection & dehiscence
- Breastfeeding impairment
- Disruption of maternal-infant bonding
- Sepsis
- Hysterectomy
- Death

Single cases require public health response.

BOE can provide guidance since cases are uncommon.

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Postsurgical GAS

- PA case definition
  - GAS isolation from a normally sterile site or wound within 30 days of surgery
  - Symptom onset during the hospital stay or within the first 7 days after discharge
  - Differs from CDC case definition
  - Assess on a case-by-case basis to determine likelihood of healthcare-associated transmission

- Postsurgical iGAS has been linked to colonized healthcare workers

Sequelae: Postsurgical

- Wound infection & dehiscence
- Need for repeat/multiple surgeries
- Sepsis
- Death

Single cases require public health response.

BOE can provide guidance since cases are uncommon.

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Clinical Infectious Diseases: Oct 2002

MAJOR ARTICLE

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

The Prevention of Invasive Group A Streptococcal Infections Workshop Participants[a]

The Centers for Disease Control and Prevention hosted a workshop to formulate recommendations for the control of invasive group A streptococcal (GAS) disease among household contacts of persons with invasive GAS infections and for responding to postpartum and postsurgical invasive GAS infections. Experts reviewed data on the risk of subsequent invasive GAS infection among household contacts of case patients, the effectiveness of chemoprophylactic regimens for eradicating GAS carriage, and the epidemiology of postpartum and postsurgical GAS infection clusters. For household contacts of index patients, routine screening for and chemoprophylaxis against GAS are not recommended. Providers and public health officials may choose to offer chemoprophylaxis to household contacts who are at an increased risk of sporadic disease or mortality due to GAS. One nosocomial postpartum or postsurgical invasive GAS infection should prompt enhanced surveillance and isolate storage, whereas ≥2 cases caused by the same strain should prompt an epidemiological investigation that includes the culture of specimens from epidemiologically linked health care workers.

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Epi Manual

- **Quick guide and case investigation**

QUICK GUIDE: GROUP A STREPTOCOCCUS, INVASIVE
(Invasive Group A Strep [iGAS])

GENERAL INFORMATION AND COURSE OF DISEASE

Infectious Agent: *Streptococcus pyogenes*, a gram-positive coccus

Mode of Transmission: Large respiratory droplets or person-to-person transmission by direct

CASE INVESTIGATION

- Initiate investigation within 1 day of report
- Print the PA-NEDSS template questionnaire
- Contact provider or infection preventionist to obtain information for the PA-NEDSS questionnaire
  - Determine if the patient is a resident of a long-term facility (LTCF, e.g., nursing home, skilled nursing facility, personal care home).

    Note: If patient resides in a LTCF, request that the clinical lab save his/her GAS isolate, even if this is the only case of iGAS at the facility; further laboratory testing may be performed on the isolate. Also, consider asking local lab to look retrospectively for positive GAS specimens (invasive & non-invasive) for residents from the same LTCF identified within past month.
  - Determine if the patient delivered a baby or had surgery in the past 30 days.
  - Contact Bureau of Epidemiology for guidance, if either of the above criteria apply to case being investigated

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PA-NEDSS Review/Risk Assessment

Has the patient had surgery in the past 30 days?	
Date of surgery	*(Date)*
Name of facility	*(Text)*
Location of facility	*(Text)*
Describe	*(Multiline Text)*
Did the patient deliver a baby in the past 30 days?	
Date of delivery	*(Date)*
Date of discharge following delivery	*(Date)*
Name of facility	*(Text)*
Location of facility	*(Text)*
Type of delivery	*(Select :Vaginal, Caesarean (C-section), Unknown)*
Any post-partum complications associated with the invasive infection (e.g., hysterectomy, uterine abscess)	*(Select :Yes, No, Unknown)*
If yes, describe	*(Text)*
Comments	*(Multiline Text)*

- If yes, begin single-case investigation
- Contact facility
  - Obtain resident details (e.g., demographics, other PA-NEDSS risk questions)
- PADOH staff: email Epi List Serve
- Instruct testing lab to save isolate for 4 months

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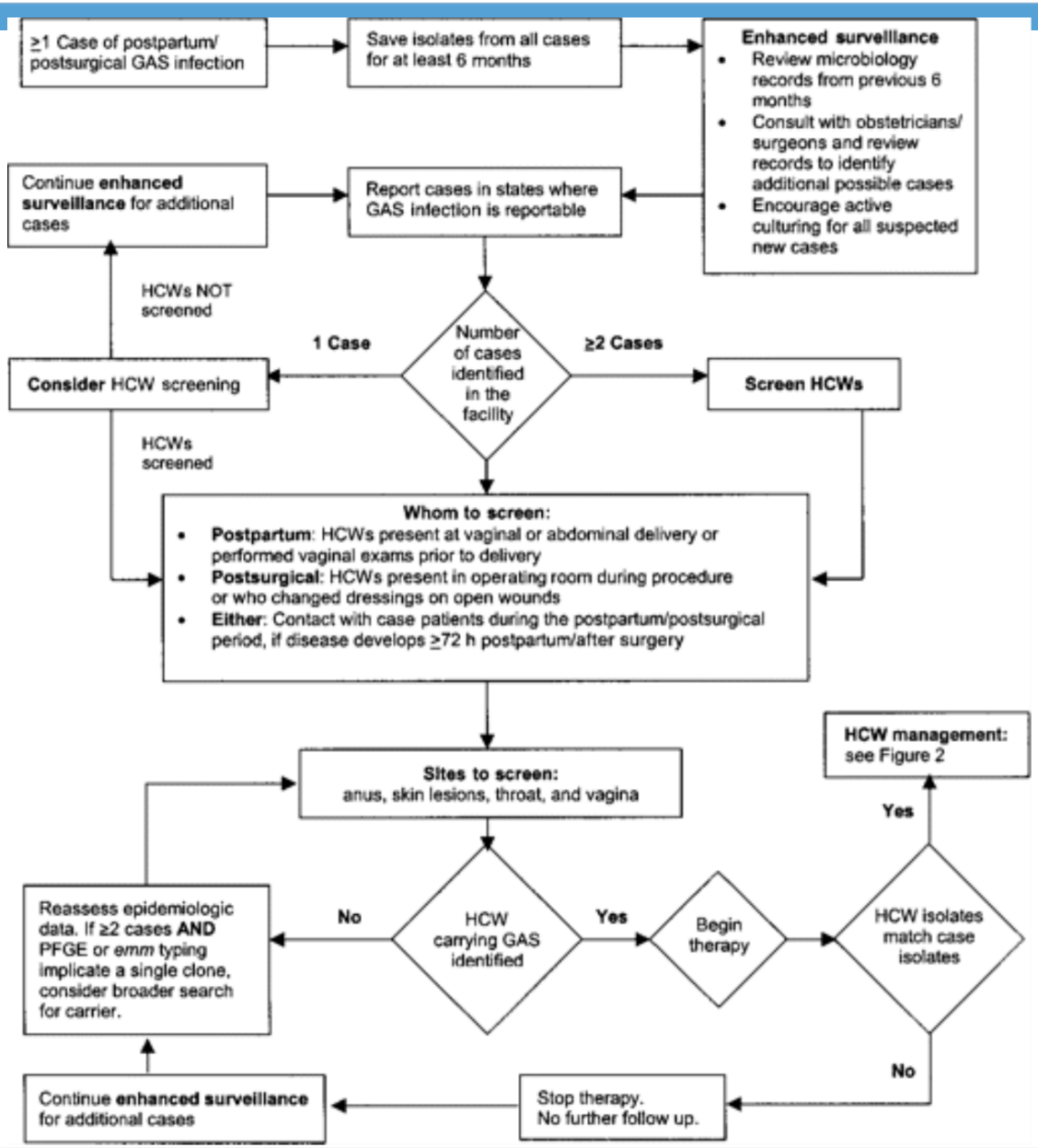
Figure 1: Recommended public health response to cases of postpartum and postsurgical group A streptococcal (GAS) disease



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Public Health Investigations

- Single case
  - Retrospective microbiology/chart review over previous 6 months
  - Enhanced surveillance for 4 months from onset
  - Encourage obstetricians/surgeons to conduct pretreatment cultures
  - Survey HCWs for symptoms of GAS and culture symptomatic HCW
  - Review hand hygiene and infection control
- Postpartum or postsurgical iGAS one-case letter template

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More Than 2 Cases

- Identified within 6 months of one another
- Coordinate with BOE to discuss potential next steps including:
  - Site visit
  - HCW screening
  - Strain typing

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GAS LTCF Toolkit Components

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- How to collect a throat swab
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    Note: If patient resides in a LTCF, request that the clinical lab save his/her GAS isolate, even if this is the only case of iGAS at the facility; further laboratory testing may be performed on the isolate. Also, consider asking local lab to look retrospectively for positive GAS specimens (invasive & non-invasive) for residents from the same LTCF identified within past month.
  - Determine if the patient delivered a baby or had surgery in the past 30 days.
  - Contact Bureau of Epidemiology for guidance, if either of the above criteria apply to case being investigated
- Recommend that symptomatic contacts seek medical care
- Educate the public, parents, and healthcare workers about modes of transmission and the importance of hand hygiene.
- Field investigation of cases and their contacts, in an attempt to identify source of infection, is ordinarily of no practical value and is not recommended unless foodborne or nosocomial outbreaks are suspected.
- Please reference PADOH's *Invasive Group A Streptococcus Toolkit* located on the HAIP/AS website for resources available for use during case and outbreak investigations.

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Toolkit Location

- HAIP-AS pilot website (through end of July)
  - http://www.pilot.health.pa.gov/topics/programs/HAIP-AS/Pages/HAIP-AS.aspx
- HAIP-AS website (beginning in August)
  - http://www.health.pa.gov/topics/programs/HAIP-AS/Pages/HAIP-AS.aspx
- Internal DOH N: drive
  - N:\GAS Resources\Toolkit\FINAL

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