

Concise Communication

Invasive group A streptococcal infection outbreaks and clusters associated with outpatient and ambulatory settings in South East England 2015–2025: descriptive study and narrative literature review

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Abstract

We described outbreaks of invasive group A streptococcal (iGAS) infection in outpatient and ambulatory care (OAC) settings in our region and in the literature. Outbreaks affected older patients receiving wound care or, rarely, following cosmetic surgery. Findings highlight risks of GAS transmission in OAC and the need for prevention and surveillance.

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Introduction

Invasive group A streptococcal (iGAS) infection is associated with significant morbidity and mortality, with case fatality reaching 25% in elderly cohorts.¹ While typically sporadic, outbreaks have been reported with increasing incidence.² Outbreak surveillance is important to facilitate early identification and guide preventative actions.

Outbreaks of iGAS infections in acute hospitals and maternity settings are well described^{1,3} and have also been associated with healthcare services delivered at home.^{4,5} GAS transmission in these settings is frequently associated with patients with wounds or receiving wound care and/or insufficiencies in appropriate infection prevention and control (IPC) measures.^{3,4,5}

Primary care, outpatient and ambulatory care settings (which we refer to as “outpatient and ambulatory care” (OAC)) may similarly be associated with increased iGAS outbreak risk, particularly where wound care is provided. However, we are aware of very few published outbreak reports associated with OAC, nor are these settings specifically addressed within guidelines for healthcare-associated iGAS infections.³ This may lead to lower awareness of outbreak risk and suboptimal responses following GAS cases. We aimed to describe the outbreaks and clusters within OAC settings, alongside a focused literature review, to inform surveillance and response actions.

Methods

This was a cross-sectional study using routinely collected data, with a supporting narrative literature review.

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Operational definitions

iGAS cases were defined aligning with public health guidance and adapted for the OAC setting.⁶ Noninvasive GAS cases were defined as GAS isolated from a nonsterile site and in the absence of severe GAS infection presentation. An iGAS outbreak required at least two confirmed or probable cases (at least one being iGAS) linked by molecular characterization and epidemiological association (excluding exclusively same-household links) and without evidence of another more plausible shared transmission setting. An iGAS cluster did not require the additional molecular characterization.

The contexts considered within OAC were adult or pediatric primary health care (such as General Practice), ambulatory care, hospital outpatient or walk-in clinics, and health centers.

Outbreak detection

Registered medical practitioners and diagnostic laboratories must inform health protection teams (HPTs) about suspected iGAS cases and confirmed iGAS isolates, respectively. These iGAS isolates are sent to a reference laboratory for molecular characterization, including *emm* typing. Whole genome sequencing (WGS) to compare isolate genetic relatedness can provide additional evidence that epidemiologically linked cases are associated with an outbreak.^{3,5,6} HPTs will investigate if there are any epidemiological and/or microbiological links between cases, forming an outbreak control team on identification of a potential outbreak.

Data sources and extraction

We used a structured database query of the HPT case and incident management systems (HPZone; InFact UK Ltd, Shipley, Yorkshire, BD17 7D, UK; and CIMS; UK Health Security Agency, 2025) to generate a line list of clusters/outbreaks managed by the South East

HPT between August 2015 and August 2025 and extracted detailed data from those meeting the cluster/outbreak definition.

Statistical analysis

We used descriptive frequency statistics to summarize incident characteristics. Outbreak genetic subtype is summarized by *emm* type and *emm* pattern genotype.⁷

Narrative literature review

We searched PubMed for iGAS cluster/outbreak reports in the OAC setting in high-income countries, published between August 2000 and August 2025. Following deduplication, we independently screened texts using preset criteria.

Ethics

The data used is routinely obtained and processed for communicable disease surveillance and control under section 251 of the National Health Service Act 2006, and no ethical approvals were required.

Results

Seven iGAS outbreaks and no clusters were identified within OAC settings. All outbreaks occurred within wound clinic contexts, including two within primary care, one in a podiatry clinic, and the remaining four within outpatient clinic settings. Details are reported in Table 1.

All outbreaks were identified within the last 5 years. Outbreak size ranged from two to 10 cases of iGAS/GAS (median three). Outbreak cases were older patients who had received regular care for chronic wounds. We identified few other risk factors among iGAS cases: one case resided in a care home, and none injected drugs; comorbidity data was not routinely collected. All iGAS cases were hospitalized and two died shortly after admission. Each outbreak was associated with a different specific *emm* type. Where performed, all case isolates clustered genomically (0–2 single nucleotide polymorphism (SNP) differences). All isolates were *emm* genotype pattern D or E and, of those where antimicrobial sensitivity was reported, 46% of cases were fully sensitive.

Prospective case finding through healthcare worker (HCW) swabbing (all outbreaks) and patient swabbing (three outbreaks) identified an additional asymptomatically colonized patient. Environmental swabbing (one outbreak) did not isolate group A *Streptococcus*. IPC practice reviews were conducted for all seven outbreaks: recommendations included audit of hand hygiene practices, improvements to cleaning practices, and moving appointments for patients with chronic GAS carriage to the end of clinics.

Our narrative review identified three OAC-associated outbreaks from a total of 1535 screened publications.^{8–10} The details of each outbreak are described in Table 2. All outbreaks occurred in the USA and involved a liposuction facility and two wound care clinics (one a podiatry clinic). The two outbreaks associated with the wound care clinics were relatively large and occurred in older-age cohorts with underlying comorbidities. Within their respective investigations, no clear transmission routes were identified. Comparatively, for the outbreak in the liposuction facility, two surgical team members were found to be colonized with group A *Streptococcus*.

Discussion

Our regional data demonstrate that iGAS outbreaks in OAC settings are a persistent occurrence. Infections followed delivery of wound care to elderly patients and were frequently presentations of cellulitis associated with skin-tropic or generalist strains frequently resistant to second-line antimicrobials. One outbreak was relatively large (10 iGAS/GAS cases), and all iGAS cases were hospitalized, with two deaths, underlining the potential severity of iGAS outbreaks. In keeping with community iGAS outbreak investigations associated with home healthcare,⁵ transmission routes were not definitively identified, particularly through HCW carriage, though there was evidence that patient carriage and/or infection, and inadequate prevention of HCW or fomite contamination may have had a role.

In contrast, the literature review identified only three published reports globally within OAC settings: one associated with a liposuction facility and two within chronic wound care settings.^{8–10} The outbreak linked to a liposuction facility had a rapid increase in cases, was in the context of significant non-adherence to regulations, and two HCWs were found to be colonized with GAS. The two large GAS outbreaks in wound care clinics were more prolonged, associated with substantial IPC inadequacies and did not clearly identify a transmission route. All three reports involved a high proportion of the iGAS/GAS cases being hospitalized.

The settings, population demographic and durations of the two published outbreaks associated with wound care were broadly comparable to characteristics within our region. This is consistent with there being a risk of potentially large and severe GAS outbreaks in OAC wound care settings, particularly if IPC precautions are not strictly adhered to. Notably, outbreaks in our region were typically smaller and with fewer identified IPC lapses compared to the published literature. The extent of investigation (eg, degree of prospective swabbing) may explain this, or cases may have been genuinely fewer due to stricter IPC precautions and/or earlier outbreak detection.

Limitations of our approach may have led to over- or under-estimation of GAS burden in OAC settings. For the narrative review, whilst our search strategy was comprehensive, we limited our approach to only one database and may have not identified all relevant studies. In addition, publication bias and/or lack of systematic outbreak and case detection methods may underestimate frequency and impact. Our regional data may also underestimate the GAS outbreak burden, as non-invasive GAS cases are non-notifiable in the UK, and we restricted our review to HPT case records. Notwithstanding, a key strength of our review is the high reporting rate of iGAS cases to HPTs (a statutory requirement in the UK). In terms of over-estimation, as OAC cases resided in the community and may have had multiple possible routes of GAS acquisition, it is possible the HPT misattributed cases as acquiring GAS in OAC-setting outbreaks. However, investigation of alternative common exposures by the HPT and high genomic relatedness in the context of mostly uncommon *emm* types makes this less likely. During our 10-year review period, all seven outbreaks occurred within the last five years, consistent with the general pattern of increased reporting of iGAS outbreaks.² Contributing factors may be increased awareness and improvements in systemic surveillance approaches (eg, comparing *emm* typing).

This correspondence highlights that OAC settings providing wound care may be predisposed to iGAS outbreaks, particularly if

Table 1. Descriptions of outbreaks of invasive group A streptococcal infection associated with outpatient and ambulatory care settings in South East England between 2015 and 2025

Outbreak number:	1	2	3	4	5	6	7
Context							
Start year	2020	2021	2021	2024	2024	2025	2025
Setting	GP Practice	Outpatient wound clinic	Outpatient wound clinic	GP practice	Outpatient wound clinic	Outpatient wound clinic	Podiatry clinic
Description							
Incident type	Outbreak	Outbreak	Outbreak	Outbreak	Outbreak	Outbreak	Outbreak
Contained both iGAS and GAS cases	Yes	No	No	No	Yes	Yes	Yes
Number of iGAS/GAS cases	10	2	2	3	4	2	3
Age range of cases (years)	67–89	74–84	70–84	73–86	65–94	63–82	70–76
Duration of outbreak (weeks)	34	17	12	9	77	6	26
Detail of iGAS cases in outbreak							
Number of iGAS cases	4	2	2	3	3	1	2
Clinical description (n)							
Cellulitis	1	1	–	–	2	1	–
Sepsis	3	1	2	3	1	–	1
Other	–	–	–	–	–	–	1 ^a
Sterile site where isolate from (n)							
Blood	4	2	2	3	3	1	1
Wound swab	–	–	–	–	–	–	1
Hospitalization (n (%))	4 (100)	2 (100)	2 (100)	3 (100)	3 (100)	1 (100)	2 (100)
Deaths ^b (n (%))	1 (25)	0	0	0	1 (33)	0	0
Nature of outpatient or ambulatory healthcare received							
Wound care	4	2	2	3	2	1	2
Other	–	–	–	–	1 ^c	–	–
Time interval from exposure							
<7 days	3	2	2	2	2	1	1
>7 days	1	–	–	–	–	–	1
Unknown	–	–	–	1 ^d	1 ^c	–	–
Antimicrobial resistance of isolates ^e							
Fully sensitive	4	2	–	–	–	–	–
Resistant to tetracycline	–	–	2	3	–	–	1
Resistant to erythromycin	–	–	2	–	–	–	2
Not reported	–	–	–	–	3	1	–
Detail of GAS cases in outbreak							
Number of GAS cases	6	0	0	0	1	1	1
Findings of outbreak investigation							
Emm type	102.3	121	77	83.13	4	8	22
Emm type pattern	E	D	E	D	E	E	E
WGS SNP distances	N/A	2	1	2	0	0	0
IPC review undertaken	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Patient carriage investigation	Not reported	Not reported	Not reported	Yes ^f	Yes ^g	Yes ^f	Not reported
Healthcare worker carriage investigation	Yes ^h	Yes ^h	Yes ^h	Yes ^h	Yes ^h	Yes ^h	Yes ^h
Environmental swabbing	No	No	No	No	No	Yes ⁱ	No

(Continued)

Table 1. (Continued)

Outbreak number:	1	2	3	4	5	6	7
Recommendations for IPC improvements made during the outbreak investigation	Personal protective equipment donning and doffing training, and use of hand hygiene audits. The chairs, couches and keyboards were replaced. Recommended chronic shredders attend at the end of the list.	no documented suggestions	no documented suggestions	Increased hand hygiene audit	Improved cleaning practices with additional deep cleaning schedule. Conducted a ventilation assessment	Increased deep cleaning schedule	Training on cleaning practices between patients and cleaning of specific equipment, additional deep cleaning schedule.

^aNecrotizing fasciitis.

^bNo mortality-data linkage as part of the project. Follow-up solely for mortality information is not part of routine Health Protection Team outbreak management, and therefore, note-recorded details may be incomplete.

^cThe outbreak report determined the case was likely infected via secondary transmission from a household contact who regularly attended clinic for wound care. Time interval from exposure is unknown.

^dUnclear from the outbreak report the exact time the third case received their regular dressing changes.

^eSome have multiple resistances reported.

^fNil additional cases identified.

^gOne further GAS case was identified (*emm* type matched and case included in outbreak).

^hNil additional cases identified.

ⁱNil positive swabs.

GP, General Practice; iGAS, invasive group A streptococcal infection; GAS, group A streptococcal infection; WGS, whole-genome sequencing; IPC, infection, prevention control.

Table 2. Descriptions of invasive group A streptococcal infection outbreaks in outpatient and ambulatory care settings included in the narrative review

Article	Beaudoin et al., 2014	Hancock-Allen et al., 2014	Ibrahim et al., 2016
Context			
Location	Liposuction clinic	Wound clinic	Hospital-based podiatry clinic
Contextual exposure	Outpatient tumescent liposuction cosmetic surgery facilities	Wound care clinic that shares staff with the local hospital	Wound care at a podiatry clinic using a biological dermal substitute.
Country	USA	USA	USA
Number of confirmed group A streptococcal infection (GAS) cases (invasive or non-invasive)	4 iGAS ^a	16 iGAS / GAS	13 iGAS / GAS
Age of cases (years)	28–60	26–87	36–85
Male sex, No. (%)	0	10 (62.5)	13 (100)
Available Comorbidities	Not reported	3 diabetes, 6 immunocompromised ^b	11 diabetic, 3 stroke, 3 congestive heart failure, 2 haemodialysis,
Outbreak			
Start date (dd/mm/yyyy)	01.07.2012	28.03.2014	01.01.2011
End date (dd/mm/yyyy)	14.09.2012	19.11.2014	01.11.2011
Hospitalization	4	9	13
Death	1	0	4
Time interval from exposure (days)	2–7	0–7	0–5
Clinical presentation	4 Necrotizing fasciitis 3 Streptococcal Toxic Shock Syndrome 4 Wound infection	3 Sepsis 2 Necrotizing cellulitis 1 Necrotizing fasciitis	Not reported

(Continued)

Table 2. (Continued)

Article	Beaudoin et al., 2014	Hancock-Allen et al., 2014	Ibrahim et al., 2016
Microbiology			
Sample	Not reported	3 blood cultures, 16 wound swabs	8 blood cultures 6 wound swabs
Typing test	Polymerase chain reaction of the M protein gene (<i>emm</i>) and typing of T antigen	Pulsed field gel electrophoresis	Pulsed field gel electrophoresis and <i>emm</i> gene typing
Strain	28	Indistinguishable by pulsed field gel electrophoresis	28
Antimicrobial susceptibility (AMS)	Identical AMS pattern. resistance to erythromycin, clindamycin, tetracycline	AMS testing on 12/19 (63%) isolates. All were pan-susceptible.	Not reported
Findings			
Infection Prevention and Control (IPC) review	Inappropriate PPE use. Equipment was not stored appropriately.	Inadequate personal protective equipment uses and handwashing. Equipment was not used appropriately, waste was not disposed of appropriately and staff did not have sufficient IPC training	Handwashing facilities were impeded. Equipment was not used appropriately. There were multiple documentation errors
Staff carriage swabbing investigation	All staff screened. Two staff members had positive GAS samples.	No GAS was isolated from any staff	No GAS was isolated from any podiatry clinic staff
Patient carriage swabbing	Not reported	Not reported	Not reported
Environmental investigation	Not reported	All 40 swabs were GAS negative.	Cases involved had all received a specific brand of biologic graft. The company that issued these grafts provided cultures of the graft material from the same batch numbers. The samples were all negative.
Hypothesized reason for outbreak	2 staff carriers and opportunities to improve IPC	Opportunities to improve IPC and inadequate oversight	Opportunities to improve IPC. Hypothesized that patient-to-patient or staff-to-patient transmission was integral.
Suggestions for outbreak prevention	To improve regulation adherence and increase IPC training	To change dressings in sterile conditions. To improve cleaning practices and waste disposal.	To improve equipment provision and cleaning practices. To have only the necessary staff present for dressing changes

^aThere were 9 suspected GAS cases reported, defined as an inflamed surgical site and either purulent discharge or fever and chills in a patient with no alternative diagnosis.⁸

^bImmunocompromised defined as a patient on chronic steroid use, with a history of an immunocompromising condition (eg, active cancer), or on immunosuppression medications (eg, methotrexate, tacrolimus).

iGAS, invasive group A streptococcal infection; GAS, non-invasive group A streptococcal infection cases; AMS, antimicrobial susceptibility; IPC, infection prevention and control.

IPC practices are weak. Few published reports suggest that previous awareness of this risk may have been limited. For HPTs, our findings illustrate the importance of careful risk assessment and review of IPC practices even after a single case in these contexts, alongside outbreak surveillance, aligning with the wider guidance for GAS in healthcare settings and its known capacity for significant clinical and public health impact.⁴

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