Guidelines for the Public Health Management of Contacts of Invasive Group A Streptococcus (iGAS) infection in Ireland

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Version History

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Version 1.0	02nd February 2024	Complete update of guideline

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Table of Contents

Summary of recommendations

Reference Number	Section	Recommendation	SIGN-Grade*
	Single case of iGAS		
1.	Older persons (>75 years)	Offer antibiotic chemoprophylaxis to all older (75 years and above) household contacts of the case.	D and GPP
2.	Pregnancy, post-partum, and neonates	Offer antibiotic chemoprophylaxis to all women from ≥37 weeks of pregnancy up to 28 days after giving birth who are close contacts of the case.	D and GPP
3.		Offer antibiotic chemoprophylaxis to neonates up to 28 days after birth where the mother or any close contact develops iGAS infection.	D and GPP
4.	Chickenpox and Influenza	Offer antibiotic chemoprophylaxis to a close contact who has developed chickenpox with active lesions within the 7 days prior to diagnosis of iGAS in the index case, or within the 48 hours after commencing antibiotics by the iGAS case if exposure ongoing.	D and GPP
5.	Time to clearance following antibiotics	Contacts of iGAS cases who have GAS pharyngitis or pharyngeal carriage should isolate for at least 24 hours after starting antibiotic treatment.	B
6.		Contacts of iGAS cases who have other presentations of GAS infection should isolate for at least 24 hours after starting antibiotic treatment	GPP
7.	Contact communication and antibiotic chemoprophylaxis	Offer antibiotic chemoprophylaxis promptly (within 24 hours, and not beyond 10 days after date of diagnosis of index case)[1] to high-risk contacts, without need for screening.	D and GPP
8.	Timing of administration of chemoprophylaxis	Chemoprophylaxis should be commenced as soon as possible (within 24 hours) after eligible contacts are identified and not beyond 10 days after date of diagnosis of index case[1]. Advise GPs to maintain low threshold of suspicion for 30 days in all close contacts. When a contact	D and GPP

[1] For maximum benefit, antimicrobial chemoprophylaxis should be commenced as soon as possible (within 24 hours) after a contact has been identified. All identified close contacts should be commenced on chemoprophylaxis, except those who have been identified more than 10 days following the date of diagnosis of the iGAS index case, as commencement of therapy after this period is very unlikely to confer any protective benefit.

		is deemed eligible for chemoprophylaxis, the full course should always be completed.	
	Household settings		
9.	Outbreak of iGAS in household setting	If 2 or more confirmed or probable iGAS cases are identified in the household, offer chemoprophylaxis to the entire household ASAP and not beyond 10 days after date of diagnosis of index case[1]	GPP
	Crèche, schools and other childcare settings		
10.	Single case of iGAS in a crèche, school or other childcare setting	For a single case of iGAS in a crèche, school, or other childcare setting: establish if there are other cases of GAS within 7 days or iGAS within 30 days or co-circulating chickenpox or influenza in staff and children. Send Strep A (Group A streptococcus) factsheet to staff and parents within defined setting to provide information. Send Information leaflet for contacts of patients with Invasive Group A Streptococcal infection (iGAS) to identified close contacts.	GPP
11.	Outbreak of iGAS in a crèche, school or other childcare setting	In an outbreak of iGAS, or when there is evidence of ongoing GAS, or chickenpox or influenza transmission in a crèche, school or other childcare setting, the Guideline Development Group recommends: • Setting up an OCT • Following principles of outbreak investigation set out above • Seeking expert advice on investigation and management	GPP

*Refer to Appendix 1 for SIGN-Grading

1 Introduction

1.1 Purpose

This guideline is for the public health management of contacts of invasive Group A Streptococcus (iGAS) infection in Ireland. It describes how contacts of iGAS infection should be managed in: Household settings; crèche, school and other childcare settings; residential care facility settings (RCFs); and other congregate community settings.

This guideline has been adapted from the *2023 UKHSA Guidelines for the Management of Contacts of Invasive Group A Streptococcus (iGAS) in Community Settings* (1). It replaces the *Management of Invasive Group A Streptococcal Infections in Ireland 2006* (2). This guideline review was undertaken by a multidisciplinary guideline development group convened by HSE Public Health: National Health Protection Office in 2023 following an upsurge in incidence of iGAS infections in Ireland in 2022/2023 (please see Appendix 3 for membership). This guideline has been externally reviewed by the iGAS Incident Management Team (IMT) and Area Directors of Public Health (ADPHs) in Ireland.

This guideline should be considered in conjunction with the HSE Public Health: National Health Protection Office guidance and algorithms for the public health management of iGAS:

- Management of invasive group A streptococcal infection (iGAS) for Emergency Medicine Physicians
- Guidance for General Practitioners and others on the management of infections caused by Group A Streptococcus
- Management of invasive and non-invasive Group A Streptococcal infection for mothers and neonates within 28 days of delivery
- Choice of agent for treatment of Group A Streptococcus (GAS) or chemoprophylaxis for a contact of invasive Group A Streptococcus (iGAS)
- Algorithm 1: Management of contacts of a case of iGAS in a household setting
- Algorithm 2: Management of iGAS case linked to a crèche, school or other childcare setting

- Algorithm 3: Identification of suspected or confirmed iGAS outbreak in an acute hospital or maternity setting
- Algorithm 4: Management of a single case of iGAS in an acute hospital or maternity setting
- Algorithm 5: Management of a single case of iGAS infection in a Residential Care Facility
- Algorithm 6: Identification and management of suspected or confirmed iGAS outbreak in a Residential Care Facility

1.2 Methodology

A literature search of available evidence was undertaken in 2023 and was considered alongside the 2023 *UKHSA Guidelines for the Management of Contacts of Invasive Group A Streptococcus (iGAS) in Community Settings* and Irish national surveillance data. The quality of evidence within the UKHSA guideline was graded according to SIGN guidelines (3) (Appendix 1). The guideline development group reviewed UKHSA evidence tables and agreed with the SIGN-GRADE judgements provided by UKHSA.

Where it was necessary to contextualise evidence, for example, where the context plays an essential role and therefore needs to be considered, agreement on best practice was reached through consensus among guideline development group members.

1.3 Future updates

A review of this guideline may be addressed three years after publication when the Research and Guideline Development Unit (RGDU) next considers updating this guideline. The RGDU may undertake a more rapid update of specific chapters within this guideline if new and relevant evidence is published.

1.4 Disclosure statement and funding

The guideline development group members were asked to declare potential conflicts of interest at the time of appointment. No conflicts of interest were declared. The RGDU was commissioned by the HSE Public Health: National Health Protection Office to undertake the work on this guideline. No funding was received for the development of this guideline.

1.5 Strengths and limitations

This guideline was adapted from the UKHSA guidelines. The RGDU reviewed the judgement of UKHSA on the appraisal and relevance of the evidence base informing these guidelines. Experts from across the Irish health system were invited to review the content and group consensus was applied to determine the final recommendations. Consensus-based methods can assist in the process of drawing conclusions and developing recommendations. The RGDU acknowledge that there may be limitations in developing rapid guidelines.

1.6 Definitions of terminology

1.6.1 Case definitions

Table 1 below outlines the case definitions for iGAS, current as of January 2024.

Table 1 Surveillance case definitions

Criteria	Definition
Clinical criteria	Clinical systemic presentation consistent with iGAS or severe GAS[2] infection necessitating hospitalisation including: • Streptococcal toxic shock syndrome (STSS) • Necrotising fasciitis • Pneumonia • Septic arthritis • Meningitis • Peritonitis

[2] GAS refers to *Streptococcus pyogenes*, not *S. dysgalactiae* or any other streptococcal lineage which carries the group A antigen.

	• Osteomyelitis • Myositis • Puerperal sepsis • Severe cellulitis
Laboratory criteria	1. Isolation of group A streptococcus (GAS), **by culture or molecular methods** (such as PCR), from a normally sterile body site (blood, cerebrospinal fluid, pleural-peritoneal-pericardial fluids, joint aspirate, bone, or deep tissue or abscess at operation or post-mortem) 2. Isolation of GAS from a non-sterile site (for example: Throat, sputum, vagina)
Epidemiological criteria	Suspected case has an epidemiological link to a confirmed case of iGAS
Case classification	1. **Confirmed case** • Any person meeting the laboratory criteria of 1 above **OR** • Any person meeting the laboratory criteria of 2 above PLUS the clinical criteria described above 2. **Probable case** • Any person meeting the clinical criteria above PLUS ○ the epidemiological criteria above **OR** ○ the clinician considers that GAS is the most likely cause

1.6.2 Other terminology and definitions

a) iGAS diagnosis date

The date at which invasive disease was diagnosed. For confirmed iGAS cases, the diagnosis date is the date that the specimen used to diagnose iGAS infection was taken. Where iGAS is confirmed post-mortem, use the date of onset for severe clinical presentation. For probable

cases (no microbiological confirmation), use hospital admission date where available, otherwise use date of onset for severe clinical presentation.

b) Close contact

This is defined as those who have had prolonged close contact with the case in a household-type setting during the 7 days before diagnosis of illness and up to 24 hours after initiation of appropriate antimicrobial therapy in the index case.

Examples of such contacts would be (4):

- Those living and/or sleeping in the same household, (including extended household if the case has stayed at another household)
- Pupils in the same dormitory
- Intimate partners
- University students sharing a kitchen in a hall of residence accommodation (4).
- Contacts who provide nursing care (public health nurses, carers).

Close contacts would <u>not</u> normally include (SIGN grading C):

- Staff and children attending the same school, class, or tutor group (although the risk assessment may allow you to define a group within the setting in which extensive close contact takes place)
- Work colleagues
- Care home residents (unless sharing a bedroom)
- Friends (not co-habiting)
- Low-level saliva contact, for example, social kissing (cheek)
- Sharing food or drink with the case
- Attending the same social function
- Travelling in the same plane, bus, or train, unless for prolonged periods of time and within two rows (for example, a flight ≥8 hours, coach tours over a period of days) (5)

For a residential care facility (RCF), residents are **not** usually classified as close contacts unless they share a bedroom. For crèches, schools, and other childcare settings please see Chapter 4.

In other settings such as congregate settings, settings where individuals co-habit, crèches, schools or other childcare settings, acute hospitals, high risk close contacts may be identified through a Public Health Risk Assessment (PHRA).

c) *High risk close contact*

- Older persons (≥75 years)
- Pregnant women ≥37 weeks gestation
- Women within 28 days of giving birth
- Neonates (up to 28 days old)
- Individuals who develop chickenpox with active lesions within the time period of 7 days prior to diagnosis in the iGAS case or within 48 hours after commencing antibiotics by the iGAS case, if exposure ongoing. Elements of PHRA should be considered.

d) *Older person*

A person aged 75 years and above.

e) *Residential Care Facility (RCF)*

A Residential Care Facility (RCF) is any long-term facility for the nursing or social care of its residents. This includes nursing homes caring for older persons and younger adults and children with mental or physical disabilities.

f) *iGAS Outbreak*

An outbreak is defined as two or more cases of probable or confirmed iGAS infection related by person, place, and time. Cases will usually be within a month of each other, but interval may extend for several months. For outbreak closure, a conservative approach of 60 days since last iGAS case (2 x 30-day period) should be considered. A single case of iGAS infection with one or more cases of non-invasive Group A Streptococcus (GAS) infection, although not considered an outbreak, may still warrant investigation and ongoing management taking into

consideration time interval, number of cases, and epidemiological links.

Table 2 List of definitions

Term	Definition
Incubation period	The period between exposure to an infectious agent and the development of symptoms or signs of illness
Infectious period	The period during which the case is contagious and can transmit disease
Prophylaxis window	The ideal period of time during which prophylactic treatment should be initiated

1.7 Epidemiology of iGAS disease

Since the 1980s GAS infections have been increasing globally. In particular, iGAS infections have increased markedly since 2010. Genetic changes in circulating strains, along with changes in host susceptibility, can result in dramatic upsurges in disease. GAS can occasionally colonise the throat, skin, and vagina of healthy humans. GAS can cause a range of diseases, from non-invasive manifestations such as pharyngitis, impetigo, and scarlet fever to life-threatening invasive disease, such as GAS bacteraemia, necrotising fasciitis, or streptococcal toxic shock syndrome (6). Cases of iGAS infection primarily occur sporadically, although outbreaks do arise, particularly in institutional care settings (7).

Notifications of iGAS typically peak in the first 6 months of the year, however an unseasonal and severe upsurge occurred in Ireland in the final quarter of 2022 and during the first half of 2023 (8). This resulted in iGAS notifications being 4.5 times higher than expected. Children were disproportionately affected. During the pre-pandemic period, paediatric cases would normally constitute one quarter of iGAS cases; during this upsurge, paediatric cases comprised 40% of all cases. Twelve paediatric deaths occurred during this period, a marked increase on the pre-pandemic period. The upsurge in iGAS was closely associated with increases in common respiratory viruses (influenza, COVID-19, and RSV) during the winter period in all age groups, and with varicella infection during the spring-summer period in children. This upsurge was characterised by a markedly increased proportion of isolates expressing *emm*1 and *emm*12 genes, which are associated with more severe disease (8).

Asymptomatic throat carriage rates in the healthy adult population are reported to be low, around 2% in high-income countries (9). Carriage of GAS is higher in children compared to adults (10-12) with one particular systematic review and meta-analysis reporting a carriage prevalence of 10.5% in asymptomatic children (9). In a school outbreak transmission study asymptomatic throat carriage of the S. *pyogenes* outbreak strain was found in 9.6%, 26.9% and 24.1% of children in weeks 1, 2 and 3 respectively post outbreak onset; carriage of non-outbreak strains was 2.8% during the study (13). Vaginal GAS carriage is low, with figures of 0.03% to 0.37% reported from research studies and laboratory surveillance (14-18).

Around 90% of iGAS cases occur in the community (19-21) with elevated risk observed for residents in Residential Care Facilities (RCF) and older people (22, 23). Other groups considered to be particularly at risk of iGAS infection are people with co-morbidities such as diabetes, cardiovascular disease, conditions, or treatments affecting immunity, influenza or recent chickenpox, neonates and post-partum women in the neonatal period, and people who are homeless or inject drugs (7).

Information on the epidemiology of iGAS at the time of publishing can be found on the HPSC website at the link here.

1.8 Legal obligation to notify cases of iGAS infection

iGAS is a notifiable disease under the Infectious Diseases Regulations 1981 (24). Under Section 14 of these regulations, as amended by S.I. No. 707 of 2003, a medical practitioner or a clinical director of a diagnostic laboratory, on suspecting or identifying a case of the infection, is obliged to notify cases to the Director of Public Health/Medical Officer of Health for the area of residence of the patient. All iGAS cases are classified as urgent and should be notified by telephone promptly to facilitate urgent public health actions. iGAS is not currently a notifiable disease in Northern Ireland (25).

1.9 Microbiological characterisation of iGAS isolates

Isolates from patients with iGAS infection should be retained for 6 months and sent directly to the Irish Meningitis & Sepsis Reference Laboratory (IMSRL) for typing. Epidemiological investigations and preventative measures should not await results of typing.

Currently, *emm* typing remains the molecular gold standard for typing GAS and more than 200 *emm* types have been described globally (26). However, further sub-typing or single-nucleotide polymorphism from whole genome sequencing (WGS) may be required to identify, or more clearly define, a potential outbreak as well as for monitoring during the management and investigation of an outbreak.

At present WGS is not routinely used during outbreak investigations in the UK but it has been used during a number of outbreaks in care homes (27, 28) hospital and maternity settings (29, 30) outbreaks among people who inject drugs or experience homelessness (31) and outbreaks associated with community health services delivered at home (32). The high discriminatory power of WGS has been useful to: (i) confirm that epidemiologically linked cases form a cluster, including those where a long interval exists between cases, (ii) exclude epidemiologically linked cases of the same *emm* type from further investigation if they did not cluster with the other cases (32, 33).

There are some general associations between *emm* types and particular clinical presentations, both in broad terms (skin/soft-tissue vs respiratory), and in relation to more specific presentations such as puerperal sepsis (*emm*28) (34, 35). However, *S. pyogenes* is a versatile pathogen and specific strains can cause an array of clinical presentations of varying severity (36, 37). Teams investigating outbreaks should be vigilant for a range of possible clinical manifestations. Whilst there is some evidence indicating excess risk of death for specific *emm* types, namely *emm*3 and *emm*1, all strains should be regarded as having the potential to cause life-threatening infection (38).

2 Single case of iGAS: risk assessment and identification of contacts

2.1 Risk Assessment

Following a notification of iGAS infection, conduct a Public Health Risk Assessment (PHRA) on a case-by-case basis to:

a) Establish any potential sources of infection or contact with healthcare within the last 7 days prior to the onset of symptoms consistent with GAS
b) Establish if there are any settings or contexts that may require more detailed risk assessment to establish close contact and possible onward transmission
c) Details should be recorded on the enhanced surveillance form.

Examples of settings or contexts are identified below; however, this is not an exhaustive list and other settings may be identified through a PHRA:

- **Residential Care Facilities**: residents are **not** usually classified as close contacts unless they share a bedroom; however, a detailed risk assessment should be undertaken, see Chapter 5
- **Settings where individuals co-habit**: (for example, boarding schools, universities, hostels), see Chapter 6
- **Congregate settings**: Congregate settings refer to a range of facilities where people (most or all of whom are not related) live or stay overnight and use shared spaces (e.g., common sleeping areas, bathrooms, kitchens) such as: shelters, group homes and emergency accommodation including International Protection Accommodation Services (IPAS)(39).
- **Childcare facilities (CCF):** Children attending the same crèche, school or other childcare setting are **not** normally considered to be close contacts; however, it may be possible to define a group within this setting which fulfils the definition of close contact (for example, a childminder's home), see Chapter 4
- Acute hospital and maternity settings see here.

d) Long haul travel (8 hours or more) see Section 2.2
e) Identify close contacts (see Section 2.2)
f) Ascertain close contacts at high risk (Section 2.3)

Following the PHRA, advice should be given to contacts and antibiotic chemoprophylaxis offered where appropriate. Details should be recorded on the available incident management system.

2.2 Identify close contacts

Individuals meeting the definition of close contacts should be identified (see definition of close contact in Chapter 1). Contacts with more than 24 hours of continuous exposure to cases are at highest risk of infection and colonisation (40, 41). If any close contacts with signs and symptoms of possible GAS infection are identified, they should be referred for clinical assessment and treatment (Table 3, Table 4 and Algorithm 1) (42).

A PHRA may identify other close contacts, such as those with prolonged or intimate contact. Area Public Health Teams should exercise judgement in defining close contacts for cases who do not reside in the same household as the case. Criteria for identifying close contacts are outlined earlier in Section 1.3.2.

Situations which may require more detailed assessment include people living in the following settings:

- Congregate settings
- Complex household arrangements where people are reluctant to disclose information
- Hostels providing temporary accommodation for the homeless, see Chapter 6.

People travelling in prolonged close proximity, on long-haul vehicle or aircraft journeys (8 hours or longer) should also be considered when identifying close contacts (5). In these situations, consider:

1. The duration of exposure
2. Ventilation in the vehicle and

3. Whether the case was symptomatic during the journey.

Where the identity of individuals in prolonged close proximity to the case is known, treatment or prophylaxis for individual contacts may be possible and a risk assessment may be undertaken.

If the case undertook international travel, regardless of the length of the journey, ensure that the International Health Regulations (IHR) national focal point is notified. Please refer to International Aviation and Transport Authority (IATA) guidance for more information relating to air travel and communicable diseases.

2.3 Identify high risk contacts

Identify any close contacts considered high risk and eligible for antibiotic chemoprophylaxis (see Table 4).

2.3.1 Older persons (≥75 years)

The incidence of iGAS increases with age (43-45) and this risk is significantly elevated for cohabiting persons whose partner or spouse develops iGAS infection (6, 46). In couples over 75 years the secondary household risk of iGAS infection was estimated at 15,000 per 100,000 person-years (46). The guideline development group made a pragmatic decision to recommend antibiotic chemoprophylaxis for all older persons (75 years and above) who are household contacts of an iGAS case regardless of the nature of the relationship. In a residential care facility, only sharing a bedroom with a case is to a household, refer to Chapter 5 for further information.

In other settings such as congregate settings, settings where individuals co-habit, crèche, school or other childcare settings, acute hospitals, high risk close contacts may be identified through a PHRA. Refer to the appropriate sections in this guideline.

Recommendation 1: Offer antibiotic chemoprophylaxis to all older (75 years and above) household contacts of the case.

SIGN grading D and good practice

2.3.2 Pregnancy, post-partum period and neonates

Signs of severe sepsis in women ≥37 weeks of pregnancy or with a history of recent childbirth, particularly with confirmed or probable GAS infection, should be regarded as an obstetric emergency (47, 48). A recent systematic review reported a pooled incidence of iGAS infection in pregnancy of 0.12 per 1,000 live births from 9 studies conducted in high income countries (49).

Women with puerperal sepsis acquire their infection from children in the household or other contacts (50, 51). The majority of iGAS infections in the post-partum period are reported in the 28 days after giving birth (85%) and can be severe for both mother and baby (51, 52). A UK study reported that the risk of iGAS is increased by approximately 80-fold within 28 days post-partum as compared to other women aged 15 to 44 (53) and US surveillance data report a 20- fold increase in bacteraemia and developing septicaemia (52). This highlights the importance of suspecting iGAS in a maternity patient presenting with sepsis and providing immediate support, including early administration of intravenous antibiotics.

Babies born to infected or colonised mothers may become colonised at birth (54). Swabbing of ears, nose, and umbilicus should be considered for babies born to iGAS-infected mothers. Maternal and neonatal infection can arise on the same day but the median onset times are 2 days postpartum (interquartile range (IQR) 0 to 5 days) for mothers and 12 days (IQR 7 to 15 days) for neonates (53). Whilst the increased risk within mother-baby pairs is likely due to transmission at birth, a small proportion of these neonates may acquire infection from the household or other close contact rather than the mother in the days following delivery.

Recommendation 2: Offer antibiotic chemoprophylaxis to all women from ≥37 weeks of pregnancy up to 28 days after giving birth who are close contacts of the case.

SIGN grading D and good practice

Recommendation 3: Offer antibiotic chemoprophylaxis to neonates up to 28 days after birth where the mother or any close contact develops iGAS infection.

SIGN grading D and good practice

2.3.3 Chickenpox and influenza

Chickenpox (or Varicella) is a risk factor for development of iGAS infection in children, with the highest risk 4 to 5 days after onset of rash (range 2 to 14 days) (55, 56). Clusters of chickenpox and iGAS co-infection have previously been identified in Ireland, as outlined in a 2016 study by Ó Maoldomhnaigh et al. (57). In this study, of 10 children admitted to hospital with iGAS infection, 7 also had active chickenpox co-infection. A year later, in 2017, a similar cluster was identified in the same hospital, with 6 of 13 children with iGAS presenting with chickenpox co-infection (58). Evidence suggests that offering antibiotic chemoprophylaxis to a household contact who develops chickenpox with active lesions within the 7 days prior to diagnosis of iGAS in the index case or within 48 hours after commencing antibiotics by the iGAS case, if exposure is ongoing, may reduce the risk (59).

Influenza is also a recognised risk factor for iGAS infection (60-63) but as there is limited evidence regarding the impact of influenza on secondary household transmission of iGAS, antibiotic chemoprophylaxis is not currently recommended. (Also see Section 2.3.2).

Although other illnesses and host factors have been associated with an increased risk of sporadic iGAS infection there is limited evidence to recommend antibiotic chemoprophylaxis (64, 65).

Recommendation 4: Offer antibiotic chemoprophylaxis to a close contact who has developed chickenpox with active lesions within the 7 days prior to diagnosis of iGAS in the index case, or within the 48 hours after commencing antibiotics by the iGAS case if exposure ongoing.

SIGN grading D and good practice

Table 3 Summary of public health actions for close contacts of iGAS cases in household settings

Risk assessment of household contact	Defined as	Action required
A) High-risk	• older persons (≥75 years) • pregnant women ≥37 weeks • women within 28 days after giving birth • neonates (up to 28 days old) • individuals who develop chickenpox with active lesions within 7 days prior to diagnosis of iGAS in the index case or within 48 hours after commencing antibiotics by the iGAS case, if exposure ongoing	Offer chemoprophylaxis only to high-risk contacts. Administer as soon as possible (within 24 hours) and not beyond 10 days after iGAS after date of diagnosis of index case. Provide household with '*Information leaflet for contacts of patients with Invasive Group A Streptococcal infection (iGAS)*
B) Symptomatic: iGAS symptoms*	Symptoms suggestive of iGAS	Urgent referral to secondary medical care for immediate medical assessment Provide household with *Information Leaflet for Contacts of Patients with Invasive Group A Streptococcal infection (iGAS)*

	If 2 or more confirmed or probable iGAS cases (in previous 30 days) are identified in the household setting	Offer chemoprophylaxis to entire household ASAP Provide household with *Information Leaflet for Contacts of Patients with Invasive Group A Streptococcal infection (iGAS)*
C) Symptomatic: GAS symptoms**	Symptoms suggestive of localised GAS infection	Refer symptomatic close contact for clinical assessment and treatment (*GP assessment and treatment if GAS suspected).* Provide household and close contacts with *Information Leaflet for Contacts of Patients with Invasive Group A Streptococcal infection (iGAS)* Provide GP with copy of Guidance for General Practitioners and others on the management of infections caused by Group A Streptococcus
D) All other close contacts	Those not reporting symptoms at the time of the risk assessment and not in a high-risk group.	Provide *Information leaflet for contacts of patients with Invasive Group A Streptococcal infection (iGAS)* to advise all other close contacts to be alert to the signs and symptoms of GAS infection and seek medical attention if they develop a febrile illness or any clinical manifestation of GAS within 30 days after diagnosis of index case. In this situation, consider chemoprophylaxis for any asymptomatic close contacts based on PHRA (other asymptomatic household close contacts may be offered chemoprophylaxis following PHRA and taking account of current epidemiological situation)

* High fever, severe muscle aches or localised muscle tenderness increasing pain, swelling and redness at site of wound, unexplained diarrhoea, or vomiting.
** Sore throat, fever, minor skin infections, scarlatiniform rash.

2.4 Antibiotic chemoprophylaxis

2.4.1 Recommended prophylactic antibiotic regimens for close contacts

Phenoxymethylpenicillin (penicillin V) or Amoxicillin are the drugs of choice for adults and children with no history of penicillin allergy. It has been in use for the prevention of acute rheumatic fever following GAS pharyngitis for over 50 years and has a favourable tolerability, safety, and cost profile (66-70). To our knowledge there have been no published reports of penicillin-resistant GAS isolates.

For those who are penicillin allergic, macrolides remain the option of choice and where susceptibilities are available, these should be reviewed to ensure the prescribed agent remains active. Clinicians should check for potential significant interactions with other prescribed medications.

In penicillin allergy, clarithromycin is the recommended option for non-pregnant adults, children, and infants <6 months of age. This is based on expert consensus and available evidence. For example, a 2001 study demonstrated that 10 days of clarithromycin was more effective than 5 days of azithromycin in the eradication of group A Streptococcus (71). Furthermore, there is evidence that azithromycin favours the development of antibiotic resistance when compared to clarithromycin (72). For those who are penicillin allergic and either pregnant or within 28 days of giving birth, erythromycin is recommended due to more robust safety data for this agent in pregnancy and the post-partum period compared to newer macrolides (73, 74). For close contacts in the first trimester of pregnancy, a 5-day course of azithromycin may be considered as an alternative based on decision of the prescribing clinician.

See Table 4 for information on Choice of agent for treatment of Group A Streptococcus (GAS) or chemoprophylaxis for a contact of invasive Group A Streptococcus (iGAS).

2.4.2 Time to clearance following antibiotics

There is relevant evidence that antibiotic treatment achieves a high rate (>90%) of clearance of pharyngeal GAS 24 hours after initiation of therapy (75). This evidence supports the recommendations provided in subsequent chapters, that individuals with GAS pharyngitis should isolate for at least 24 hours after starting antibiotic treatment. The systematic review also found that GAS was cultured from the pharynx of 9% of patients on routine follow-up after completion of antibiotics (75).

Recommendation 5: Contacts of iGAS cases who have GAS pharyngitis or pharyngeal carriage should isolate for at least 24 hours after starting antibiotic treatment.

SIGN grading B

Recommendation 6: Contacts of iGAS cases who have other presentations of GAS infection should isolate for at least 24 hours after starting antibiotic treatment.

Good practice point

Table 4 Choice of agent for treatment of Group A Streptococcus (GAS) or chemoprophylaxis for a contact of invasive Group A Streptococcus (iGAS)

Group	Drug	Dose	Duration
Adult first line			
All adults ≥18 years	Phenoxymethylpenicillin (Penicillin V) or Amoxicillin	500mg PO every 6 hours 500mg PO every 8 hours	10 days 10 days
Adult second line (penicillin allergy)			
Adults including non-pregnant women	Clarithromycin*^	250mg PO every 12 hours	10 days
Pregnant women and mothers within 28 days of giving birth***	Erythromycin*^	500mg PO every 6 hours	10 days
Child first line[3]			
Infant 1 to 11 months**	Amoxicillin	125mg PO every 8 hours	10 days
Child 1 to 4 years	Amoxicillin	250mg PO every 8 hours	10 days
Child 5 to 17	Amoxicillin	500mg PO every 8 hours	10 days
Child second line (penicillin allergy)			
Birth to 6 months	Clarithromycin*^	7.5 mg/kg PO every 12 hours	10 days
6 months to 17 years	Clarithromycin*^	7.5 mg/kg PO every 12 hours to a maximum of 250mg every 12 hours	10 days
Adolescents (under 18 years) who are pregnant or within 28 days of giving birth***	Erythromycin*^	As per pregnant women dosing above – if very low body weight, consider lower dose and consult a pharmacist.	10 days

* Where susceptibilities are available, these should be reviewed to ensure the prescribed agent remains active.
** Please seek specialist advice for dosing for premature infants
*** Azithromycin may be considered as an alternative in 1st trimester of pregnancy, on advice of the prescribing clinician
^ Clinicians should check for potential significant interactions with other prescribed medications and discuss with a local microbiologist if macrolides are not felt to be appropriate.

3 For the Management of invasive and non-invasive Group A Streptococcal infection for mothers and neonates within 28 days of delivery, see here.

2.4.3 Contact communication and antibiotic chemoprophylaxis

Probable and confirmed cases of iGAS infection should be notified by telephone promptly to the Medical Officer of Health and Area Public Health Teams in and out of hours so that public health actions can be taken as soon as possible, ideally within 24 hours.

Priority must be given to identifying and assessing close contacts, providing them with Information leaflet for contacts of patients with Invasive Group A Streptococcal infection (iGAS) and arranging antibiotic chemoprophylaxis for high-risk contacts (Table 4). No contact screening is necessary.

Recommendation 7: Offer antibiotic chemoprophylaxis promptly (within 24 hours, and not beyond 10 days after date of diagnosis in the index case) to high-risk contacts, without screening.

SIGN grading D and good practice

2.4.4 Timing of administration of chemoprophylaxis

Chemoprophylaxis should be commenced as soon as possible, within 24 hours. The risk to close contacts is highest immediately following exposure and elevated for the first 10 days after iGAS diagnosis[4] in the index case (7, 46, 76) although cases have also been reported up to 28 days later (45, 46).

Recommendation 8: Chemoprophylaxis should be commenced as soon as possible (within 24 hours) after eligible contacts are identified and not beyond 10 days of diagnosis in the index case. Advise GPs to maintain low threshold of suspicion for 30 days in all close contacts. When a contact is deemed eligible for chemoprophylaxis, the full course should always be completed.

SIGN grading D and good practice

[4] As the existing evidence base comprises studies centered on hospital admission or diagnosis date, rather than exposure date, we use diagnosis date to define the period of highest risk of transmission.

3 Household settings

3.1 Risk assessment

See Chapter 2 for recommendations on risk assessment and identification of contacts.

3.2 Public health actions: Single case of invasive Group A Streptococcus (iGAS)

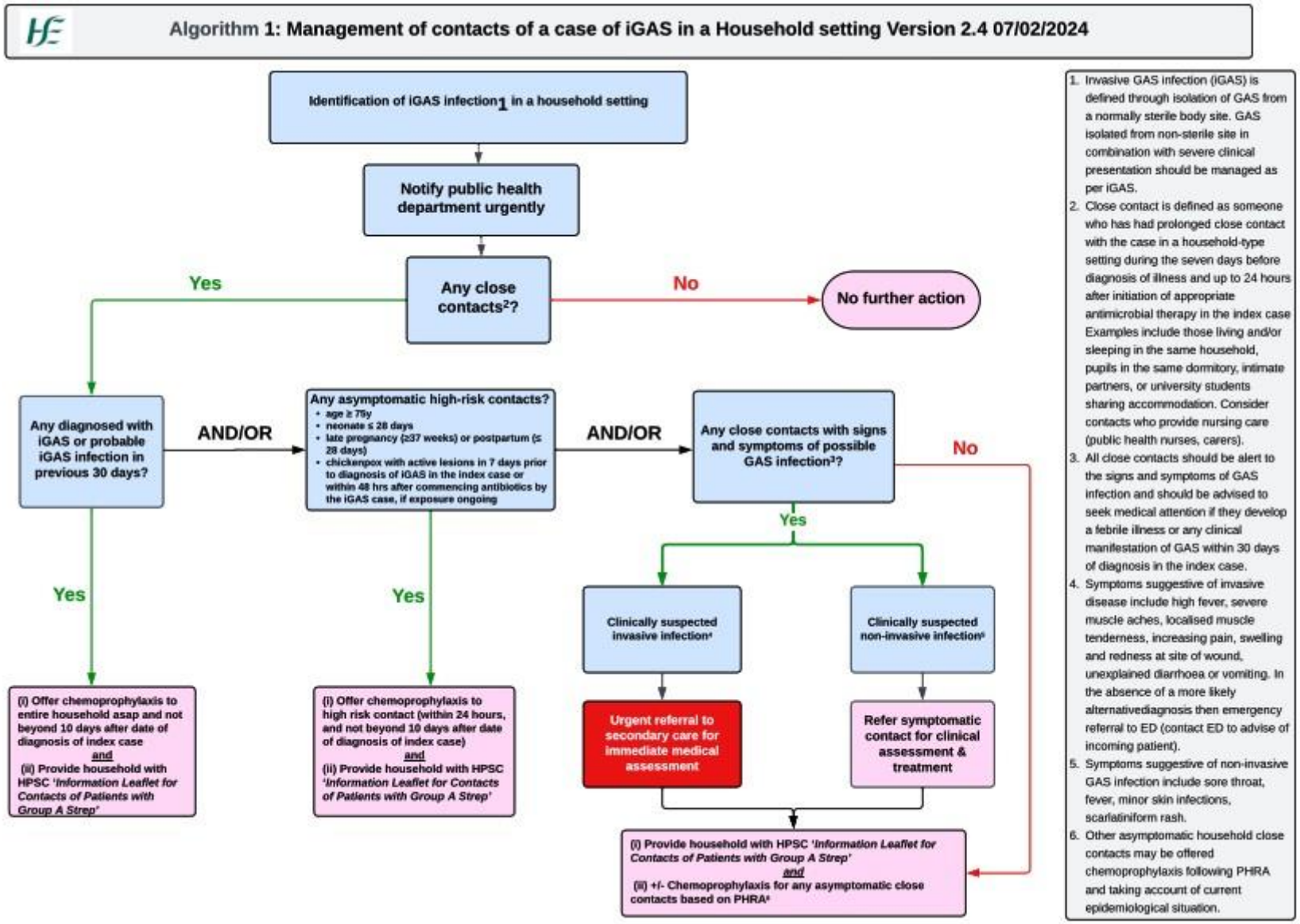
Transmission of Group A Streptococcus (GAS) within households is well documented (76-78) and the risk is highest in mother-neonate pairs and older couples (6, 46, 79). There is some limited evidence that clusters of iGAS cases are more likely to occur in households with higher numbers of occupants (46). Secondary attack rates in household contacts ranging from 800 to over 5000 per 100,000 person-years at risk have been observed in different countries (7).

3.3 Public health actions: Outbreak of iGAS in household setting

During household outbreaks of iGAS infection, advise chemoprophylaxis for all household members. As with all infectious diseases that are transmissible via droplet spread, emphasise hand and respiratory hygiene.

Recommendation 9: If 2 or more confirmed or probable iGAS cases are identified in the household, offer chemoprophylaxis to the entire household ASAP and not beyond 10 days after date of diagnosis of index case[1]

Algorithm 1: Management of contacts of a case of iGAS in a household setting.



1. Invasive GAS infection (iGAS) is defined through isolation of GAS from a normally sterile body site. GAS isolated from non-sterile site in combination with severe clinical presentation should be managed as per iGAS.
2. Close contact is defined as someone who has had prolonged close contact with the case in a household-type setting during the seven days before diagnosis of illness and up to 24 hours after initiation of appropriate antimicrobial therapy in the index case Examples include those living and/or sleeping in the same household, pupils in the same dormitory, intimate partners, or university students sharing accommodation. Consider contacts who provide nursing care (public health nurses, carers).
3. All close contacts should be alert to the signs and symptoms of GAS infection and should be advised to seek medical attention if they develop a febrile illness or any clinical manifestation of GAS within 30 days of diagnosis in the index case.
4. Symptoms suggestive of invasive disease include high fever, severe muscle aches, localised muscle tenderness, increasing pain, swelling and redness at site of wound, unexplained diarrhoea or vomiting. In the absence of a more likely alternativediagnosis then emergency referral to ED (contact ED to advise of incoming patient).
5. Symptoms suggestive of non-invasive GAS infection include sore throat, fever, minor skin infections, scarlatiniform rash.
6. Other asymptomatic household close contacts may be offered chemoprophylaxis following PHRA and taking account of current epidemiological situation.

4 Crèche, schools, and other childcare settings

Cases of invasive Group A Streptococcus (iGAS) are rare in children, with children under 10 years of age constituting 13 to 16% of cases annually (80). A global systematic review and meta-analysis of iGAS infection in pregnant women and young children reported a pooled incidence rate of 0.09 per 1,000 person- years for children aged 0 to 5 years (49). The overall case fatality rate in this age group was 9% (49). In Ireland, between 2nd October 2022 and 2nd December 2023, 575 cases of iGAS were notified in Ireland (8). Of these, 234 (or 41%) were in children aged <18 years, of whom 204 were aged 0-9 years. This contrasts with the pre-pandemic years when approximately 25% of iGAS infections were in children aged < 18 years.

Among cases notified since October 2022, there have been 12 deaths in children (10 in children aged under 10 years old and two in children aged 10-17 years). So far in 2023, there have been 8 paediatric deaths reported (8).

4.1 Public Health Risk Assessment

If a reported iGAS case attended or worked in a crèche, school, or other childcare setting within 7 days of onset of symptoms, a Public Health Risk Assessment (PHRA) should be conducted. The threshold for action and communication with crèches is lower compared to schools with older children, as the risk of transmission is higher by nature of the setting and level of mixing amongst younger children. As mentioned in Section 2.1, children attending the same crèche, school or other childcare setting are **not** normally considered to be close contacts, but it may be possible to define a group within the setting in which extensive close contact takes place.

The PHRA should consider the following factors:

Are there any other children/ staff with:

- Group A Streptococcus (GAS) infection within the last 7 days

- Any other iGAS cases[5] in the last 30 days
- Evidence of co-circulating chicken pox or influenza, as co-infection with either is associated with increased susceptibility to iGAS
- Other public health concern, (e.g. possible household-type contact a concern i.e. if the childcare setting is a childminder's home)

4.2 Public health actions: single case of iGAS

4.2.1 Control measures

a) Add crèche or school context on available incident management system, so that any linked cases are easily identified by Area Public Health Team.

b) Ask crèche or school to report new cases of GAS, iGAS, chickenpox and influenza of which they become aware of in the next 30 days. Evidence of ongoing infection, chickenpox or influenza in staff or children, should trigger the establishment of an Outbreak Control Team (OCT).

c) Swabbing and antibiotic chemoprophylaxis is not routinely recommended for contacts of a single case of iGAS in crèches or schools; in situations where there is evidence of ongoing GAS transmission and chickenpox or influenza activity, see (Section 4.3).

4.2.2 Communication with Contacts & Others

The crèche, school, or other childcare setting should send the Strep A (Group A streptococcus) factsheet to parents and staff within the defined setting to provide information and raise awareness of the signs and symptoms of GAS/iGAS, particularly in vulnerable contacts (immunocompromised, high risk contacts).

The crèche, school, or other childcare setting should also send the *Information leaflet for contacts of patients with Invasive Group A Streptococcal infection (iGAS)* factsheet to identified close contacts.

[5] Symptoms suggestive of invasive disease include high temperature, severe muscle aches or localised muscle tenderness, increasing pain, swelling and redness at the site of a wound, and/or unexplained diarrhoea or vomiting.

Recommendation 10: For a single case of iGAS in a creche, school or other childcare setting: establish if there are other cases of GAS within 7 days or iGAS within 30 days or co-circulating chickenpox or influenza in staff and children.

Send *Strep A (Group A streptococcus) factsheet* to staff and parents within defined setting to provide information and the '*Information leaflet for contacts of patients with Invasive Group A Streptococcal infection (iGAS)* to identified close contacts.

Good practice point

4.3 Public health actions: outbreak of iGAS infection or one case of iGAS AND evidence of ongoing GAS, or chickenpox or influenza transmission

Crèches, schools, and other childcare settings have been the focus of clusters of iGAS disease. If, in the context of an iGAS case linked to a crèche, school or other childcare setting, the PHRA conducted by the Area Public Health Team suggests that there is evidence of ongoing GAS, or chickenpox or influenza transmission as well as a case of iGAS, an investigation should be started promptly. An OCT should be set up and the key facts established to inform all subsequent decisions and actions.

Outbreaks of iGAS infection are rare, and are highly sensitive situations, raising concerns among parents with likely interest from the media, particularly if there have been one or more deaths. Expert advice on investigation and management should be sought promptly.

4.3.1 Source of infection

Undertake epidemiological investigations, including review of microbiology and surveillance records for further GAS/iGAS cases usually over previous 6 months. This aims to identify any common source or link between cases if there are 2 or more iGAS cases.

4.3.2 Control measures

a) Convene an OCT

To coordinate the investigation and management of the outbreak (*include local microbiologist or IMSRL)*

b) Exclusion

As outlined in Algorithm 2 Management of iGAS case linked to a crèche, school, or other childcare setting staff and parents should be reminded that symptomatic children and staff should remain at home and not return to crèche, school, or other childcare setting until at least 24 hours after starting treatment with an appropriate antibiotic.

c) Personal hygiene

Personal hygiene remains important in preventing infections. Good hand hygiene should be enforced for all pupils and staff and a programme should be put into place that encourages children to wash their hands at the start of the school day, after using the toilet, after play, before and after eating, and at the end of the school day. It is important that hands are washed correctly. Liquid soap via a soap dispenser should be made available and there should be a plentiful supply of paper towels. Children and adults should be encouraged to cover their mouth and nose with a tissue when they cough and sneeze and to wash hands after sneezing and after using or disposing of tissues. Spitting should be discouraged. Breaching the skin barrier provides a portal of entry for the organism, therefore children and staff should be reminded that all scrapes or wounds, especially bites, should be thoroughly cleaned and covered.

d) Environmental cleaning

The environment can play a significant part in transmission as GAS can remain in dust as well as on furniture and equipment (81-86). Cleaning of the environment, including toys and equipment, should as a minimum be carried out daily during the outbreak and a very thorough terminal clean should be undertaken when the outbreak is declared over.

Frequently touched points such as taps, toilet flush handles, and door handles, should be cleaned regularly throughout the day.

- **For cleaning of equipment, hard surfaces, hard toys, and sleep mats**: Physical clean using a detergent followed by disinfection with a chlorine-based product such as sodium hypochlorite or another appropriate disinfectant. Horizontal surfaces should be kept clear of unnecessary equipment and ornaments to facilitate thorough cleaning.
- **Carpets and soft furnishings** should be vacuumed daily. The vacuum cleaner should have a high efficiency filter on its exhaust. Single use cloths or paper towels should be used for cleaning. Where soft toys cannot be avoided, they should be machine washed; hard surface toys are more easily washed and disinfected. Consider replacing low-cost items that may be difficult to clean thoroughly, for example, pencils, crayons, play dough and plasticine.
- During the **terminal clean**, carpets and rugs should be cleaned with a washer-extractor. Curtains, soft furnishing covers, and all linen should be removed, and washed at the hottest compatible temperature (87, 88). Care should be taken when loading potentially contaminated items into the washing machine as direct contact with surfaces or excessive shaking will increase the risk of contaminating other environmental surfaces. The wash will be most effective where there is plenty of warm or hot water, detergent, and mechanical action. This can be increased by reducing the number of laundry items added to load (half to two-thirds full), increasing cycle times or temperatures, and avoiding low water or economy cycles. After laundering, clean items should not be placed in the same laundry basket or container that was used for the uncleaned items. Soft furnishings without removable covers should be steam cleaned taking care to hold the nozzle of the steam cleaner sufficiently close to the surface and for long enough for all surfaces (particularly contact areas) to ensure they heat up thoroughly. For more information, please see Volume 1, Section 3.1.3 of the National Clinical Guideline No. 30: Infection Prevention and Control.

e) Ventilation

Specialist ventilation is not routinely required when managing GAS infections but background ventilation through good design and opening doors and/or windows (where appropriate)

brings a variety of health benefits. This allows introduction and circulation of fresh air which dilutes and removes airborne contaminants which might otherwise cause harm, including co-circulating viruses known to increase the risk of iGAS infection. For this reason, opportunities to improve ventilation should always be considered, as part of a wider strategy to limit indoor transmission of infectious diseases (89).

f) Seek expert advice

Seek expert advice and ensure local laboratory sends samples to the reference laboratory (IMSRL) as soon as possible to enable rapid typing of isolates.

g) Swabbing and chemoprophylaxis

Antibiotic chemoprophylaxis aims to eradicate carriage in those who may be at risk of infection or pose a risk to others through onward transmission. Chemoprophylaxis can be considered by the OCT in certain circumstances, based on the PHRA; factors to be considered include evidence of co-circulating chickenpox or influenza alongside GAS infections. Mass swabbing of children is not routinely recommended; however, it can be considered in exceptional circumstances by the OCT. There are scenarios where targeted swabbing may be helpful, for example to identify ongoing transmission or confirm aetiology of clinical reports. The recommended antibiotic regimen for chemoprophylaxis is detailed in Section 2.4 and is the same as for treatment.

h) Varicella vaccination

Chickenpox has been identified as a risk factor for iGAS infection in anywhere between 15% to 25% of iGAS cases in hospitalised children in several different international studies (55, 90-92). Sentinel surveillance data for chickenpox and a sero-prevalence study (unpublished data) conducted in England show that by the age of 5, 65% of children will already have had chickenpox. Therefore, most children susceptible to chickenpox are in the younger age groups.

Chickenpox cases and outbreaks are more likely to occur in crèches, schools and other childcare settings serving children under the age of 5 years. An analysis of chickenpox mortality data from 2001 to 2007 in England and Wales reported 5 deaths where co-infection

or secondary infection with GAS was a risk factor and all of these were in children under 5 years (unpublished data).

In Ireland, during 2023, a clear relationship between paediatric iGAS and varicella was evident, most especially during the summer months. Additional data from Computerised Infectious Disease Reporting (CIDR) indicated that as of December 2023, 30 children (28 aged 0-9 years and 2 aged 10-17 years) had a co-infection with iGAS and varicella (17% of all children); while 49 children (32 aged 0-4 years, 14 aged 5-9 years and three aged 10-17 years) with iGAS reported varicella as a risk factor (23%) (8). If chickenpox is co-circulating in a crèche or pre-school setting where an iGAS case has been notified, the OCT could consider post-exposure prophylaxis with varicella vaccine and will need to consider the chickenpox outbreak management aspect. Varicella vaccine administered within 3 days of exposure may be effective in preventing chickenpox (93) and its use has been documented in several iGAS outbreaks in this setting (59, 94). Children from 9 months of age and staff with no clear history of chickenpox could be offered 2 doses of varicella vaccine, 4 to 8 weeks apart (95, 96).

i) Antivirals and flu vaccination

Influenza has been identified as a risk factor for iGAS disease although there is limited quantitative evidence on this (60-63, 97). If influenza is suspected or confirmed to be co-circulating in a crèche, school, or other childcare setting where an iGAS case has been confirmed, this provides an opportunity to remind eligible children, including those in clinical risk groups who are at increased risk of severe disease, to take up their offer of influenza vaccination. Influenza vaccination is not routinely recommended as post-exposure prophylaxis in this context. Two weeks are required for the immune response to vaccination to develop and so this is unlikely to prevent secondary cases.

Detailed recommendations about the use of antiviral neuraminidase inhibitors (that is, 'antivirals') can be found in the Guidance on the use of antiviral agents for the treatment and prophylaxis of Influenza . A summary of clinical guidance is available here. In keeping with current recommendations by Irish Guidelines and NICE (98, 99) HSE HPSC recommends the targeted use of antivirals as follows:

1. For treatment of uncomplicated influenza among specific at-risk groups (ideally within 48 hours of onset of symptoms).
2. Treatment of complicated influenza regardless of underlying individual risk factors.

There may be rare outbreak situations when wider use of post-exposure prophylaxis with antivirals in crèche, school, or childcare settings could be considered, such as in boarding schools. Ideally swabbing of a small number of recent cases should be used to confirm influenza and GAS circulation but may not be feasible if children are at home. Advice should be sought on a case-by-case basis.

j) Surveillance

After control measures are implemented and the outbreak declared over[6] on OCT direction, maintain surveillance for an additional 6 months and ensure any laboratory isolates are saved.

4.3.3 Communication with contacts and others

In the event of an outbreak of iGAS the crèche, school, or other childcare setting should send Strep A (Group A streptococcus) factsheet to parents and staff, to raise awareness of the signs and symptoms of GAS/iGAS, particularly in vulnerable contacts (immunocompromised, high risk contacts).

The crèche, school, or other childcare setting should also send the *Information leaflet for contacts of patients with Invasive Group A Streptococcal infection (iGAS)* factsheet to identified close contacts.

[6] For outbreak closure, a conservative approach of 60 days since last iGAS case (2 x 30-day period)

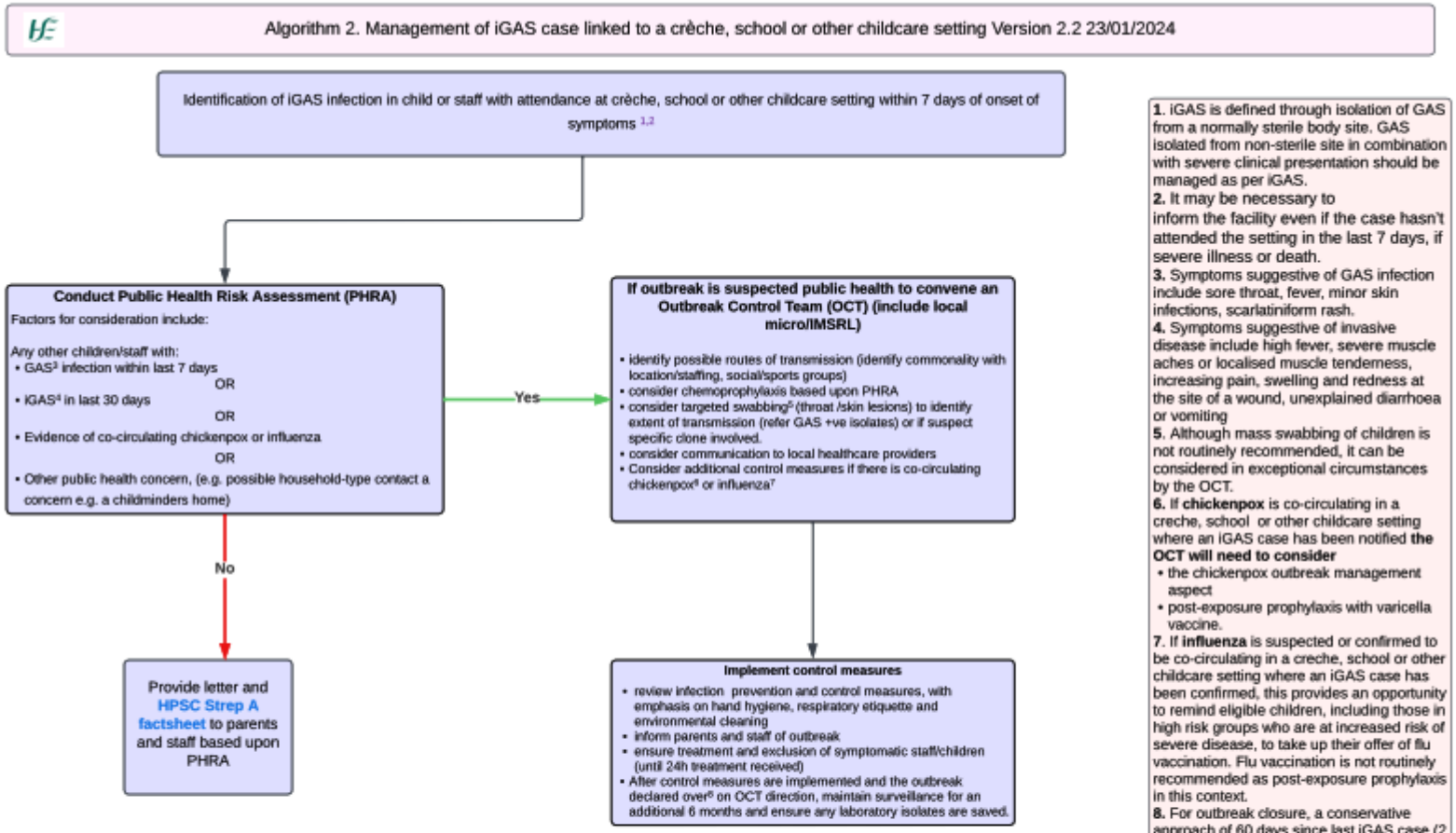
If there is co-circulating GAS, chickenpox or influenza, additional relevant information should be included in the information leaflet. The OCT should also communicate with local healthcare providers to alert them of the iGAS outbreak or situation to ensure prompt identification and treatment of cases.

Recommendation 11: In an outbreak of iGAS, or when there is evidence of ongoing GAS, or chickenpox or influenza transmission in a creche, school, or other childcare setting, the Guideline Development Group recommends:

- Setting up an OCT
- Following principles of outbreak investigation set out above
- Seeking expert advice on investigation and management

Good practice guidelines

Algorithm 2: Management of iGAS case linked to a nursery, school, or other childcare setting



1. iGAS is defined through isolation of GAS from a normally sterile body site. GAS isolated from non-sterile site in combination with severe clinical presentation should be managed as per iGAS.
2. It may be necessary to inform the facility even if the case hasn't attended the setting in the last 7 days, if severe illness or death.
3. Symptoms suggestive of GAS infection include sore throat, fever, minor skin infections, scarlatiniform rash.
4. Symptoms suggestive of invasive disease include high fever, severe muscle aches or localised muscle tenderness, increasing pain, swelling and redness at the site of a wound, unexplained diarrhoea or vomiting
5. Although mass swabbing of children is not routinely recommended, it can be considered in exceptional circumstances by the OCT.
6. If **chickenpox** is co-circulating in a creche, school or other childcare setting where an iGAS case has been notified **the OCT will need to consider**
- the chickenpox outbreak management aspect
- post-exposure prophylaxis with varicella vaccine.

7. If **influenza** is suspected or confirmed to be co-circulating in a creche, school or other childcare setting where an iGAS case has been confirmed, this provides an opportunity to remind eligible children, including those in high risk groups who are at increased risk of severe disease, to take up their offer of flu vaccination. Flu vaccination is not routinely recommended as post-exposure prophylaxis in this context.
8. For outbreak closure, a conservative approach of 60 days since last iGAS case (2 x 30 day period).

5 Residential care facility (RCF) settings

Clustering of cases of invasive Group A Streptococcus (iGAS) in residential care facilities (RCF) is more likely compared to households, and older people with iGAS infection are much more likely to have a fatal outcome. A study of confirmed iGAS cases in England found that long term RCF (LTRCF) residents aged over 75 years had a higher risk of iGAS (1.7 incidence rate ratio, 95% Confidence Interval 1.3 to 2.1) and death (odds ratio 2.3, 95%CI 1.3 to 3.8) compared to community cases of the same age (21). The overall rate in RCF residents above 75 years was 16.1 per 100,000 (21).

An international study in the US reported similar findings: iGAS incidence was 6 times higher among long-term care facility residents (≥65 years) than community-based elderly residents (41.0 versus 6.9 cases per 100,000 population) and the LTRCF residents were also 1.5 times more likely to die from infection than community-based residents (97). Cases of iGAS infection in residential care and nursing homes may have a mix of presentations, and the interval between cases may vary (100, 101). Sources of outbreaks in RCFs can include peripatetic staff (for example hairdressers, podiatrists, hospital chaplins or contract cleaners, homecare nurses, or home help support staff) and environmental contamination. Thus, cases in RCFs require careful assessment with ongoing surveillance for linked cases.

5.1 Risk assessment

A single case of iGAS infection linked to an RCF or similar setting should prompt a detailed risk assessment. Residents are not usually considered close contacts unless they share a bedroom. However, a Public Health Risk Assessment (PHRA) should be carried out on a case-by-case basis. (Please see Algorithm 5 Management of a single case of iGAS infection in a Residential Care Facility)

The main aims of the PHRA are to:

- ascertain the source of infection
- minimise the risk of transmission to other residents or staff
- assess the severity of the situation and establish if there are linked cases

- Determine size or layout of home, number of staff and residents, and staffing movements
- Advise on infection prevention and control as per acute healthcare guidelines if the iGAS case is being managed in residential care facility,
- Ask if there were other iGAS or Group A Streptococcus (GAS) cases in previous 6 months in that residential care facility (see Algorithm 6 if additional cases identified).

5.2 Public health actions: single case of iGAS in an RCF

5.2.1 Source of infection

Establish if the infection is likely to have been acquired in the RCF by checking for symptomatic staff, residents, or visitors. If the resident has spent time in a separate health care facility in the 7 days prior to the onset of symptoms consistent with GAS, manage the case in conjunction with the acute healthcare guidance and ensure hospital and community infection prevention and control (IPC) team are informed.

For cases likely to have been acquired in the RCF, ask the RCF if they know of any other cases of iGAS or GAS infection in residents, staff, or their families. Review microbiology, and surveillance records for any other notifications from the RCF in the past 6 months; if further cases identified, go to Section 5.3.

Key information required from the RCF:

- is the resident independently mobile? It may be useful to ask if the resident is confused/walking with purpose
- which areas of the RCF did they spend the most[7] time in?
- identify staff who provided care over the previous 6 months e.g. has the resident been cared for by home healthcare providers (for example, homecare nurses or home help support staff, podiatrists etc.)? If yes, use the guidance in this section alongside Section 6.4.

[7] In general, the person will be in one unit all the time, and only have access to all open areas of that specific unit, but nowhere else in the RCF unless there is an area such as a chapel or a co-located activity room.

5.2.2 Control measures

a) Infection prevention and control

IGAS is a diagnosis generally made in an acute hospital setting. Most cases of iGAS would be transferred to hospital. The decision on treatment options available resides with the attending physician with support from Acute/Public Health colleagues in consultation with the resident and their families/carers.

Table 5 is a checklist of infection prevention and control measures that may be used in an RCF.

b) Isolation

- Ensure residents with iGAS infection who **do not** require admission to hospital and remain in residence in the RCF have their own dedicated equipment and single ensuite bedroom[8]. If there are coincidental cases of GAS in the RCF, residents who begin treatment should remain in their room for 24 hours post commencement of antibiotic treatment.
- Arrange swabbing (throat or skin lesions) for staff with active symptoms of GAS (fever, sore throat, minor skin infections, scarlatiniform rash) and immediate exclusion from the workplace (until 24 hours after treatment has been received).
- Undertake treatment of infection in liaison with the individuals GP or healthcare provider
- Do not wait for culture results, but ensure antibiotics are appropriate once antimicrobial susceptibility testing results are available.
- Cases with discharging wounds or ulcers should be isolated until the discharge has ceased and preferably until a swab taken 24 hours after completing antibiotics is negative. Refer to HSE Wound Management Guidelines

[8] There is inconclusive evidence as to whether the rate of infection or carriage is higher in residents who have close contact with a roommate who is a case or carrier (22). Consider only those sharing a bedroom as 'household contacts' and manage according to Algorithm 1. There may be no additional benefit in relocating a roommate as they will already have been exposed to the infection.

- Provide relevant information and raise awareness of the signs and symptoms of GAS and iGAS to staff, residents, and family members, particularly in vulnerable contacts (immunocompromised, high-risk contacts).
- RCFs must strike a balance between the need to manage the risk of introduction of communicable infectious diseases by people accessing the RCF and their responsibility for ensuring the right of residents to meaningful contact is respected in line with regulatory obligations. Full access should be facilitated to the greatest degree practical for all residents. Access may be very limited for a period of time in the early stages of dealing with an outbreak, but a total withdrawal of access is not appropriate. If limitations on access are considered necessary, this should be based on a risk assessment that is reviewed regularly in view of the prevailing public health circumstances in the population served by the RCF.

c) Personal hygiene

Check if there are any staff who have had close contact, such as during dressing an open infected wound. Suggest review of standard and transmission-based precautions practices within the RCF. Educate RCF management to recognise signs and symptoms of GAS and iGAS infection and advise to seek medical attention if staff or any of the residents develop such symptoms.

d) Environmental decontamination, linen, and waste disposal

- Complete a cleaning of the environment of the resident who has infection as GAS can be found to remain in dust (82-86) as well as on furniture and equipment.
- A terminal clean of resident's bedroom and bathroom should be carried out after the infectious period or after their transfer or discharge, including care equipment.
- Keep surfaces clear of unnecessary equipment to allow thorough cleaning to occur.
- As a minimum recommendation, cleaning with detergent and water followed by disinfection using hypochlorite at 1,000 ppm of available chlorine or a combined product, should be used for equipment and hard surfaces, including commodes and hoists (88, 102, 103)(87)

- Whilst a resident is considered infectious, their clothing, linen and waste must be handled as hazardous (88, 102, 103) (104). Healthcare facilities must have documented policies on the collection, transportation, and storage of linen. Healthcare facilities that process or launder linen must have documented operating policies. All used linen should be handled with care to avoid dispersal of microorganisms into the environment and to avoid contact with staff clothing. Please refer to the National Clinical Guideline: Infection Prevention and Control for more information.

e) Swabbing

Recommend swabbing of contacts sharing the same room or bathroom as the index case especially if they have open wounds or ulcers or are symptomatic. The microbiology lab should retain isolates for up to 6 months and send positive samples directly to the Irish Meningitis and Sepsis Reference Laboratory (IMSRL) for molecular typing. Epidemiological investigation should not be delayed while awaiting results of typing.

f) Transferring residents

Avoid transferring a resident with GAS to another unit for non-clinical reasons to minimise the risk of cross-infection. If transfer to a healthcare facility for treatment is unavoidable, communicate details of the risk of infection effectively to the ambulance service, the receiving ward or department or facility, the receiving IPC team, and the local Area Public Health Team.

g) Prospective surveillance

The Area Public Health Team should be notified. Ask RCF to report new cases amongst staff and residents in the next 30 days. Add RCF (and homecare nurses or home help support staff where relevant) as a context on case and incident management system, so that any linked cases are easily identified by the Area Public Health Team for a prospective period of 6 months.

5.3 Public health actions: outbreak of iGAS infection OR one iGAS case and one or more cases of non- invasive GAS infection

As referred to earlier in this guidance, an outbreak is defined as two or more cases of probable or confirmed iGAS infection related by person, place, and time.

A single case of iGAS infection with one or more cases of non-invasive GAS infection, although not considered an outbreak, may still warrant investigation and ongoing management taking into consideration time interval, number of cases, and epidemiological links. Actions should not wait for results of isolate sequence typing, however checking the antimicrobial susceptibility profile ('antibiogram') may be useful, that is, if isolated susceptibility profiles are very discrepant, they are unlikely to be linked.

The following could be considered:

- The number of residents and their risk factors/co-morbidities.
- The number of staff and their working patterns, including peripatetic staff (for example, homecare nurses, or home help support staff, podiatrists etc.). Check which staff have had close contact, such as dressing an open wound, or evidence of suboptimal infection prevention and control practices which could have facilitated transmission. If the cases have been cared for by peripatetic staff, initiate dual investigations of the RCF and home support services, using guidance in this section alongside guidance in Section 6.4.
- The size of the RCF – the number of buildings or floors, residents on each floor, types of room, shared bathrooms etc.
- Undertaking a retrospective analysis of microbiology and other surveillance records for at least the past 6 months to establish if the new case is sporadic or could be linked to earlier cases of GAS infection.
- Whether the case shares a bedroom with anyone else – roommates should be managed as 'household' contacts.

5.3.1 Source of infection

Undertake epidemiological investigations, including review of microbiology and surveillance records for further GAS/ iGAS cases over past 6 months. The aim of this is to try to identify commonalities between cases in the source or exposures in the 7 days prior to onset to inform public health actions to prevent further transmission.

These include common exposures to staff (including peripatetic healthcare staff, hairdressers etc.), common floors, social contacts, healthcare needs (for example, attending outpatient appointments such as GP dressing clinics), and shared bathrooms. Early assessment of case movements within the RCF (for example, if the individual is bedbound) will provide important insight into potential routes of transmission. Consider active symptoms of GAS in staff and visitors of the cases.

5.3.2 Control measures

a) Convene an Outbreak Control Team

Convene an Outbreak Control Team (OCT) including (but not limited to):

- Administrators (medical and nursing)
- Managers of implicated areas
- relevant Clinical Directors/Chief Clinical Directors
- IPC Professionals
- Clinical Microbiologists
- Public Health Physicians
- Infectious Diseases Physicians
- Epidemiologists
- Occupational Health Physicians
- Chair (Medical Officer of Health, CPHM or SPHM)
- Health Protection Nurse manager
- Cleaning services and estates
- Food services, and others as defined by circumstances
- GP input would be valuable where possible

The OCT should coordinate the overall management and oversee the immediate implementation of control measures. (Please see Algorithm 6: Identification and management of suspected or confirmed IGAS outbreak in a Residential Care Facility).

b) Follow all control measures for a single case

Undertake additional measures in proportion to the number, time interval and severity of cases (Table 5). Advise the RCF to isolate new cases and enforce enhanced cleaning measures.

c) Advise closure of the facility

Advise closure of the facility to admissions and transfers (see Section 5.3.3) for a period of time. This should be for as short a period as possible, to establish control measures, and understand whether there is evidence of transmission to other residents, undertake such swabbing as is advised by OCT, complete a terminal clean of the relevant area/s.

It is typical that such a closure would be for approximately 2 weeks, depending on the above measures being implemented and evidence of control of transmission. This should be communicated to relevant parties (including hospitals, GPs, community organisations etc). If limitations on access are considered necessary, this should be based on a risk assessment that is reviewed regularly in view of the prevailing public health circumstances in the population served by the RCF.

d) Expert advice

Seek expert advice and ensure local laboratory sends samples to the IMSRL (Irish Meningitis and Sepsis Reference Laboratory) as soon as possible to enable rapid typing of isolates, both retrospective and prospective isolates. However, treatment and control measures should not await typing results.

If different *emm* types are detected, this does not exclude that there is an issue as heavy environmental contamination may occur with more than one type. Contact the IMSRL to discuss the possibility of performing Whole Genome Sequencing.

e) Swabbing and chemoprophylaxis

Consideration should be given to screening and/or prophylaxis of residents and staff, for the purpose of identifying additional cases. The use of mass versus targeted swabbing and/or antibiotic chemoprophylaxis should be determined by the OCT Risk Assessment. There is limited evidence on the most effective intervention (22, 105). Actions range from a strategy of surveillance swabbing and targeted prophylaxis to immediate implementation of mass prophylaxis throughout the RCF. A record should be maintained of numbers of cases, numbers screened and investigated, and numbers treated.

Swabbing

- In some situations, consideration can be given to surveillance swabbing of RCF residents and staff, including kitchen staff, ancillary / household staff and community health care workers, for ongoing assessment of the outbreak (but not visitors). The aim of swabbing is to identify routes of transmission that could inform the public health response.
- Mass swabbing could help guide subsequent actions where targeted treatment is used and may identify which individuals require repeat sampling at least 24 hours post-treatment. If this is being considered, it should be planned in coordination with the appropriate laboratory.
- Swabs should be taken from the throat and from sites of broken skin integrity such as wounds and ulcers, new piercing sites, and from exfoliating skin lesions such as eczema and psoriasis. Samples from dry skin lesions should be taken with a swab moistened with sterile fluid. However, swabbing may miss some carriers if carriage is on sites other than those sampled or where only small numbers of GAS are present, so caution must be exercised in interpreting negative results.
- If further cases arise, the OCT could consider further swabbing, including at additional intervals post-treatment. In certain scenarios where local epidemiology links to a particular individual but swabs are negative, swabs from additional sites (for example, vagina, perineum) may be considered.
- In general, post-treatment swabbing is not recommended, as prophylaxis is generally effective at eradication of carriage of GAS.

Sample Management

- Inform and send isolates to Irish Meningitis & Sepsis Reference Laboratory (IMSRL). Clearly label isolates sent to IMSRL as part of a suspected outbreak to prioritise processing. Epidemiological investigations and preventative measures should not await results of typing.

Chemoprophylaxis

- Decisions to use mass prophylaxis for staff and residents should include an assessment of benefits versus risks. Mass prophylaxis can provide treatment for those asymptomatically colonised from developing infection, and/or could remove carriage state, or reduce transmission from carriers. However, there are potential harms with use of antibiotics, and this must be weighed against any potential benefits. If mass prophylaxis is used, initiation of treatment should be synchronized as far as possible to maximise impact. There can be unwanted secondary effects including allergic reactions or, in individuals colonised with C. *difficile*, the risk of precipitating overt disease. The decision to administer antibiotics should be the result of an individual risk assessment
- Staff who were previously positive should be re-swabbed to check for clearance, as per acute healthcare guidelines (54). If they are still positive, risk assess to consider alternative antibiotics and initiate investigation of household contacts. Healthcare facilities that have identified staff as persistent carriers should have processes in place to ensure appropriate staff follow-up is complete.
- Organising mass administration of antimicrobials in RCFs can be challenging and the guideline development group therefore recommend a simple approach consistent with the regimens outlined in Table 4. If this is not successful, alternative regimens may be required and should be prescribed following consultation with a local microbiologist or infectious disease specialist. Lack of compliance with treatment regimens can occur among both staff and residents. For residents who lack capacity to consent and adhere to oral chemoprophylaxis, for example those with dementia, discuss with local microbiologist whether alternative regimens are available and could be administered, with appropriate delegated consent. Before eradication can be achieved, treatment of chronic skin conditions may also be required.

f) Environmental sampling

Environmental sampling is not usually indicated and is unlikely to add to the management of the situation. Risk assessment should be done regarding the need for environmental sampling, as advised by Area Public Health Team or Outbreak Control Team (88). Please see the National Clinical Guideline No. 30: Infection Prevention and Control (IPC) for more information on control measures.

5.3.3 Declaration of the end of an outbreak

As initial control measures are not always successful and given the potentially long intervals between cases (100, 101, 106) ongoing surveillance and vigilance for potential cases and new symptoms is required for at least 6 months. A period of 60 days applies to formal declaration of the end of the outbreak; however, the RCF / Unit can be re-opened to admissions and transfers when:

- all control measures have been implemented
- a terminal clean has been performed
- there have been no new cases for 2 weeks (the 2-week timeframe is a pragmatic, rather than evidence-based, decision)

Staff who were initially identified as symptomatic or positive on screening can return to work 24 hours after treatment has been received.

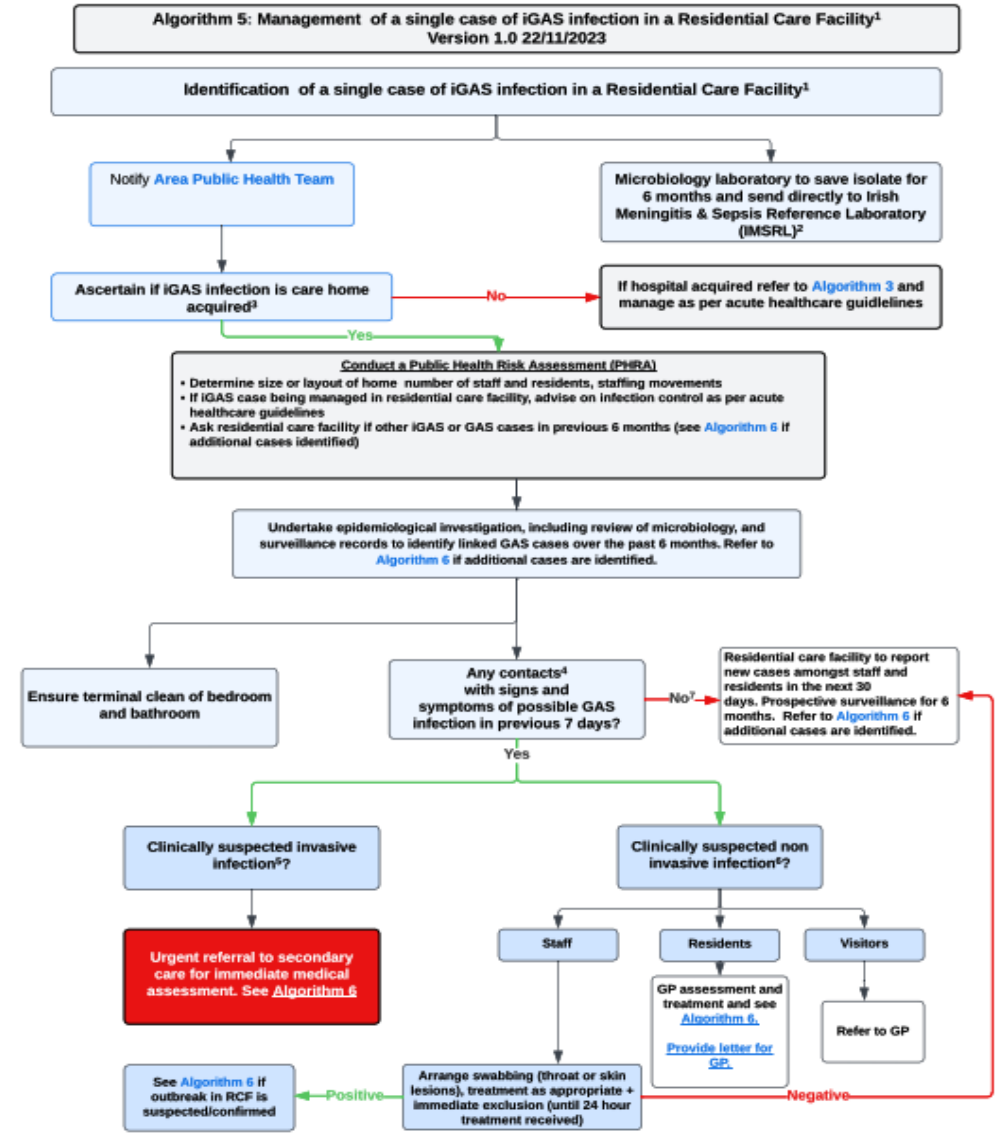
Table 5 Infection, Prevention and Control measures for RCFs

(Adapted from SIGN D) (105, 107).

Indication for use	Control Measures	Strength of evidence
Single case of iGAS	• all staff must adhere to strict hygiene as per '5 moments of Hand Hygiene'. Support service user to perform hand hygiene as required. • review *Management of Attendance* policy so staff not encouraged to work while ill • ensure application of standard and transmission-based precautions as required • check if any staff or residents have signs or symptoms of GAS (sore throat, fever, minor skin infections, scarlatiniform rash) • recommend swabbing of contacts sharing the same room or bathroom as the index case especially if they have open wounds or ulcers or are symptomatic. The microbiology lab should retain isolates for up to 6 months and send positive isolates to IMSRL for molecular typing • undertake a point of care risk assessment to identify what personal protective equipment may be required when caring for your resident, see here • implement enhanced surveillance for GAS infection • support all staff to complete hand hygiene education; see here for further resources • restrict staff movement where possible • educate residents, staff and visitors by distribution of GAS information letter • carry out full terminal clean of bedroom and bathroom to reduce possible environmental reservoir of GAS • provide education on transmission-based precautions	Common, well-accepted

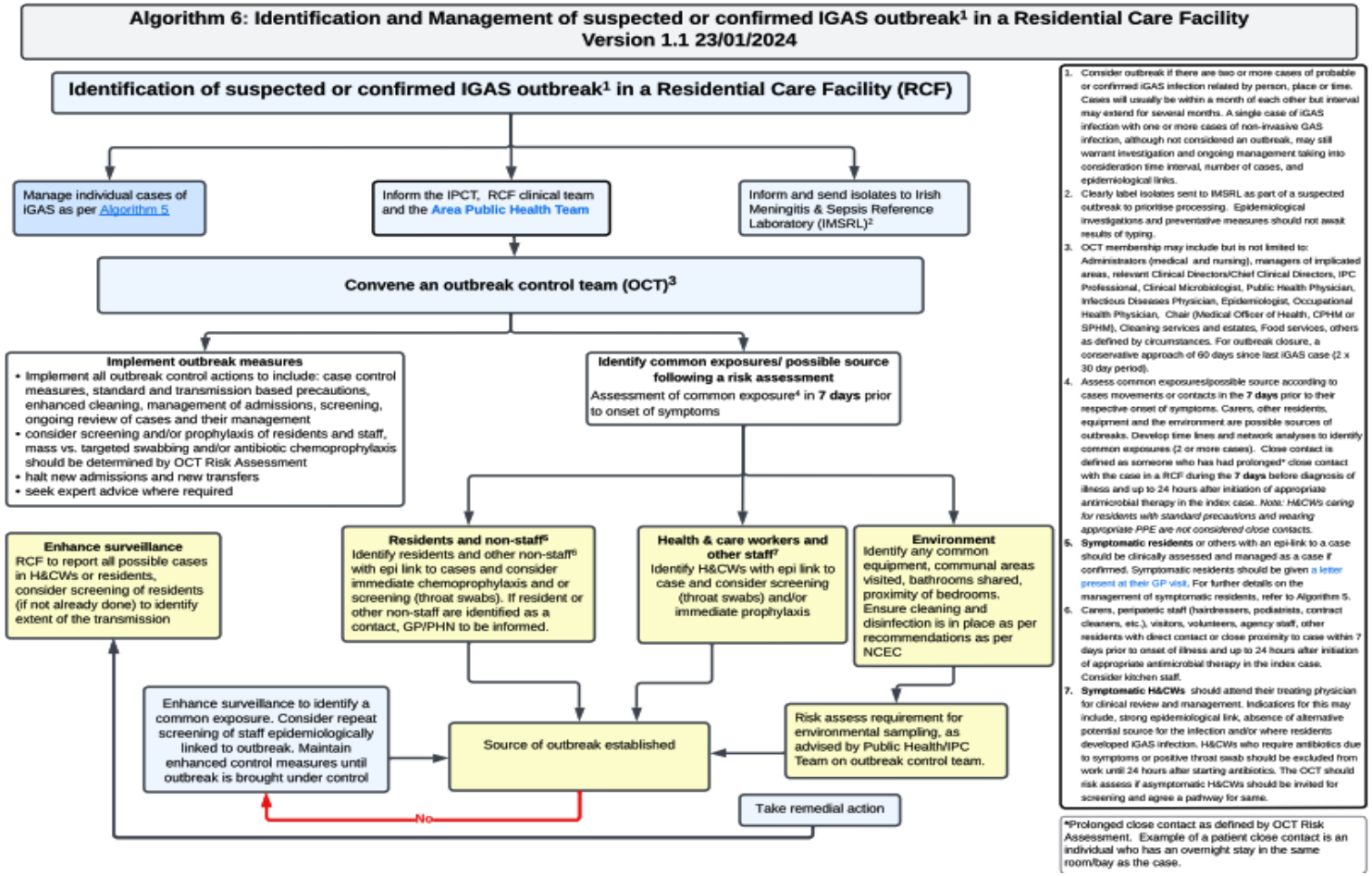
Further cases of iGAS identified	• advise closure of the facility to admissions and transfers for a period of time. This should be for as short a period as possible. or defer routine clinic and radiology appointments where possible • consider screening all residents for GAS in throat and wounds • screen staff (throat swab and open skin lesions, for example, eczema) who are symptomatic or are epidemiologically linked to cases (for example, have had contact with cases) • isolate or cohort residents with GAS • trigger for further investigation (>=2 cases of iGAS/GAS) • The use of mass versus targeted swabbing and/or antibiotic chemoprophylaxis should be determined by OCT Risk Assessment	Unproven but unlikely to harm
Outbreak prolonged, consider further measures	• role of re-screening • consider further antibiotics • consider environmental involvement • optimum cleaning protocol	Needs further evidence

Algorithm 5 Management of a single case of iGAS infection in a Residential Care Facility



1. Patient resided in a residential care facility in 7 days prior to onset of symptoms
2. Clearly label isolates sent to IMSRL. Epidemiological investigations and preventative measures should not await results of typing.
3. Consider care home acquired if symptoms or signs of infection not present on entry to care home and no other possible source of transmission identified, such as from recent hospital stay.
4. Carers, peripatetic staff (hairdressers, podiatrists, hospital chaplins, contract cleaners etc.), visitors, volunteers, other patients with direct contact or close proximity to case within 7 days prior to onset of illness and up to 24 hours after initiation of appropriate antimicrobial therapy in the index case. Example of a patient close contact is an individual who has an overnight stay in the same room/bay as the case. Consider kitchen staff.
5. Symptoms suggestive of invasive disease include high fever, severe muscle aches, localised muscle tenderness, increasing pain, swelling and redness at site of wound, unexplained diarrhoea or vomiting. In the absence of a more likely alternative diagnosis then emergency referral to ED (contact ED to advise of incoming patient)
6. Symptoms suggestive of non-invasive GAS infection include sore throat, fever, minor skin infections, scarlatiniform rash.
7. Consider whether **asymptomatic** staff contacts should be screened. Indications may include strong epidemiological link, absence of alternative potential source and/or where recent transmission of GAS within the home suspected.

Algorithm 6 Identification and management of suspected or confirmed iGAS outbreak in a Residential Care Facility



6 Other congregate community settings

Clustering of invasive Group A Streptococcus (iGAS) cases in other congregate community settings present distinct challenges for public health response. Community settings fall into two categories: those that involve healthcare services, for example, community or public health nursing, and those that do not, which can include a wide variety of settings and contexts such as congregate settings for people within the international protection process, people who experience homelessness (PEH), people who inject drugs (PWID) and residential settings such as for third level institutions (108-111).

Several international studies have found that marginalised populations such as PEH and PWID are disproportionately affected by iGAS (108-111). These populations often overlap with each other and with those in prison settings. A number of factors are thought to place PWID at increased risk of iGAS including their injecting practices, for example engagement in sharing of injecting equipment and/or groin injection, and their increased risk of skin lesions (108, 112-114). In addition, poor access to hygiene facilities, malnutrition and comorbidities increase risk for PWID and PEH alike (115).

Globally there have been several instances of periodic increases in iGAS in recent years, with a number of outbreaks in Canada (116-119), the United States (109, 110, 120), and the United Kingdom (108, 121). Recent investigations into a Canadian outbreak where iGAS cases more than quadrupled between 2015 and 2017 found that over half of the cases reported drug injection or homelessness risk factors (116). This is supported through an analysis of US surveillance data (109) which found PEH were over 50% more likely to have an iGAS infection than the general population. Increased skin breakdown among PWID and PEH was noted through an analysis of US hospitalisation data (110), where the proportion of cases with injection drug use and homeless risk factors more than doubled between 2013 and 2017 and over 80% of cases with these risk factors reported skin breakdown in the last month. This is of concern as skin breakdown could offer an entry point for Group A Streptococcus (GAS) infection (108) with a recent study into an outbreak in a homeless shelter in Canada finding residents with a diagnosed skin condition had 56 times the odds of acquiring GAS (119).

In England, there has been a general increase in iGAS infection notifications among PWID, PEH and individuals in prison since 2018 (108). Surveillance data (122) for England and Wales indicate that the number of iGAS isolates with a PWID risk factor has increased from 4 cases to 234 cases over the period 2013 to 2019. An investigation into a recent outbreak in Northwest England (108) found PWID and PWID experiencing homelessness carried a significant burden of these cases and noted differences in the *emm* type distribution between PWID and PEH groups when compared with non-risk groups.

Stigma, marginalisation, and criminalisation of people who inject drugs are a challenge to effective engagement with PWID and presents challenges for outbreak control team. It is important to keep this in mind when responding to any increase in cases among this population. Information on the epidemiology of iGAS cases in Ireland can be found on the HPSC website here.

6.1 Risk assessment

For iGAS cases in community settings involving health and social care services, use the home support services guidance found in Section 6.4 in conjunction with hospital guidance to inform staff risk assessment.

For iGAS cases in other community settings not involving healthcare services, follow the guidance detailed in Chapter 2 for recommendations on risk assessment and identification of contacts. Among homeless and injecting populations, it is important to identify contacts with open wounds or lesions, as they present a higher risk for transmission. Contact tracing may be challenging among some groups who inject drugs as individuals may not be willing to provide contact information for their peers. It is important to stress that you are asking for contact details for healthcare purposes and that their details, and those of their contacts, will remain confidential to the outbreak control team. It is also important to identify whether each case has been linked to sheltered accommodation, a drug service or specific injecting network, military base, prison setting in the 7 days prior to onset of symptoms. When giving advice to contacts of cases with injecting risk factors, work with addiction services to provide advice and information on wound care and safer injecting practices.

6.2 Public Health Actions: single case of iGAS

6.2.1 Source of infection

Consider if the source of iGAS infection is likely to be from close contact through living in close proximity (on a military base, sheltered accommodation, prison etc.), through employment, social contact or injecting related behaviours (peer networks etc.).

6.2.2 Control measures

If an iGAS case is linked to a setting which is not a private residential setting or RCF (for example, sheltered accommodation, military base, or prison) or is part of an organised group, the Area Public Health Team should:

- follow the household setting guidance in Chapter 3 of this document
- contact the setting or group to conduct a risk assessment
- follow the additional actions outlined below

a) Prospective surveillance

Initiate surveillance for 30 days to identify any further probable or confirmed cases of iGAS. All probable and confirmed cases should be notified urgently in and out of hours so that public health actions can be taken as soon as possible and ideally within 24 hours.

b) Environmental cleaning

Any bedding, sleeping bags, blankets, pillows, curtains, towels and/or clothing used by the case should be washed at a high temperature (at least 60° Celsius) using detergent. Clean all hard surfaces and touch points in rooms regularly used by the case (that is, bedrooms, bathrooms etc.) using a detergent followed by disinfection with solution containing hypochlorite at 1,000ppm of available chlorine (88). Ensure thorough cleaning and disinfection of rooms used by the case after they have vacated a room and/ or between residents.

For more information, please refer to National Clinical Guideline No. 30: Infection Prevention and Control (IPC).

c) Communication

It is important to provide educational resources on, and stress the importance of, good hygiene, wound care, and safer injecting practices, as applicable, to all close contacts. Translation of resources may be required.

6.3 Public health actions: Generalised rise or outbreak of iGAS cases

If the risk assessment conducted by the Area Public Health Team suggests evidence of ongoing GAS transmission in the community an investigation should be started promptly. An investigation should also be initiated where *emm* typing suggests a possible cluster or genomic assessment has confirmed an outbreak. An outbreak control team (OCT) should be formed, and key facts established to inform future action.

6.3.1 Source of infection

Undertake epidemiological investigations, including review of microbiology and surveillance records for further GAS/ iGAS cases that have occurred over the previous 6 months. This aims to identify any common source or link between cases in situations where there are 2 or more iGAS cases. Investigate symptomatic contacts or contacts with wounds or lesions through contact tracing. Consider investigation of carriage in people and the environment through swabbing. Define the risk group or setting and relevant case definitions.

6.3.2 Control measures

a) Convene an OCT

Convene an OCT to coordinate the investigation and management of the outbreak. If the case is among PWID or PEH, consider including representatives from appropriate local social inclusion or addiction services and/or organisations working with PEH in the OCT. Refer to National Social Inclusion office.

b) Surveillance

Establish enhanced surveillance for 30 days to identify those at risk, including health and care workers and prison staff where appropriate.

c) Seek expert advice

Seek advice from IMSRL and ensure microbiological assessment of all available isolates. Refer isolates for typing to the Irish Meningitis and Sepsis Reference Laboratory (IMSRL) clearly labelled with a unique ID. Consider requesting whole genome sequencing (WGS) to be conducted on all confirmed GAS cases.

d) Swabbing and chemoprophylaxis

Consider chemoprophylaxis, case by case based upon the Public Health Risk Assessment (PHRA) considering vulnerability and nature of contact, especially in situations where there is a defined group in a closed setting. The recommended antibiotic regimen is the same as for treatment (see Table 4). For individual service users where there is a risk of leaving before treatment completion or of low adherence to oral regimens (for example, PEH and PWID) discuss with a local microbiologist whether alternative regimens are available, such as a single oral, intravenous, or intramuscular dose. A number of studies indicate a reluctance to engage with healthcare and a low compliance to oral antibiotic regimens among these groups (118, 123-125). The HSE has established effective links with services as seen in the COVID-19 vaccine campaign. The importance of working with service providers across the HSE and non-HSE agencies needs to be reinforced. Area Public Health Teams should liaise with IPC teams within Prison services.

It is suggested that a single dose of intramuscular or oral chemoprophylaxis may be more effective among PEH and PWID since ensuring completion of an oral regimen may be difficult for these underserved groups (118, 126). During an outbreak of iGAS *emm26.3* among PEH in Alaska, a 1g single oral dose of azithromycin was administered to 391 persons. Baseline and post-intervention colonisation surveys showed a drop in the colonisation rate with this *emm* type, from 4% to 1% (127).

e) Personal hygiene

Good personal hygiene remains important in preventing infection. If the outbreak is in a closed setting (for example, prison, homeless shelter etc.), showers or washing facilities with clean towels should be available to everyone. Education on the importance of hand hygiene should be encouraged with liquid soap and paper towels provided. Individuals should be encouraged to cover their mouth and nose with a tissue when they cough and sneeze and to wash hands or use alcohol gel after sneezing and after using or disposing of tissues. Spitting should be discouraged. As skin breakdown increases the risk for GAS transmission (111), it is vitally important that all wounds are cleaned and covered hygienically. For service users who require assistance with wound care, clinics should be established. The service should engage with Public Health Nursing/HSE Social Inclusion services for support and advice regarding an appropriate wound care plan. Educational materials aimed at both PWID and those working with this population are essential to raise awareness of the importance of wound care and the increased risk of GAS infection among this group (110).

It is also important to investigate if there have been any prior infestations at the service location, i.e. lice, bedbugs, scabies, varicella as these infestations and any topical treatment may cause additional damage to the skin (119, 120).

f) Environmental cleaning, linen, and waste disposal

The environment can play a significant role in transmission as GAS can remain in dust as well as on furniture and equipment (81-86). During an outbreak in closed settings such as hostels, prisons or military establishments, cleaning of the environment should be carried out daily and a thorough terminal clean should be undertaken when the outbreak is declared over (88). For more information, please refer to National Clinical Guideline No. 30: Infection Prevention and Control (IPC).

g) Additional measures for prison settings

UKHSA have published guidance outlining the measures that should be taken in the event that incidents or outbreaks of iGAS are reported in prisons or prescribed places of detention (128).

6.3.3 Communication

In the event of an outbreak of iGAS infection in other congregate community settings, an information leaflet should be circulated to staff and those residing at the setting to raise awareness of the signs and symptoms of GAS/iGAS, particularly in vulnerable contacts (immunocompromised, high-risk contacts). Any additional control measures instigated (for example, antibiotic chemoprophylaxis) also need to be included here. Posters highlighting the symptoms of iGAS and the importance of wound care and good hygiene may also be displayed to further raise awareness (129).

For community outbreaks among PEH and PWID, targeted communications and educational resources can be supplied via needle exchanges, drug and alcohol services and services for the underhoused to raise awareness.

The OCT should also consider alerting local health professionals of the iGAS outbreak or case increase to ensure prompt identification and treatment of cases.

6.4 Home support (including personal care and home help services)

Home support services refers to the provision of medical or nursing care within a patient's home, including community and public health nursing, general practitioners, podiatry (chiropody), community midwifery, hospital outreach and palliative care. For cases and outbreaks associated with home support services, use this guidance in conjunction with acute hospital and maternity settings guidance to inform staff risk assessment.

Identification of outbreaks associated with home support services is difficult for several reasons:

- patients receiving homecare usually have many points of healthcare contact
- it was previously not routine for area public health teams to ask about healthcare exposures when undertaking routine follow-up of community-acquired iGAS infection
- care networks are often complex and links between cases may be difficult to ascertain (32).

Published data on infections associated with home support services is scarce but an international secondary data analysis study of homecare patients in the United States reported that 3.2% of patients become infected and require hospitalisation or emergency care, with wound infections being the most reported (130).

However, in Ireland, infection control in the home environment has improved. All staff now have access to alcohol hand gels, equipment is not shared and is supplied directly to the patient.

6.4.1 Source and mode of transmission

Investigation of outbreaks associated with home support services are complex, making it difficult to definitively establish a source. Indeed, no definitive source was identified in any of the outbreaks associated with home support services in England, 2018 to 2019 (29, 131). The common hypothesis was that GAS was transmitted between colonised or infected patients and healthcare workers and that numerous transmission events caused each outbreak, following lapses in infection control. The complexity of outbreaks associated with home support services is illustrated by the finding that during outbreaks in England, homecare workers visited up to 20 patients per day and several homecare workers might see the same patient each week (131). While the role of fomites in transmission remains unclear, GAS are known to persist on inanimate surfaces for up to 4 months (132) and challenges with decontamination in the home environment may provide opportunities for contamination to occur. It is likely that transmission occurs via a combination of carriage, transient contamination of home healthcare workers, equipment, or other fomites.

6.4.2 Outbreak characteristics

A PHE led review of 10 iGAS outbreaks linked to homecare services from January 2018 to September 2019 found that delays in recognition are common; for 9 outbreaks where this data was available, a median of 4.5 iGAS cases (range 2 to 11) and 40 days (range 3 to 517) had occurred before the outbreaks were declared (29, 131). The reasons cited for the delays included those concerning *emm* typing: delays in *emm* typing results, no standardised recording and review of *emm* types and outbreaks being caused by common *emm* types.

Overlap with residential care also caused delays in outbreak identification because the residential care initially formed the focus of the investigation. Finally, long delays between cases and lack of routinely collected data on homecare exposures meant that epidemiological links were missed. The complex nature of care networks, together with the issues cited above around delays in recognition of outbreaks means that they can last a long time. For the 10 outbreaks studied in England, the median duration was 199 days (range 3 to 517) (29, 131).

As the cases are predominantly older people with limited mobility and complex healthcare needs, these outbreaks often have high mortality rates. The PHE led review of 10 homecare associated outbreaks reported a case fatality rate of 29% (131).

6.4.3 Recommendations

The guideline development group adopts the following recommendations, as outlined in the PHE review of iGAS outbreaks linked to homecare services (32):

1. All community iGAS cases, including those occurring in nursing or residential care facilities, should be investigated for links to home support services.
2. Any identified links to home support services should be recorded on a case and incident management system.
3. Area Public Health Teams should systematically record and regularly review the *emm* types of all iGAS cases in their locality to allow early detection of potential outbreaks.
4. The OCT (for membership of OCT, please refer to Section 5.3.2) should consider a site visit to the home support services base, both to identify breaches in infection control and to build a relationship with the home support services team. This may necessitate visits to private or voluntary agencies who provide home support services on behalf of HSE.
5. All screening swabs which culture GAS should be sent for typing, and WGS if they are of the same *emm* type as the related outbreak. A positive screening swab is highly suggestive of transmission.
6. A member of the OCT (or delegated professional) should visit the home support services site in person if antimicrobial prophylaxis is considered. They should explain the rationale

for this, together with the limited risk of isolates developing antimicrobial resistance and H&CW should be given written information to promote compliance.

Appendix 1: SIGN-GRADE

Evidence informing the recommendations in this guideline was graded using the Scottish Intercollegiate Guidelines Network (SIGN) grading system, 1999-2012 (3).

Levels of evidence

1++ High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias

1+ Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias

1- Meta-analyses, systematic reviews, or RCTs with a high risk of bias

2++ High quality systematic reviews of case control or cohort or studies. High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal

2+ Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal

2- Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal

3 Non-analytic studies, e.g. case reports, case series

4 Expert opinion

Grades of recommendations

A At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or a body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results

B A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+

C A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++

D Evidence level 3 or 4; Or Extrapolated evidence from studies rated as 2+

Good practice points (GPP)

Recommended best practice based on the clinical experience of the guideline development group.

Appendix 2: Glossary of acronyms and abbreviations

Acronym	Definition
iGAS	invasive Group A Streptococcus
UKHSA	UK Health Security Agency
SIGN	Scottish Intercollegiate Guidelines Network
GAS	Group A Streptococcus
PCR	Polymerase Chain Reaction
RCF	Residential Care Facilities
CCF	Childcare Facilities
PHRA	Public Health Risk Assessment
RSV	Respiratory Syncytial Virus
IMSRL	Irish Meningitis & Sepsis Reference Laboratory
WGS	Whole Genome Sequencing
IHR	International Health Regulations
IATA	International Aviation and Transport Authority
IQR	Interquartile Range
OCT	Outbreak Control Team
HSE	Health Service Executive
HPSC	Health Protection Surveillance Centre
LTRCF	Long Term Residential Care Facility
IPC	Infection, Prevention and Control
CPHM	Consultant in Public Health
SPHM	Specialist in Public Health
PEH	People who Experience Homelessness
PWID	People who Inject Drugs
PHE	Public Health England
GPG	Good Practice Guidance

Appendix 3: iGAS Guideline Development Group Membership

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Appendix 4: iGAS Factsheets

Strep A (Group A streptococcus) factsheet

Information leaflet for contacts of patients with Invasive Group A Streptococcal infection (iGAS)

Appendix 5: Letter Templates for Area Public Health Teams (*to modify to suit local arrangements*)

Template letter to GP for a case of iGAS

Dear Dr xx,

Re: Invasive group A streptococcal infection (iGAS) in a patient registered with you

Case:	DOB:
Ref Number	Address
Close	Contacts:
DOBs:	

The above patient registered with your practice has been notified to Public Health as a case of invasive group A streptococcal disease (iGAS). Studies suggest that there may be an increased risk of iGAS infection in close contacts of a case but this risk is low. A close contact is defined as a person who has had prolonged close contact with the case in a household-type setting during the 7 days before diagnosis of iGAS infection in the index case.

The following is recommended for close contacts of iGAS infection.

1. Area Public Health Teams to provide close contacts of a case of iGAS disease with information about symptoms of iGAS (Please see here for further information) << *This leaflet has already been sent to close contacts of this case*>>.
2. Close contacts should seek urgent medical attention if they develop symptoms suggestive of invasive disease, for example, high fever, severe muscle aches/localised tenderness within 30 days of diagnosis in the index case. <<*We have already advised close contacts of this*>>
3. Close contacts with symptoms suggestive of localised GAS infection (sore throat, skin infection, fever) within 30 days of diagnosis in the index case should be offered antibiotic treatment. Refer to Table 4 for choice of agent. <<*None of the identified close contacts have symptoms currently / The following contacts have reported symptoms of GAS and have been advised to attend their GP for clinical assessment. If clinical presentation is suggestive of GAS, antibiotic treatment is recommended.*

4. Close contacts in the following high-risk groups should be prescribed antibiotic chemoprophylaxis:
   - Older persons (≥75 years)
   - Pregnant women ≥37 weeks gestation
   - Women within 28 days of giving birth
   - Neonates (up to 28 days old) *Please see* here *for further information*
   - Individuals who develop chickenpox with active lesions within the time period of 7 days prior to diagnosis in the iGAS case or within 48 hours after commencing antibiotics by the iGAS case, if exposure ongoing. Elements of PHRA should be taken into account.

5. If further cases of iGAS occur in the group of close contacts within a 30-day period, additional measures will be necessary. Please contact us in these circumstances.

If you have any queries, please contact the Area Public Health Team on << Phone number>>

Thank you for your assistance with this.

Yours sincerely,

Area Public Health Team

Template letter to GP for close contacts of an iGAS case

00 month 20XX

Dear Dr.

Re: Close Contacts of invasive Group A Streptococcal infection (iGAS)

Our ref:

Name	Date of birth

We have identified that the above patients, registered with your practice, are close contacts of a case of invasive group A streptococcal infection (iGAS). A close contact is defined as someone who has had prolonged close contact with the case in a household-type setting during the 7 days before diagnosis of illness and up to 24 hours after initiation of appropriate antimicrobial therapy in the index case. Studies suggest that there may be an increased risk of GAS in close contacts of cases but this risk is low.

Close contacts with symptoms of mild GAS infection within 30 days of diagnosis of the index case should be offered antibiotic treatment. We have sent the above contacts information about the symptoms of GAS and asked that they seek medical advice if they experience symptoms of mild GAS infection (sore throat, fever, minor skin infections, scarlatiniform rash) within 30 days of diagnosis of the index case.

The following groups are considered high-risk and are recommended to be given antibiotic chemoprophylaxis:

- Older persons (≥75 years)
- Pregnant women ≥37 weeks gestation
- Women within 28 days of giving birth
- Neonates (up to 28 days old)

- Individuals who develop chickenpox with active lesions within the time period of 7 days prior to diagnosis in the iGAS case or within 48 hours after commencing antibiotics by the iGAS case, if exposure ongoing.
- If further cases of iGAS occur in the group of close contacts within a 30-day period, additional measures will be necessary. Please contact us in these circumstances.

For **Choice of agent** please see here. If none of these antibiotics are suitable, a medical microbiologist should be consulted[9]. If you suspect any more cases of invasive group A streptococcal infection, please inform us without delay.

We have advised close contacts to seek urgent medical attention if they develop symptoms of more severe infection, for example, high fever, severe muscle aches or localised muscle tenderness, increasing pain, swelling and redness at site of wound and/or unexplained diarrohea or vomiting.

Please do not hesitate to contact us if you have any further queries.

Yours faithfully,

Area Public Health Team

[9] *Note: It remains the responsibility of the registered healthcare professionals supplying or administering medicines to check the medicine is appropriate for the patient and be aware of potential side effects. This may include checking doses, contraindications and drug interactions and communicating to the patient about potential adverse effects.*

Template letter for creche, school or other childcare setting

Dear parent or guardian,

A child who attends your child's creche, school or other childcare setting has developed invasive group A streptococcal infection (iGAS). Group A streptococcus are bacteria that can be found in the throat and on the skin. People may carry group A streptococcus and have no symptoms of illness or may develop infection.

This letter gives you some information about the disease, including the signs and symptoms to look out for. There is no reason to make any changes to the creche or school routine and no reason for children to be kept at home if well.

The most common group A streptococcal infections are mild: sore throats (strep throat), mild fever, minor skin infections, scarlatiniform rash. If your child has any of these symptoms in the next 30 days we advise that you take them (along with this letter) to see their GP. Their GP can arrange for the child to be tested if necessary and then treated with antibiotics if the GP thinks they have a group A streptococcal infection. If the GP thinks that the child has group A streptococcal infection, the child will need to remain off creche, school or other childcare setting for 24 hours following the start of the antibiotics.

In very rare cases, for example when chickenpox infection is also present, group A streptococcal infection can be more serious and cause more severe and even life-threatening diseases known as invasive group A streptococcus. Although the risk of another case of invasive disease in the creche, school or childcare setting is very small, it is important to be aware of the signs and symptoms of invasive group A streptococcal infection, which are detailed below:

- high fever
- severe muscle aches
- localised muscle pain
- increasing pain, swelling or redness at the site of a wound
- unexplained diarrhoea or vomiting

If someone in your family or household becomes ill with some of these signs or symptoms, please immediately attend ED (with this letter) for emergency assessment.
Further information on Group A Streptococcus is also available online at the following link.

Yours sincerely

Area Public Health Department

Template letter for GP – close contact of iGAS in RCF setting

Date:

Dear [GP name]

This letter is to inform you that a resident of [insert RCF name] has been diagnosed with invasive Group A Streptococcus (iGAS) infection. Following public health risk assessment, [Patient name] has been identified as a close contact of the iGAS case.

[Patient name] has developed the following symptoms but was well at the time of assessment.

Please tick all that apply
Sore throat ☐
High temperature (38°C or higher) ☐
Chills ☐
Muscle aches ☐
Minor skin infection ☐
Scarlet fever rash ☐
Other (*please specify below*)

We would be grateful for your assessment and management of [patient name] as per national guidance. These guidelines state the following:

> Symptomatic close contacts of an iGAS case, with symptoms that could be attributable to non-invasive GAS Infection (e.g., sore throat/impetigo), should be treated with empiric antibiotics. Treatment should not be delayed by awaiting microbiology lab confirmation.

Further details are available here: Guidance for General Practitioners and Others on the Management of Infections Caused by Group A Streptococcus.

We will continue to monitor his/her condition and will inform you of any new or worsening symptoms.

Yours sincerely,

_____

[Name and title of RCF contact person]
[insert RCF name]

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