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Annual Epidemiological Report

July 2019

Invasive Group A Streptococcal Disease in Ireland, 2018

Key Facts

- In 2018, there were 136 cases of invasive Group A streptococcal (iGAS) disease
- The crude incidence rate (CIR) was estimated to be 2.86 per 100,000 population
- Both the number and CIR represent a slight increase from 2017 (130 and 2.73, respectively)
- Eighteen cases presented with streptococcal toxic shock syndrome and/or necrotising fasciitis (among the most severe clinical presentations associated with iGAS), which is a decrease from 2017 (22 cases)
- Eight patients died, where iGAS infection was determined to be the main or contributory cause of death. Of these, two patients presented with both STSS and necrotising fasciitis
- Typing data from the Irish Meningitis and Sepsis Reference Laboratory (IMSRL) indicate that the predominant *emm*-type in 2018 was *emm*-type 1 (which is associated with STSS), representing almost 25% of all cases and almost 40% of STSS cases

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Background

Invasive Group A Streptococcal (iGAS; *Streptococcus pyogenes*) disease is an acute potentially life-threatening infection. Three clinical syndromes are recognised:

- Streptococcal toxic shock syndrome (STSS), which is characterised by hypotension and two or more of the following: renal impairment, coagulopathy, liver dysfunction, adult respiratory distress syndrome, generalised erythematous rash that may desquamate and soft tissue necrosis (necrotising fasciitis, myositis, gangrene)
- Necrotising fasciitis
- Bloodstream infection (BSI) with or without an identifiable focus of infection, such as meningitis, pneumonia, cellulitis, peritonitis, puerperal sepsis, septic arthritis, myositis or an identifiable focus of infection without bacteraemia, STSS or necrotising fasciitis

Methods

The figures presented in this summary are based on data extracted from CIDR on **30th April 2019**. Additional data on *emm*-typing and antimicrobial resistance were provided by the Irish Meningitis and Sepsis Reference Laboratory at the Children's University Hospital, Temple Street and EARS-Net at HPSC, respectively.

Results

Notifications

In 2018, 136 cases of invasive group A streptococcal (iGAS) disease were notified, which is a slight increase from 130 cases in 2017. This corresponds with a rate of 2.86 iGAS cases per 100,000 population [95% confidence interval (CI): 2.40-3.38], which is slightly higher than that seen in 2017 (2.73 [95% CI: 2.28 – 3.24]).

Case classification

There were 134 cases of iGAS classified as confirmed (99%) and two probable cases (1%). A confirmed case is a patient with group A streptococcus (GAS; *Streptococcus pyogenes*) isolated from a sterile site; while a probable case is a patient with a diagnosis of STSS or necrotising fasciitis, with GAS isolated from a non-sterile site.

Patient demographics

Of the 136 cases, 75 (55%) were male. The mean age was 47 years (range = 10 months – 94 years) and iGAS was more common in young children and older adults (Figure 1).

Geographic spread and seasonal variation

Table 1 displays the numbers and crude incidence rates (CIRs) of iGAS disease by HSE area from 2014 to 2018. HSE East accounted for the highest number of reported cases in 2018 (n=52); while the highest CIRs were seen in HSE Midlands (4.79 per 100,000 population). Overall, the numbers and CIRs of iGAS cases decreased in five HSE areas,

while three HSE areas reported increases. The peak month for notifications in 2018 was May (19 cases), followed by April (15 cases), January and July (14 cases each) (Figure 2). Figure 3 displays cumulative monthly iGAS cases from 2014 to 2018 inclusive. In 2018, 60% of iGAS cases occurred in the first six-months of the year. Data presented are based on the date the case was notified to public health, not on the date the case was first detected.

Figure 1. Age-specific rates of iGAS disease in Ireland, 2018

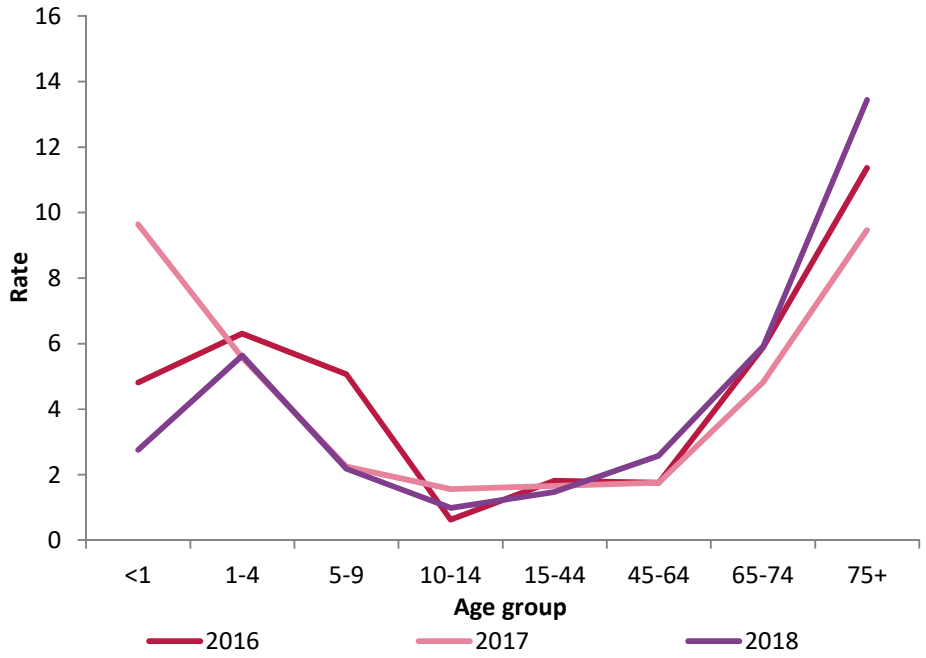


Table 1. Numbers (n) and Crude Incidence Rates (CIRs) per 100,000 population of iGAS disease by HSE Area, 2014-2018

HSE Area	2014		2015		2016		2017		2018	
	n	CIR	n	CIR	n	CIR	n	CIR	n	CIR
HSE E	65	**3.80**	40	**2.34**	68	**3.97**	54	**3.15**	52	**3.04**
HSE M	4	**1.37**	7	**2.39**	10	**3.42**	5	**1.71**	14	**4.79**
HSE MW	13	**3.39**	6	**1.56**	12	**3.13**	15	**3.91**	10	**2.60**
HSE NE	12	**2.60**	10	**2.17**	15	**3.25**	8	**1.73**	17	**3.68**
HSE NW	3	**1.17**	7	**2.73**	3	**1.17**	7	**2.73**	6	**2.34**
HSE SE	18	**2.61**	9	**1.30**	15	**2.17**	10	**1.45**	13	**1.88**
HSE S	27	**5.28**	11	**2.15**	12	**2.35**	20	**3.91**	13	**2.54**
HSE W	22	**4.86**	17	**3.75**	13	**2.87**	11	**2.43**	11	**2.43**
IRELAND	**164**	**3.44**	**107**	**2.25**	**148**	**3.11**	**130**	**2.73**	**136**	**2.86**

Figure 2. **Monthly distribution of iGAS cases in Ireland, 2016-2018**

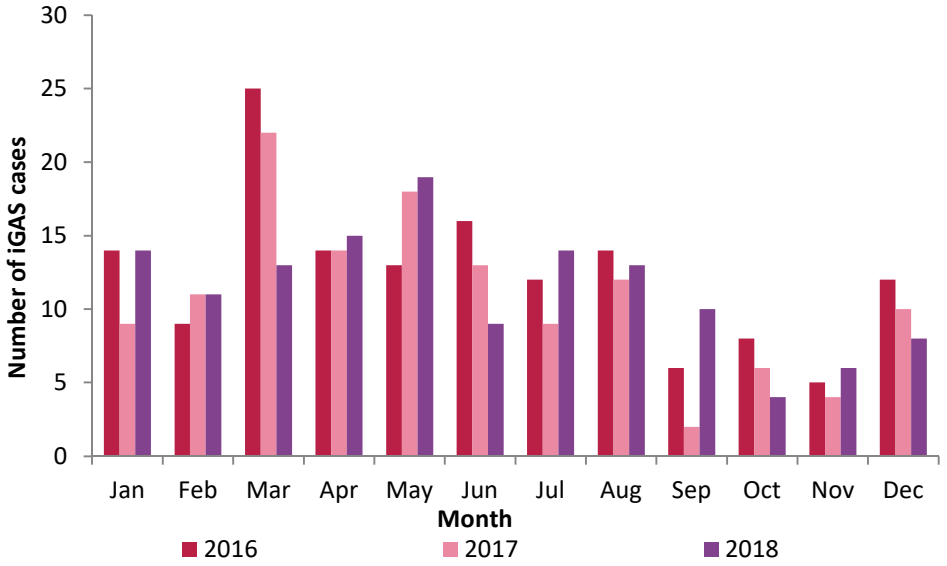
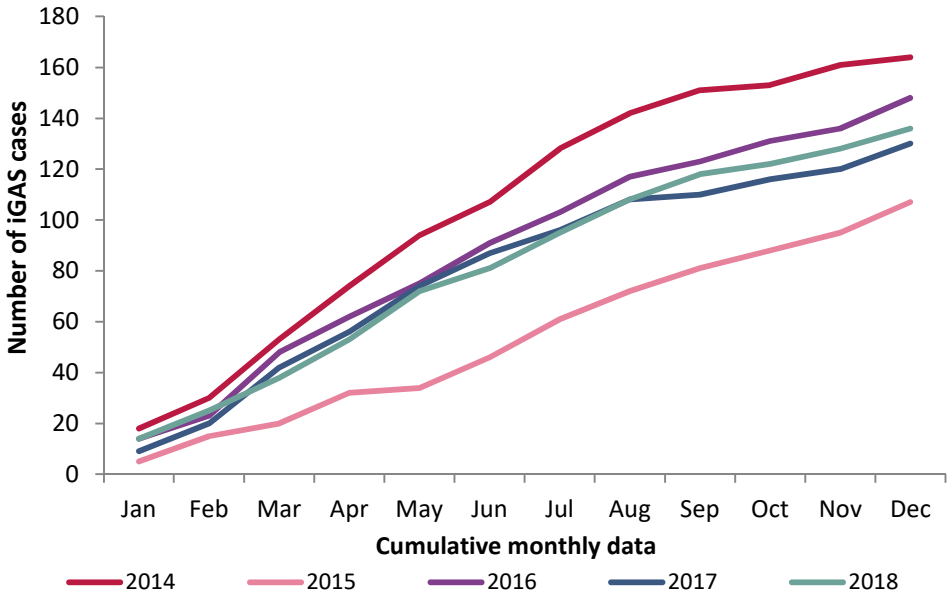


Figure 3. **Cumulative monthly numbers of iGAS cases in Ireland, 2014-2018**



Isolate details

Of 134 confirmed cases, GAS was isolated from a sterile site in 104, with source site not reported for 30 cases. Of reported sterile sites, GAS was isolated primarily from blood cultures (n=79; 80%), joint (n=7; 7%), deep tissue and/or bone (n=7; 7%) and abscess (n=6; 6%). For one case, GAS was isolated from two sterile sites (joint fluid and blood). There were two probable cases in 2018, whereby GAS was isolated from a non-sterile site (vaginal and skin swabs, respectively) with a clinical presentation that included STSS. Typing data, based on sequencing of the *emm* genes that encode the M protein (the major virulence factor), were available on 104 isolates submitted from 27 laboratories: *emm*-types

1 (n=25; 24%), 3 (n=12; 12%), 28 (n=10; 10%), 12 (n=9; 9%) and 89 (n=5; 5%) comprised 59% of all the isolates typed. Nineteen other *emm*-types (each represented by five isolates or less) were also detected. Of the 14 patients with STSS for whom *emm*-typing was undertaken, four GAS isolates each belonged to *emm*1 (80%) and *emm*3 with one each to *emm*28 and *emm*89.

Enhanced surveillance data

Enhanced data were provided for 115 (86%) of the 136 iGAS cases. The source laboratory could be ascertained for all cases. As in previous years, there was wide variation in completeness of enhanced data reporting. Table 2 summarises characteristics of iGAS cases in Ireland from 2014 to 2018.

Clinical details

Clinical presentation data were provided for 104 cases (76%). As in previous years, BSI (n=85) and cellulitis (n=40) were the most common presentations followed by STSS (n=16), pneumonia (n=14), septic arthritis (n=8) and necrotising fasciitis (n=5). Note that an iGAS case could have more than one clinical manifestation of infection.

Risk factors

Risk factor data were provided for 89 iGAS cases (65%). The most common risk factors were presence of skin or wound lesions (n=40), diabetes mellitus (n=14), malignancy (n=11) and recent childbirth (n=7). Note that an iGAS case could have more than one risk factor. No risk factors were identified for 23 cases.

Clinical management/severity

Surgical intervention was required for 30 patients (aged 12 months – 86 years). This included three patients with STSS only, two patients with necrotising fasciitis only and three patients with both STSS and necrotising fasciitis.

Among patients requiring surgical intervention, risk factor data were provided for 26 cases. The most common risk factors were skin and wound lesions (n=13) and age ≥65 years (n=6). No risk factors were identified for eight patients.

Admission to an intensive care unit (ICU) was required for 28 patients ranging in age from six days to 86 years. Of those, 10 had STSS, two had necrotising fasciitis and two had both STSS and necrotising fasciitis.

Risk factor data was provided for 24 of 28 ICU admissions, with skin and wound lesions (n=12) and age ≥65 years (n=9) most commonly reported. No risk factors were identified for four patients. Length of ICU stay was provided for 16 cases. The median length of ICU stay was three days (range = 1- 20 days).

Other epidemiological information

In 2018, three cases of iGAS were reported as hospital-acquired, with no cases of iGAS reported to be associated with an outbreak.

Outcome

Outcome at seven days following GAS detection was reported for 82 cases:

- Eight patients died, where GAS was the main or contributory cause of death
- The remaining 74 were still alive

The seven-day case fatality rate (CFR) for iGAS disease was 10%.

Of 16 STSS cases, outcome at seven days was reported for 13 cases. Of those, there were two deaths due to GAS (CFR = 15%).

Of 30 cases requiring surgical intervention, outcome at seven days was reported for 25 cases. Of those, there were two deaths where GAS was the main or contributory cause of death (CFR = 8%).

Of 28 cases admitted to ICU, outcome at seven days was reported for 22 cases. Of those, there were three deaths due to GAS (CFR = 14%) where GAS was the main or contributory cause of death.

Antimicrobial susceptibility

Antimicrobial susceptibility data were reported on 109 GAS isolates (99 from blood and 10 from other specimens) by 29 laboratories via the European Antimicrobial Resistance Surveillance Network (EARS-Net). All isolates tested were susceptible to penicillin (n=109) and vancomycin (n=74). Resistance to erythromycin was reported in three (3%) of 104 isolates and to tetracycline in eight (11%) of 74 isolates.

Public health implications

Invasive GAS is a potentially life-threatening infection. In 2018, the CFR was 5% for all iGAS infections and even higher for patients presenting with STSS (22%). The number of patients presenting with STSS remained the same for 2018 as in 2017 (n=16).

*Emm*1 has been the predominant *emm* type since 2015, but the proportion that are *emm*1 decreased from 38% in 2017 to 24% in 2018. There was greater diversity among the *emm* types identified in 2018 (n=24) compared with 2017 (n=18) with *emm* types other than the top five listed in Table 2 accounting for a higher proportion of all isolates typed (41% in 2018 versus 27% in 2017). Certain *emm* types, including *emm*1 and *emm*3, are associated with STSS, and STSS in turn is strongly associated with increased mortality. Changes in the *emm* types in circulation, as well as in the clinical presentations over time, highlight the dynamic nature of iGAS infection.

Ongoing surveillance is essential, specifically completion of the enhanced data questionnaire, to gain a greater understanding of iGAS, to enable early detection of clusters/outbreaks, to ensure prompt implementation of infection prevention and control precautions and appropriate management of contacts. Epidemiological typing as provided by the IMSRL is another vital element to increase insight into GAS infection in Ireland, as certain *emm* types are associated with greater morbidity and mortality.

Antimicrobial susceptibility data confirm that iGAS remains susceptible to penicillin and that penicillin should continue to be the treatment of choice for iGAS.

Table 2. Characteristics of iGAS cases in Ireland, 2014-2018

	Year				
	2014	2015	2016	2017	2018
Notifications					
Total iGAS cases notified	164	107	148	130	136
iGAS incidence rate per 100,000 population	3.57	2.25	3.11	2.73	2.86
Cases for which Enhanced data provided (%)*	150 (91%)	95 (89%)	120 (81%)	100 (77%)	115 (86%)
Patient Demographics					
Male (%)	94 (57%)	60 (56%)	77 (52%)	69 (53%)	75 (55%)
Mean age	44	43	44	43	47
Median age	44	42	44	44	51
Age range	0-99	0-99	0-92	0-92	0-94
Paediatric cases (aged <18 years) (%)	47 (29%)	26 (24%)	40 (27%)	35 (27%)	33 (24%)
Older cases (aged 65+ years) (%)	56 (34%)	34 (32%)	52 (35%)	43 (33%)	49 (36%)
Clinical Presentation†					
Data on Clinical Presentation (%)	133 (81%)	88 (82%)	111 (75%)	97 (75%)	104 (76%)
Streptococcal Toxic Shock-like Syndrome (STSS) without NF (%)	18 (14%)	11 (13%)	21 (19%)	11 (11%)	13 (13%)
Necrotising fasciitis (NF) without STSS (%)	4 (3%)	5 (6%)	5 (5%)	6 (6%)	2 (2%)
STSS and NF (%)	3 (2%)	0 (0%)	3 (3%)	5 (5%)	3 (3%)
Bacteraemia with focal presentations (%)	43 (32%)	33 (38%)	44 (40%)	35 (36%)	38 (37%)
Bacteraemia with no focal presentations (%)	37 (28%)	21 (24%)	25 (23%)	22 (23%)	32 (31%)
Other focal presentations with no bacteraemia (%)	28 (21%)	18 (20%)	13 (12%)	18 (19%)	16 (15%)
Bacteraemia (%)	100 (75%)	64 (73%)	90 (81%)	69 (71%)	85 (82%)
Other focal presentations:					
Cellulitis (%)	57 (43%)	34 (39%)	50 (45%)	41 (42%)	40 (38%)
STSS (%)	21 (16%)	11 (13%)	24 (22%)	16 (16%)	16 (15%)
Pneumonia (%)	14 (11%)	12 (14%)	9 (8%)	8 (8%)	14 (13%)
Septic arthritis (%)	10 (8%)	13 (15%)	7 (6%)	11 (11%)	8 (8%)
Necrotising fasciitis (%)	7 (5%)	5 (6%)	8 (7%)	11 (11%)	5 (5%)
Puerperal sepsis (%)	3 (2%)	6 (7%)	2 (2%)	4 (4%)	5 (5%)
Peritonitis (%)	1 (1%)	3 (3%)	5 (5%)	4 (4%)	3 (3%)
Erysipelas (%)	2 (2%)	1 (1%)	2 (2%)	3 (3%)	2 (2%)
Meninigtis (%)	0 (0%)	4 (5%)	0 (0%)	2 (2%)	0 (0%)
Risk Factors†					
Data on Risk Factors (%)	126 (77%)	77 (72%)	93 (63%)	85 (65%)	89 (65%)
Skin lesions/wounds (%)	50 (40%)	32 (42%)	38 (41%)	30 (35%)	40 (45%)
Diabetes (%)	11 (9%)	7 (9%)	10 (11%)	6 (7%)	14 (16%)
Malignancy (%)	10 (8%)	6 (8%)	16 (17%)	6 (7%)	11 (12%)
Childbirth (%)	4 (3%)	5 (6%)	3 (3%)	7 (8%)	7 (8%)
Varicella (%)	6 (5%)	3 (4%)	8 (9%)	2 (2%)	5 (6%)
Alcoholism (%)	5 (4%)	3 (4%)	2 (2%)	3 (4%)	3 (3%)
Steroid use (%)	6 (5%)	6 (8%)	8 (9%)	3 (4%)	3 (3%)
Injecting drug user (%)	5 (4%)	3 (4%)	4 (4%)	2 (2%)	2 (2%)
Non-steroid anti-inflammatory drug use (%)	2 (2%)	1 (1%)	2 (2%)	1 (1%)	2 (2%)
No identified risk factor (%)	48 (38%)	24 (31%)	27 (29%)	33 (39%)	23 (26%)
Outcome at 7 days					
Data on outcome at 7 days (%)	102 (62%)	73 (68%)	74 (50%)	73 (56%)	82 (60%)
RIP/GAS main cause or contributory (%)	10 (10%)	6 (8%)	4 (5%)	4 (5%)	8 (10%)
STSS cases: Data on outcome at 7 days (%)	17 (81%)	7 (64%)	7 (64%)	15 (63%)	13 (81%)
STSS cases: RIP/GAS main cause or contributory (%)	6 (35%)	1 (14%)	1 (14%)	2 (13%)	2 (15%)

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Table 2 (continued). Characteristics of iGAS cases in Ireland, 2014-2018

	Year				
	2014	2015	2016	2017	2018
Severity					
Data on Admission to ICU (%)	144 (88%)	92 (86%)	112 (76%)	97 (75%)	111 (82%)
Admitted to ICU (%)	36 (25%)	25 (27%)	36 (32%)	28 (29%)	28 (25%)
Data on Surgical Intervention (%)	127 (77%)	86 (80%)	99 (67%)	91 (70%)	98 (72%)
Surgical Intervention Required (%)	41 (32%)	26 (30%)	28 (28%)	32 (35%)	30 (31%)
Typing					
iGAS isolates that were typed (%)	130 (79%)	92 (86%)	127 (86%)	100 (77%)	104 (76%)
emm-1 (%)	21 (16%)	27 (29%)	51 (40%)	38 (38%)	25 (24%)
emm-3 (%)	47 (36%)	4 (4%)	6 (5%)	7 (7%)	12 (12%)
emm-28 (%)	12 (9%)	12 (13%)	10 (8%)	12 (12%)	10 (10%)
emm-12 (%)	6 (5%)	14 (15%)	14 (11%)	7 (7%)	9 (9%)
emm-89 (%)	8 (6%)	8 (9%)	6 (5%)	9 (9%)	5 (5%)
Other *emm*-types (%)	36 (28%)	27 (29%)	40 (31%)	27 (27%)	43 (41%)

* Degree of completion of enhanced surveillance forms varies from case to case: information may not be available on all variables/ categories, thus calculations of percentages take into account only those cases for which data are provided

† Note: A patient may have more than one clinical presentation or risk factor

Notes regarding the surveillance of invasive group A streptococcal infection

Laboratories

- All cases of iGAS diagnosed should be notified in a timely manner to the relevant Department of Public Health
- All iGAS isolates should be submitted to the Irish Meningitis and Sepsis Reference Laboratory at the Children's University Hospital, Temple Street for epidemiological typing
- Data on antimicrobial resistance profiles should be reported via the EARS-Net
- An enhanced surveillance form should be completed for each notification of iGAS. The latest version of the form is available at:

https://www.hpsc.ie/A-Z/Other/GroupAStreptococcalDiseaseGAS/SurveillanceForms/

Departments of Public Health

- All iGAS cases notified should be entered on CIDR
- Enhanced data should be entered on CIDR for all iGAS events where information is available

Further information available on HPSC website

Further information on iGAS disease in Ireland, including factsheets for patients and contacts, national guidelines is available at:
https://www.hpsc.ie/A-Z/Other/GroupAStreptococcalDiseaseGAS/

Acknowledgements

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