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Annual Epidemiological Report

November 2018

Invasive Group A Streptococcal Disease in Ireland, 2017

Key Facts

- In 2017, there were 130 cases of invasive Group A streptococcal (iGAS) disease
- The crude incidence rate (CIR) was estimated to be 2.73 per 100,000 population
- Both the number and CIR represent a decrease from 2016 (148 and 3.11, respectively)
- Twenty-two 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 2016 (28 cases)
- Four patients died, where iGAS infection was determined to be the main or contributory cause of death. Of these, two patients presented with STSS and necrotising fasciitis
- Typing data from the Irish Meningitis and Sepsis Reference Laboratory (IMSRL) indicate that the predominant *emm*-type in 2017 was *emm*-type 1 (which is associated with STSS), representing almost 40% of all cases and 80% of STSS cases

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Background

Invasive Group A Streptococcal (iGAS; *Streptococcus pyogenes*) infections are acute, frequently life-threatening infections. 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; soft tissue necrosis (necrotising fasciitis, myositis, gangrene)
- Necrotising fasciitis
- Bacteraemia 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 **16th August 2018**. 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 2017, 130 cases of invasive group A streptococcal (iGAS) disease were notified, which is a decrease from 148 cases in 2016. This corresponds with a rate of 2.73 iGAS cases per 100,000 population [95% confidence interval (CI): 2.28-3.24], which is lower than that seen in 2016 (3.11 [95% CI: 2.63 – 3.65]).

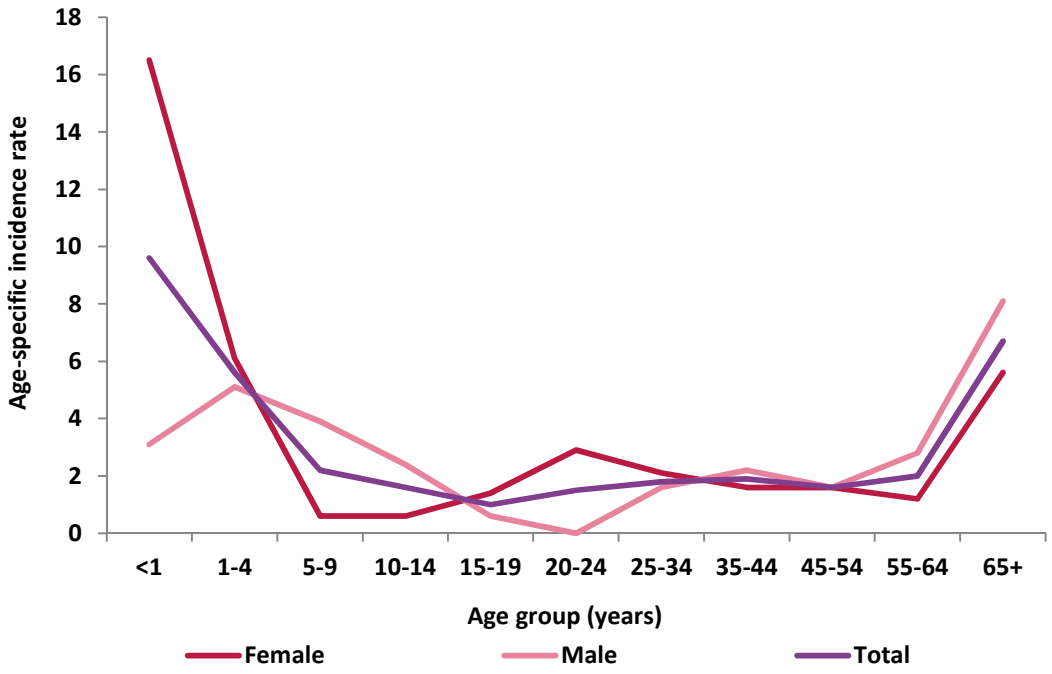
Case classification

There were 129 cases of iGAS classified as confirmed (n=129; 99%) and one probable case (n=1; 1%): confirmed cases are patients with group A streptococcus (GAS; *Streptococcus pyogenes*) isolated from a sterile site; while probable cases are patients with a diagnosis of STSS or necrotising fasciitis and where GAS is isolated from a non-sterile site.

Patient demographics

Of the 130 cases, 69 (53%) were in males. The mean age was 43 years (range = 10 months – 92 years) and iGAS was more common in young children and older adults (Figure 1).

Figure 1. Age- and sex-specific rates of iGAS disease, in Ireland, 2017



Geographic spread and seasonal variation

Table 1 displays the numbers and crude incidence rates (CIRs) of iGAS disease by HSE area from 2013 to 2017. HSE East accounted for the highest number of reported cases in 2017 (n=54); however, this represents a 20% decrease from 2016. The highest CIRs were seen in HSE South and HSE Mid-West (both 3.91 per 100,000 population). Overall, the numbers and CIRs of iGAS cases decreased in five HSE areas, while three HSE areas reported increases.

Table 1. Numbers (n) and Crude Incidence Rates (CIRs) per 100,000 population of iGAS disease by HSE Area, 2013-2017

HSE Area	2013		2014		2015		2016		2017	
	n	CIR	n	CIR	n	CIR	n	CIR	n	CIR
HSE E	67	**4.14**	65	**3.80**	40	**2.34**	68	**3.97**	54	**3.15**
HSE M	7	**2.48**	4	**1.37**	7	**2.39**	10	**3.42**	5	**1.71**
HSE MW	16	**4.22**	13	**3.39**	6	**1.56**	12	**3.13**	15	**3.91**
HSE NE	14	**3.18**	12	**2.60**	10	**2.17**	15	**3.25**	8	**1.73**
HSE NW	6	**2.32**	3	**1.17**	7	**2.73**	3	**1.17**	7	**2.73**
HSE SE	21	**4.22**	18	**2.61**	9	**1.30**	15	**2.17**	10	**1.45**
HSE S	18	**2.71**	27	**5.28**	11	**2.15**	12	**2.35**	20	**3.91**
HSE W	19	**4.27**	22	**4.86**	17	**3.75**	13	**2.87**	11	**2.43**
IRELAND	**168**	**3.66**	**164**	**3.44**	**107**	**2.25**	**148**	**3.11**	**130**	**2.73**

The peak month for notifications in 2017 was March (22 cases), followed by May (18 cases), April (14 cases) and June (13 cases) (Figure 2). Figure 3 displays cumulative monthly iGAS cases from 2013 to 2017 inclusive. In 2017, two-thirds 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 2. Monthly distribution of iGAS cases in Ireland, 2015-2017

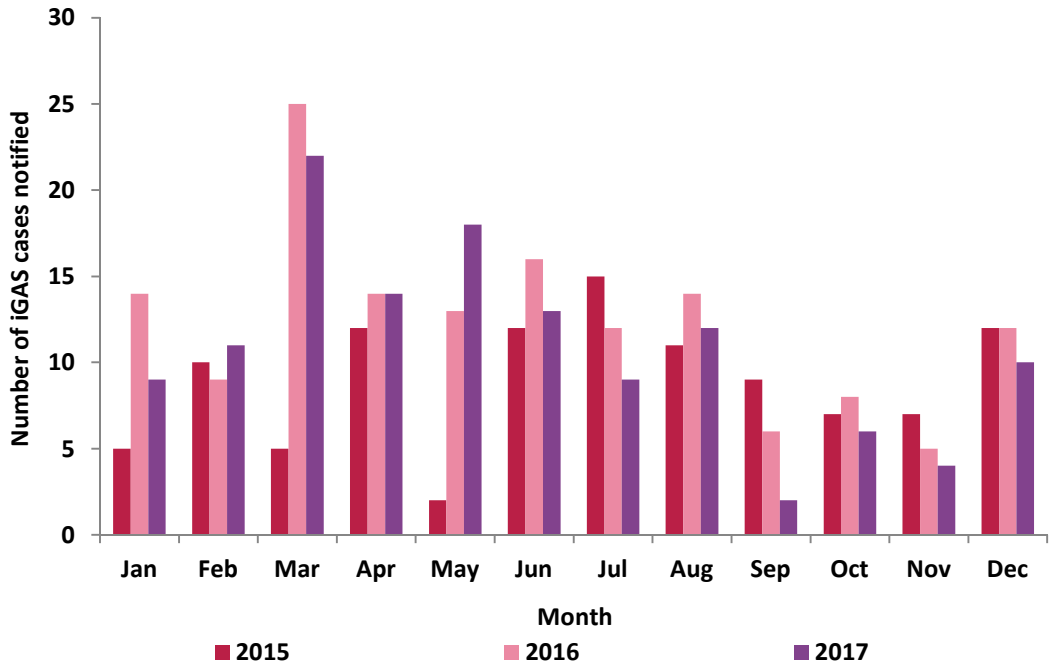
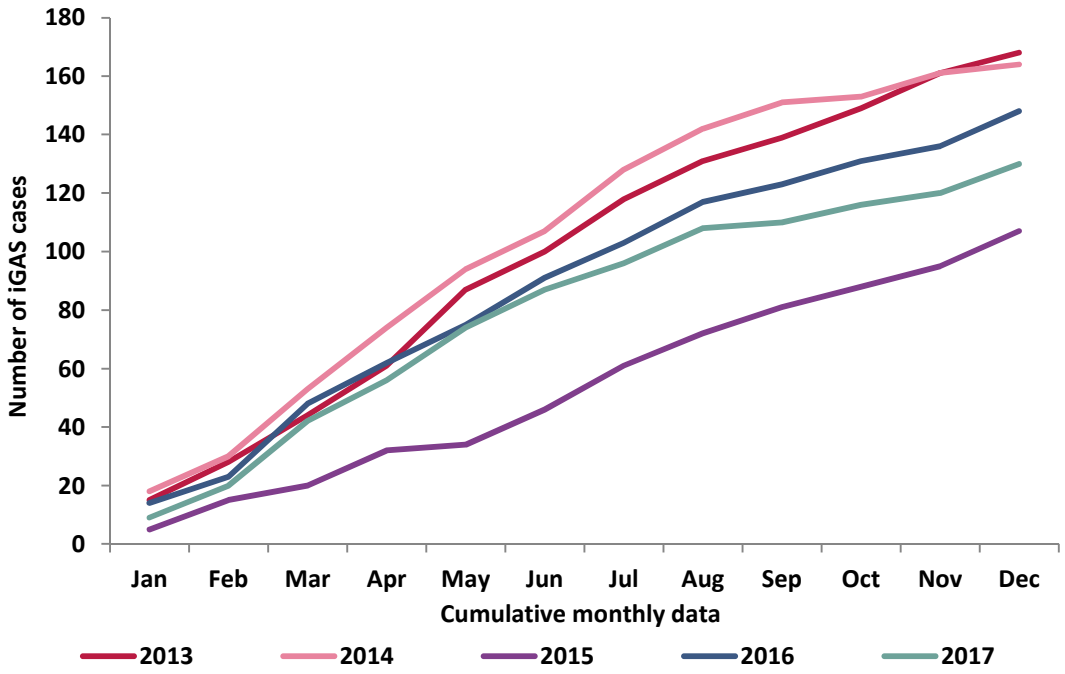


Figure 3. Cumulative monthly numbers of iGAS cases in Ireland, 2013-2017



Isolate details

Of 129 confirmed cases, GAS was isolated from a sterile site in 99, with source site not reported for 30 cases. Of reported sterile sites, GAS was isolated primarily from blood cultures (n=70; 71%), deep tissue (n=12; 12%), abscesses (n=8; 8%), joints (n=8; 8%), and bone (n=1; 1%). For three of the cases, GAS was isolated from another sterile site in addition to blood: peritoneal fluid (n=1), joint (n=1), and deep tissue (n=1).

There was one probable case in 2017 where GAS was isolated from a non-sterile site (vaginal swab) 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 98 isolates submitted from 27 laboratories: *emm*-types 1 (n=38; 39%), 28 (n=11; 11%), 89 (n=8; 8%), 3 and 12 (n=7; 7% each) comprised 72% of all the isolates typed. Thirteen other *emm*-types (each represented by five isolates or less) were also detected. Of the 10 patients with STSS for whom *emm*-typing was undertaken, eight GAS isolates belonged to *emm*1 (80%) and one each to *emm*3 and *emm*82.

Enhanced surveillance data

Enhanced data were provided for 100 (77%) of the 130 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 2013 to 2017.

Clinical details

Clinical presentation data were provided for 97 cases (75%). As in previous years, bacteraemia (n=69), including cases where bacteraemia was not specifically stated but GAS was isolated from blood, and cellulitis (n=41) were the most common presentations, followed by STSS (n=16), necrotising fasciitis (n=11), septic arthritis (n=11) and pneumonia (n=8). Note that an iGAS case could have more than one clinical manifestation of infection.

Risk factors

Risk factor data were provided for 85 iGAS cases (65%). The most common risk factors were presence of skin or wound lesions (n=30), recent childbirth (n=7), diabetes mellitus (n=6) and malignancy (n=6). Note that an iGAS case could have more than one risk factor. No risk factors were identified for 33 cases.

Clinical management/severity

Surgical intervention was required for 32 patients (aged 19 months – 82 years). This included five patients with STSS only, four patients with necrotising fasciitis only and four patients with both STSS and necrotising fasciitis.

Among patients requiring surgical intervention, risk factor data were provided for 30 cases. The most common risk factors were skin and wound lesions (n=15) and age ≥65 years (n=8). No risk factors were identified for eleven patients.

Twenty-eight patients (aged 2 months – 92 years) required intensive care unit (ICU) admission. This included seven patients with STSS, four patients with necrotising fasciitis and five patients with both STSS and necrotising fasciitis.

Among patients admitted to an ICU, risk factor data were provided for 27. The most common risk factors were age ≥65 years (n=10) and skin and wound lesions (n=9). No risk factors were identified for eleven patients. Length of ICU stay was provided for 13 cases.The median length of ICU stay was six days (range = 1 – 10 days).

Table 2. Characteristics of iGAS cases in Ireland, 2013-2017

	Year				
	2013	2014	2015	2016	2017
Notifications					
Total iGAS cases notified	168	164	107	148	130
iGAS incidence rate per 100,000 population	3.66	3.44	2.25	3.11	2.73
Cases for which Enhanced data provided (%)*	156 (93%)	150 (91%)	95 (89%)	120 (81%)	100 (77%)
Patient Demographics					
Male (%)	95 (57%)	94 (57%)	60 (56%)	77 (52%)	69 (53%)
M:F ratio	1.30:1	1.34:1	1.28:1	1.08:1	1.13:1
Mean age	41	43	42	44	43
Median age	40	44	42	43	43
Age range	0-93	0-99	0-99	0-92	0-92
Paediatric cases (aged <18 years) (%)	45 (27%)	47 (29%)	26 (24%)	40 (27%)	35 (27%)
Older cases (aged 65+ years) (%)	50 (30%)	56 (34%)	34 (31%)	52 (35%)	43 (33%)
Clinical Presentation†					
Data on Clinical Presentation (%)	141 (84%)	133 (81%)	88 (82%)	111 (75%)	97 (75%)
Streptococcal Toxic Shock-like Syndrome (STSS) without NF (%)	28 (20%)	18 (14%)	11 (13%)	21 (19%)	11 (11%)
Necrotising fasciitis (NF) without STSS (%)	6 (4%)	4 (3%)	5 (6%)	5 (5%)	6 (6%)
STSS and NF (%)	4 (3%)	3 (2%)	0 (0%)	3 (3%)	5 (5%)
Bacteraemia with focal presentations (%)	43 (30%)	43 (32%)	33 (38%)	44 (40%)	35 (36%)
Bacteraemia with no focal presentations (%)	37 (26%)	37 (28%)	21 (24%)	25 (23%)	22 (23%)
Other focal presentations with no bacteraemia (%)	23 (16%)	28 (21%)	18 (20%)	13 (12%)	18 (19%)
Bacteraemia (%)	106 (75%)	100 (75%)	64 (73%)	90 (81%)	69 (71%)
Other focal presentations:					
Cellulitis (%)	43 (30%)	57 (43%)	34 (39%)	50 (45%)	41 (42%)
STSS (%)	32 (23%)	21 (16%)	11 (13%)	24 (22%)	16 (16%)
Necrotising fasciitis (%)	9 (6%)	7 (5%)	5 (6%)	8 (7%)	11 (11%)
Septic arthritis (%)	10 (7%)	10 (8%)	13 (15%)	7 (6%)	11 (11%)
Pneumonia (%)	24 (17%)	14 (11%)	12 (14%)	9 (8%)	8 (8%)
Peritonitis (%)	4 (3%)	1 (1%)	3 (3%)	5 (5%)	4 (4%)
Puerperal sepsis (%)	4 (3%)	3 (2%)	6 (7%)	2 (2%)	4 (4%)
Erysipelas (%)	3 (2%)	2 (2%)	1 (1%)	2 (2%)	3 (3%)
Meninigtis (%)	3 (2%)	0 (0%)	4 (5%)	0 (0%)	2 (2%)
Myositis (%)	3 (2%)	5 (4%)	2 (2%)	2 (2%)	2 (2%)
Risk Factors†					
Data on Risk Factors (%)	138 (82%)	126 (77%)	77 (72%)	93 (63%)	85 (65%)
Skin lesions/wounds (%)	56 (41%)	50 (40%)	32 (42%)	38 (41%)	30 (35%)
Childbirth (%)	6 (4%)	4 (3%)	5 (6%)	3 (3%)	7 (8%)
Diabetes (%)	16 (12%)	11 (9%)	7 (9%)	10 (11%)	6 (7%)
Malignancy (%)	23 (17%)	10 (8%)	6 (8%)	16 (17%)	6 (7%)
Alcoholism (%)	6 (4%)	5 (4%)	3 (4%)	2 (2%)	3 (4%)
Steroid use (%)	11 (8%)	6 (5%)	6 (8%)	8 (9%)	3 (4%)
Injecting drug user (%)	5 (4%)	5 (4%)	3 (4%)	4 (4%)	2 (2%)
Varicella (%)	5 (4%)	6 (5%)	3 (4%)	8 (9%)	2 (2%)
Non-steroid anti-inflammatory drug use (%)	4 (3%)	2 (2%)	1 (1%)	2 (2%)	1 (1%)
No identified risk factor (%)	47 (34%)	48 (38%)	24 (31%)	27 (29%)	33 (39%)
Outcome at 7 days					
Data on outcome at 7 days (%)	108 (64%)	102 (62%)	73 (68%)	74 (50%)	72 (55%)
RIP/GAS main cause or contributory (%)	16 (15%)	10 (10%)	6 (8%)	4 (5%)	4 (6%)
STSS cases: Data on outcome at 7 days (%)	26 (81%)	17 (81%)	7 (64%)	7 (64%)	15 (63%)
STSS cases: RIP/GAS main cause or contributory (%)	10 (38%)	6 (35%)	1 (14%)	1 (14%)	2 (13%)

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Table 2 (continued). Characteristics of iGAS cases in Ireland, 2013-2017

	Year				
	2013	2014	2015	2016	2017
Severity					
Data on Admission to ITU (%)	153 (91%)	144 (88%)	92 (86%)	112 (76%)	97 (75%)
Admitted to ITU (%)	44 (29%)	36 (25%)	25 (27%)	36 (32%)	28 (29%)
Data on Surgical Intervention (%)	136 (81%)	127 (77%)	86 (80%)	99 (67%)	91 (70%)
Surgical Intervention Required (%)	39 (29%)	41 (32%)	26 (30%)	28 (28%)	32 (35%)
Typing					
iGAS isolates that were typed (%)	140 (83%)	131 (80%)	92 (86%)	127 (86%)	98 (75%)
emm-1 (%)	41 (29%)	21 (16%)	27 (29%)	51 (40%)	38 (39%)
emm-3 (%)	33 (24%)	47 (36%)	4 (4%)	6 (5%)	7 (7%)
emm-12 (%)	4 (3%)	6 (5%)	14 (15%)	14 (11%)	7 (7%)
emm-28 (%)	8 (6%)	12 (9%)	12 (13%)	10 (8%)	11 (11%)
emm-89 (%)	13 (9%)	8 (6%)	8 (9%)	6 (5%)	8 (8%)
Other *emm*-types (%)	41 (29%)	37 (28%)	27 (29%)	40 (31%)	27 (28%)

* 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 fac

Other epidemiological information

Three cases of iGAS were reported as hospital-acquired in 2017. Two cases of iGAS, including one death, were associated with one outbreak

Outcome

Outcome at seven days following GAS detection was reported for 73 cases:

- Four patients died, where GAS was the main or contributory cause of death
- One patient died, but GAS was not considered to be the cause of death
- 68 were still alive

The seven-day case fatality rate (CFR) for iGAS disease was 6%.

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 32 cases requiring surgical intervention, outcome at seven days was reported for 23 cases. Of those, there was one death due to GAS (CFR = 4%).

Of 28 cases admitted to ICU, outcome at seven days was reported for 21 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 117 GAS isolates (103 from blood and 14 from other specimens) by 27 laboratories via the European Antimicrobial Resistance Surveillance Network (EARS-Net). All isolates tested were susceptible to penicillin (n=106) and vancomycin (n=80). Resistance to erythromycin was reported in five (5%) of 106 isolates, to clindamycin in two (2%) of 83 isolates and to tetracycline in seven (10%) of 68 isolates.

Public health implications

Invasive GAS is a potentially life-threatening disease. In 2017, the CFR was 5% for all iGAS infections and even higher for patients presenting with STSS (22%). The number of patients presenting with STSS decreased from 24 in 2016 to 16 in 2017.

In 2017, one *emm* type, *emm*1, predominated comprising 39% of all isolates typed. This is similar to the situation in 2016 when *emm*1 also predominated (40% of all isolates typed). 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 the last couple of years 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.

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:

http://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:

http://www.hpsc.ie/A-Z/Other/GroupAStreptococcalDiseaseGAS/

Acknowledgements

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