

Invasive Group A Streptococcal Disease (iGAS) in British Columbia 2018 Quarter 2: April 1 – June 30, 2018

Background

In 2017, BC experienced the highest observed provincial incidence of iGAS since iGAS became notifiable in 1997.¹ No unusual clustering by date of onset or age group was identified in the provincial data set based on reporting from health authorities. *Emm* type 1 was the most frequently identified in 2017; however, no single *emm* type explained the increased incidence and *emm* type distribution varied over the span of the year.

Epidemiologic summaries are being prepared quarterly to monitor iGAS trends in BC. This epidemiologic summary for the quarter from April 1 to June 30, 2018 was prepared with data reported to the BCCDC by July 17 and National Microbiology Laboratory data available to July 18, 2018. Rate calculations are annualized without adjustment for seasonality in order to provide an incidence estimate which can be related to annual rates of reported iGAS in prior years.

Surveillance Data

Confirmed Case Reports

In the first two quarters of 2018, 242 confirmed iGAS cases were reported in BC. The year-to-date (YTD) incidence rate was 9.9 cases per 100,000 population per year (Figure 1). In the previous ten years, 68-222 (median = 101) cases were reported in the first six months of the year and the annual incidence rates ranged from 3.1 to 8.7 (median = 3.9) case per 100,000 population.

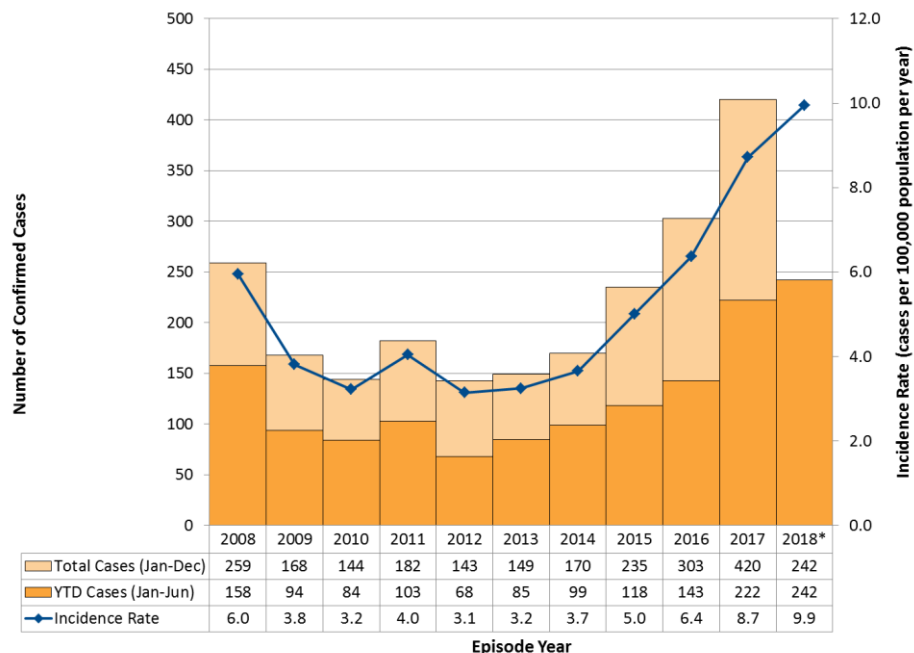
In the first quarter, the numbers of cases reported each month exceeded the maximum numbers reported during the same months in the previous ten years (Figure 2). In the second quarter, the monthly numbers of cases reported were below the historic maximums; however, they remained above the medians.

Geographic distribution

In the first two quarters of 2018, the YTD Health Authority incidence rates ranged from 8.2 to 11.9 cases per 100,000 population per year (Figure 3). Compared to the 2017 annual rates, the 2018 YTD incidence rates have increased in the Fraser, Vancouver Island and Vancouver Coastal Health Authorities, and decreased slightly in the Interior and Northern Health Authorities.

¹ BC Centre for Disease Control. Invasive Group A Streptococcal Disease (iGAS) in British Columbia, 2017 Annual Summary. Available online at: <http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/Immunization/Coverage/BC%20iGas%202017%20Epi%20Summary.pdf> [Accessed: July 18, 2018].

Figure 1. Invasive group A streptococcal disease cases and incidence rates* by year, British Columbia, 2008–2018 (January 1 – June 30)



* The 2018 incidence rate has been calculated as an annual incidence rate, without adjusting for seasonality.

Figure 2. Invasive group A streptococcal case counts by month, British Columbia, 2008-2017 and 2018

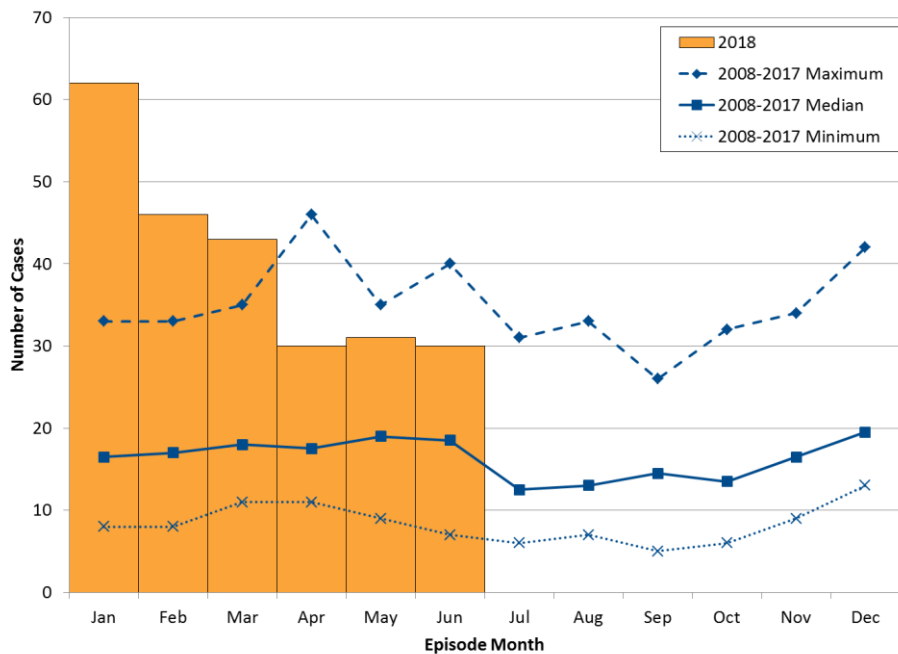
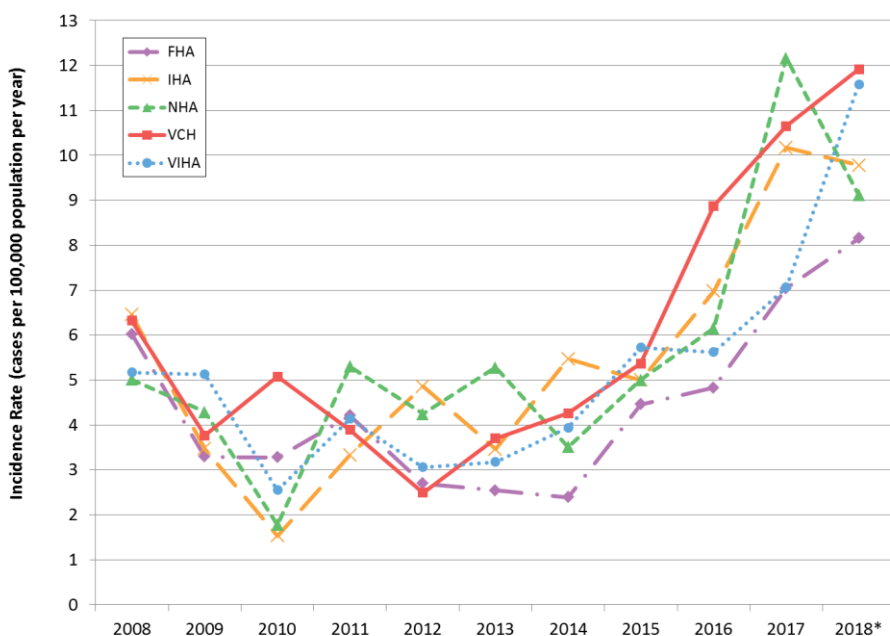


Figure 3. Invasive group A streptococcal disease incidence rates* by health authority and year, British Columbia, 2008-2018



* The 2018 incidence rates have been calculated as annual incidence rates, without adjusting for seasonality.

Age distribution

To date in 2018, cases ranged in age from 2 to 101 years (median 47 years). In the previous ten years, the age range of cases was 0-104 years (median 47 years). The largest proportions of cases were in the 40-59 and 60+ year age groups (Figure 4). The age distribution of cases in 2018 is similar to the age distribution of cases in prior years; however, there are slight increases in the proportions of cases in the 1-4 year and 10-14 year age groups and all age groups over 30 years.

To date in 2018, the highest age-specific incidence rates are in the 30-39 year age group, followed by the 40-59 and 60+ year age groups (Figure 5).

Figure 4. Age distribution of invasive group A streptococcal disease cases, British Columbia, 2008-2017 and January-June 2018

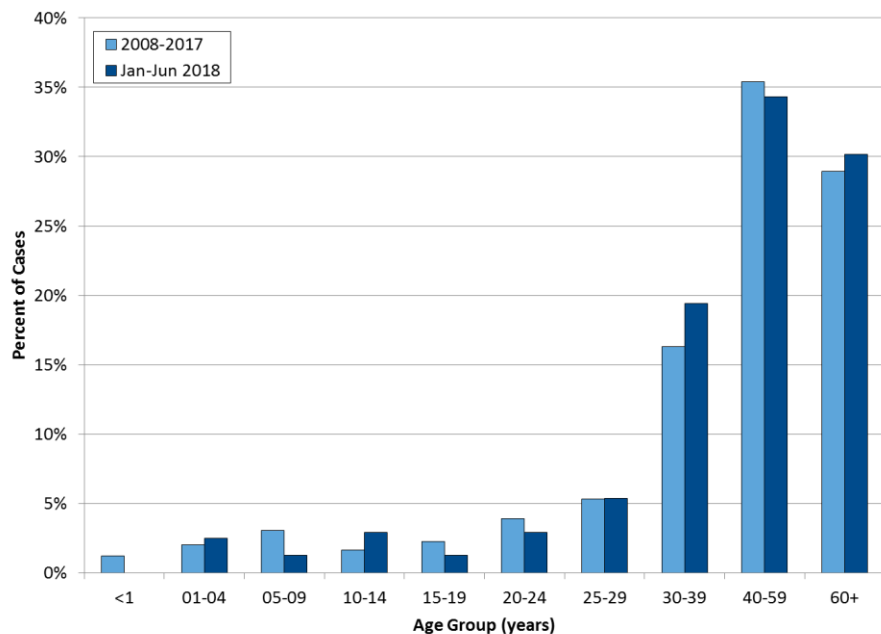
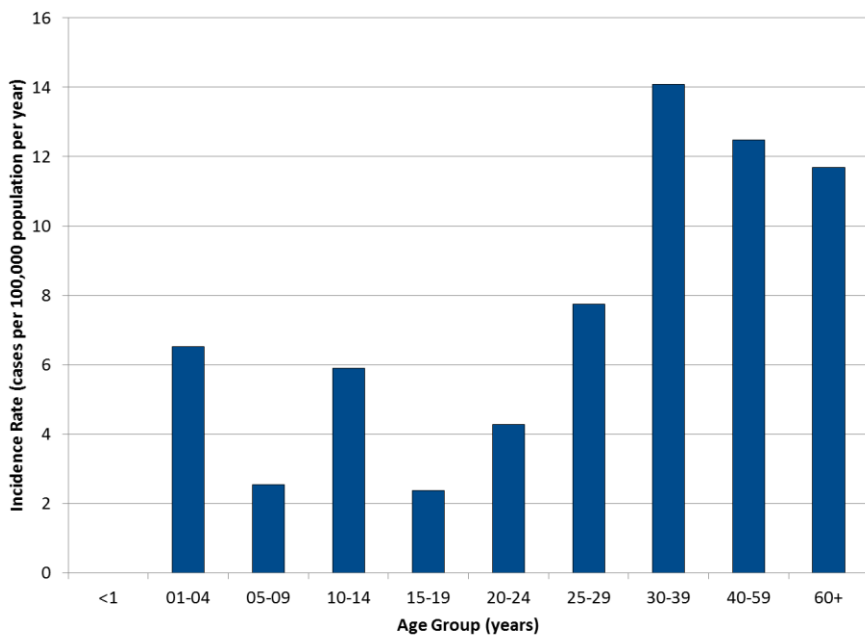


Figure 5. Invasive group A streptococcal disease incidence rates* by age group, British Columbia, January-June 2018

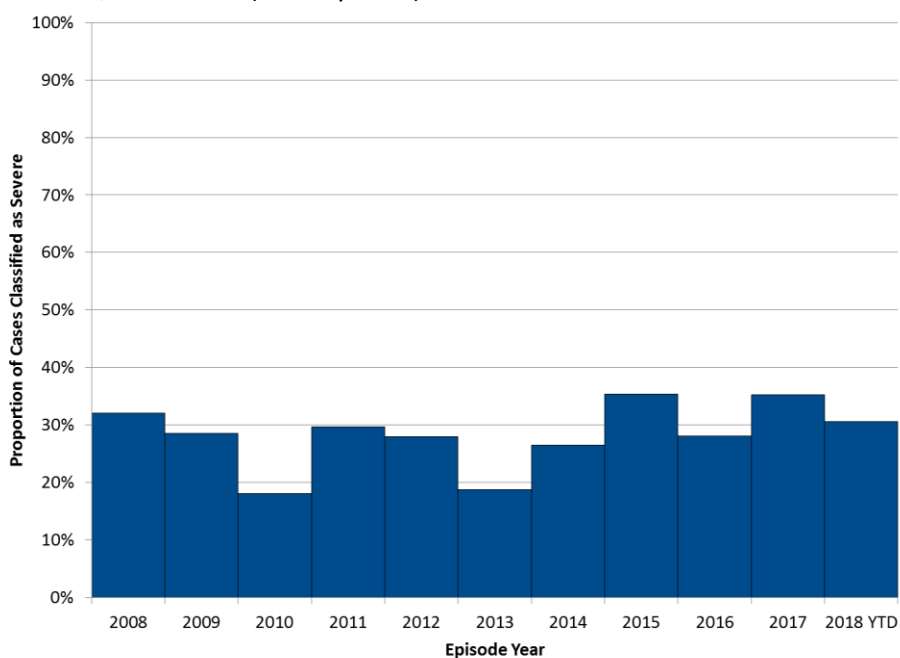


* The 2018 incidence rates have been calculated as annual incidence rates, without adjusting for seasonality.

Severity

Severe cases were defined as confirmed cases reported with toxic shock syndrome, soft tissue necrosis (necrotizing fasciitis/myositis/gangrene), group A streptococcal pneumonia, meningitis or death. Attribution of death to iGAS could not be determined from the surveillance data; all cases where death was reported as the outcome were included. To date in 2018, 31% of cases were classified as severe; in the previous decade, 29% were severe, with annual severity rates ranging from 18% to 35% of cases (Figure 6).

Figure 6. Proportion of invasive group A streptococcal disease cases classified as severe, British Columbia, 2008-2018 (January-June)



To date in 2018, a larger proportion of cases have experienced toxic shock syndrome (13%) compared to the previous decade (Table 1). There are no other temporal trends in reports of the severe presentations (data not shown).

Eighteen cases were reported with death as the outcome (case fatality rate=7%). In the previous decade, annual case fatality rates ranged from 4% to 14% (median 7%). Case fatality rates vary by age group, with the highest rates in the 10-19 year age group (2 of 10 cases), followed by the 60+ year age group (Table 2).

Table 1. Severe presentations of iGAS cases, British Columbia, 2008-2017 and 2018 (January-June)

Presentation	2018 YTD		2008-2017		
	#	%	Median	Minimum	Maximum
Soft tissue necrosis	17	7%	8%	4%	10%
Toxic shock syndrome	32	13%	7%	2%	11%
Pneumonia	36	15%	11%	5%	18%
Meningitis	0	0%	1%	0%	2%
Death	18	7%	7%	4%	14%
Any severe presentation	74	31%	28%	18%	35%

Severe cases are defined as those with toxic shock syndrome, soft-tissue necrosis (including necrotizing fasciitis, myositis or gangrene), meningitis, pneumonia, or an outcome of death.

Table 2. iGAS case fatality rates by age group, British Columbia, 2018 (January-June) and 2008-2017

Age Group (years)	2018 YTD			2008-2017
	Cases	Deaths	Case Fatality Rate	Case Fatality Rate
<5	6	0	0%	10%
05-9	3	0	0%	8%
10-19	10	2	20%	7%
20-39	67	0	0%	3%
40-59	83	6	7%	7%
60+	73	10	14%	11%
Total	242	18	7%	7%

Three confirmed case of puerperal fever due to group A streptococcus have been reported to date in 2018. One case followed a spontaneous abortion; two were associated with live births.

Risk Factors and Predisposing Conditions

Larger proportions of 2018 cases reported the following risk factors and predisposing conditions compared to cases in the previous ten years: alcoholism, chronic cardiac condition, diabetes, homelessness/under-housing, injection drug use, chronic respiratory/pulmonary conditions and skin infections (Table 3). It is unclear whether these increases may reflect more complete reporting, as prior to January 2017, this information was reported through completion of a single 'tick box'. Since January 2017 reporting requires selection of one of the following responses for each risk factor and predisposing condition: yes/ no/ asked but unknown/declined to answer/not assessed. More than one condition can be reported for a case.

Clusters and Investigations

No defined clusters or outbreaks have been notified to BCCDC.

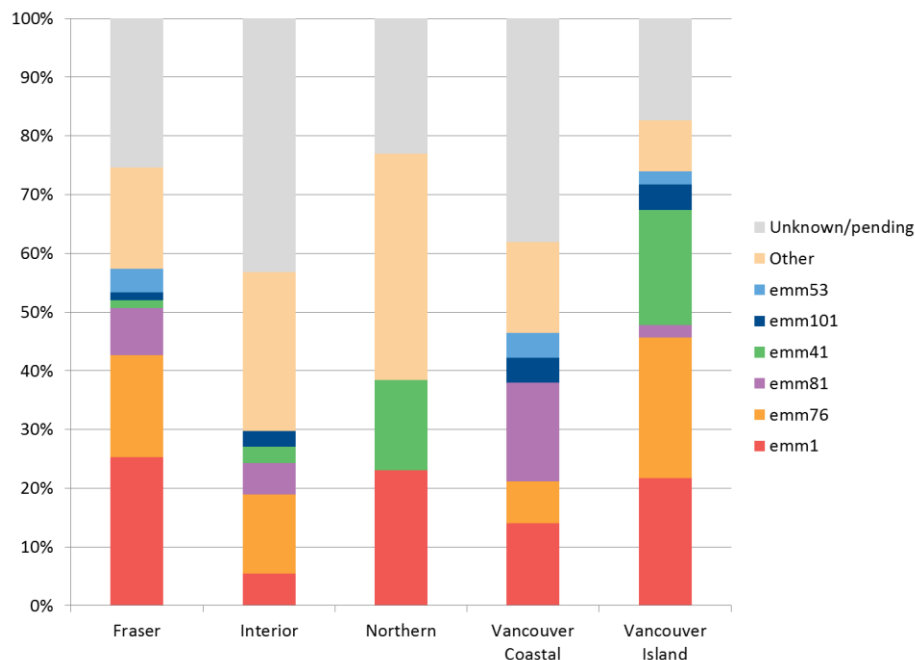
Emm Typing

The BCCDC Public Health Laboratory provided National Microbiology Laboratory *emm* typing results for 169 of the cases reported to date in 2018. The three most common *emm* types in 2018 are *emm1* (n=44; 26% of known *emm* types), *emm76* (n=34; 20%) and *emm81* (n=21; 12%). The *emm* distribution varies by Health Authority (Figure 7).

Table 3. Risk factors and predisposing conditions reported for iGAS cases, British Columbia, 2008-2017 and 2018 (January-June)

Risk Factor / Predisposing Condition	2008-2017	2018 YTD
Alcoholism	11.8%	12.4%
Chronic Cardiac Condition	13.5%	24.8%
Diabetes	12.6%	17.8%
Homeless/under-housed	10.4%	23.6%
Injection Drug Use	19.8%	23.6%
Immunocompromised	13.9%	10.3%
Chronic respiratory/pulmonary condition	6.3%	9.5%
Skin Infection	21.6%	30.2%
Wound	32.7%	30.6%

Figure 7. iGAS *emm* type distribution by health authority, British Columbia, 2018 (January-June)



Case risk factor profiles varied by *emm* type. Large proportions of *emm76* cases reported homelessness/under-housing, injection drug use, wounds and skin infections (Table 4). Large

proportions of *emm81* cases reported homelessness/under-housing, injection drug use and chronic cardiac conditions. Large proportions of *emm41* cases reported alcoholism, chronic conditions (cardiac, diabetes, immunocompromising, respiratory/pulmonary) and skin infections. Almost one quarter of *emm1* cases had no underlying risk factors or predisposing conditions.

Table 4. Proportions of iGAS cases reporting risk factors and predisposing conditions by *emm* type, British Columbia, 2018 (January-June)

Risk Factor / Predisposing Condition	<i>emm1</i>	<i>emm41</i>	<i>emm76</i>	<i>emm81</i>	Other	Unknown	Total 2018
Alcoholism	6.8%	23.1%	8.8%	9.5%	19.3%	11.0%	12.4%
Chronic Cardiac Condition	18.2%	53.8%	23.5%	28.6%	24.6%	23.3%	24.8%
Diabetes	15.9%	30.8%	23.5%	9.5%	21.1%	13.7%	17.8%
Homeless/under-housed	6.8%	15.4%	41.2%	57.1%	26.3%	15.1%	23.6%
Injection Drug Use	6.8%	7.7%	44.1%	57.1%	24.6%	16.4%	23.6%
Immunocompromised	4.5%	15.4%	11.8%	4.8%	10.5%	13.7%	10.3%
Chronic respiratory/pulmonary condition	9.1%	15.4%	5.9%	14.3%	8.8%	9.6%	9.5%
Wound	20.5%	30.8%	41.2%	33.3%	29.8%	31.5%	30.6%
Skin Infection	13.6%	46.2%	52.9%	28.6%	24.6%	31.5%	30.2%
Responded "No" for all risk factors and predisposing conditions	22.7%	0.0%	0.0%	0.0%	3.5%	4.1%	6.2%

Cases with *emm1* were more likely to have severe presentations, with a case fatality rate of 23% (Table 5).

Table 5. Indicators of severity by *emm* type, British Columbia, 2018 (January-June)

	<i>emm</i> Type												Total n=242	
	1 n=44		41 n=13		76 n=34		81 n=21		Other n=57		Unknown n=73			
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Death	10	23%	0	0%	0	0%	0	0%	5	9%	3	4%	18	7%
Soft tissue necrosis	5	11%	0	0%	3	9%	2	10%	1	2%	6	8%	17	7%
Toxic shock syndrome	18	41%	1	8%	1	3%	0	0%	6	11%	6	8%	32	13%
Pneumonia	10	23%	1	8%	1	3%	4	19%	10	18%	10	14%	36	15%
Any severe presentation	25	57%	0	0%	5	15%	6	29%	16	28%	20	27%	72	30%

Severe cases are defined as those with toxic shock syndrome, soft-tissue necrosis (including necrotizing fasciitis, myositis or gangrene), meningitis, pneumonia, or an outcome of death. No cases of meningitis were reported in this time period.

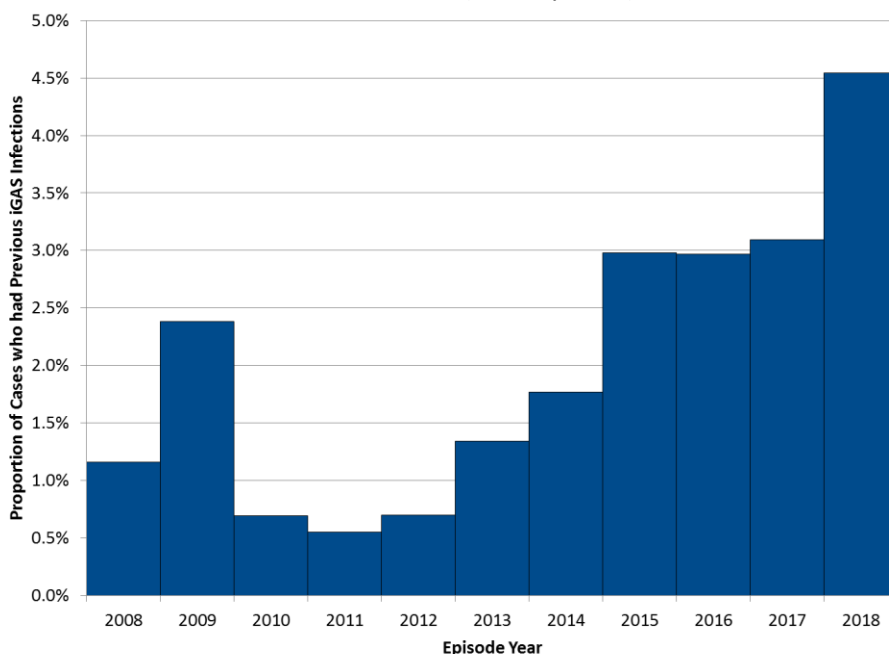
Multiple Infections

The proportion of iGAS cases with previous iGAS episodes has increased over time (Figure 8). To date in 2018, eleven cases (4.5%) had previous iGAS episodes. All reported at least one risk factor or predisposing condition: seven (64%) were injection drug users, six (55%) were homeless/under-housed,

six (55%) had wounds, five (46%) had chronic cardiac conditions, four (36%) had skin infections, two (18%) were immunocompromised, one (9%) was diabetic, and one (9%) had a chronic respiratory/pulmonary condition.

The time between iGAS episodes for these eleven people ranged from 63 days to over 10 years, with a median of 109 days. Nine of the cases had *emm* typing available: six (67%) had a different *emm* type from their previous episode and three (33%) had the same *emm* type as their previous episode.

Figure 8. Proportion of invasive group A streptococcal disease (iGAS) cases with previous iGAS infections, British Columbia, 2008-2018 (January-June)



Laboratory Data

As of July 18, 2018, the National Microbiology Laboratory had provided *emm* typing for 190 British Columbia *Streptococcus pyogenes* isolates from 2018. The most common *emm* types in 2018 were *emm1* (n=52; 27%), *emm76* (n=34; 18%), and *emm81* (n=21; 11%) (Figure 9). The most common *emm* types in 2011-2017 were *emm1* (20%), *emm89* (8%) and *emm101* (8%).

Figure 9. *Streptococcus pyogenes emm* types by year, British Columbia, 2011-2018*

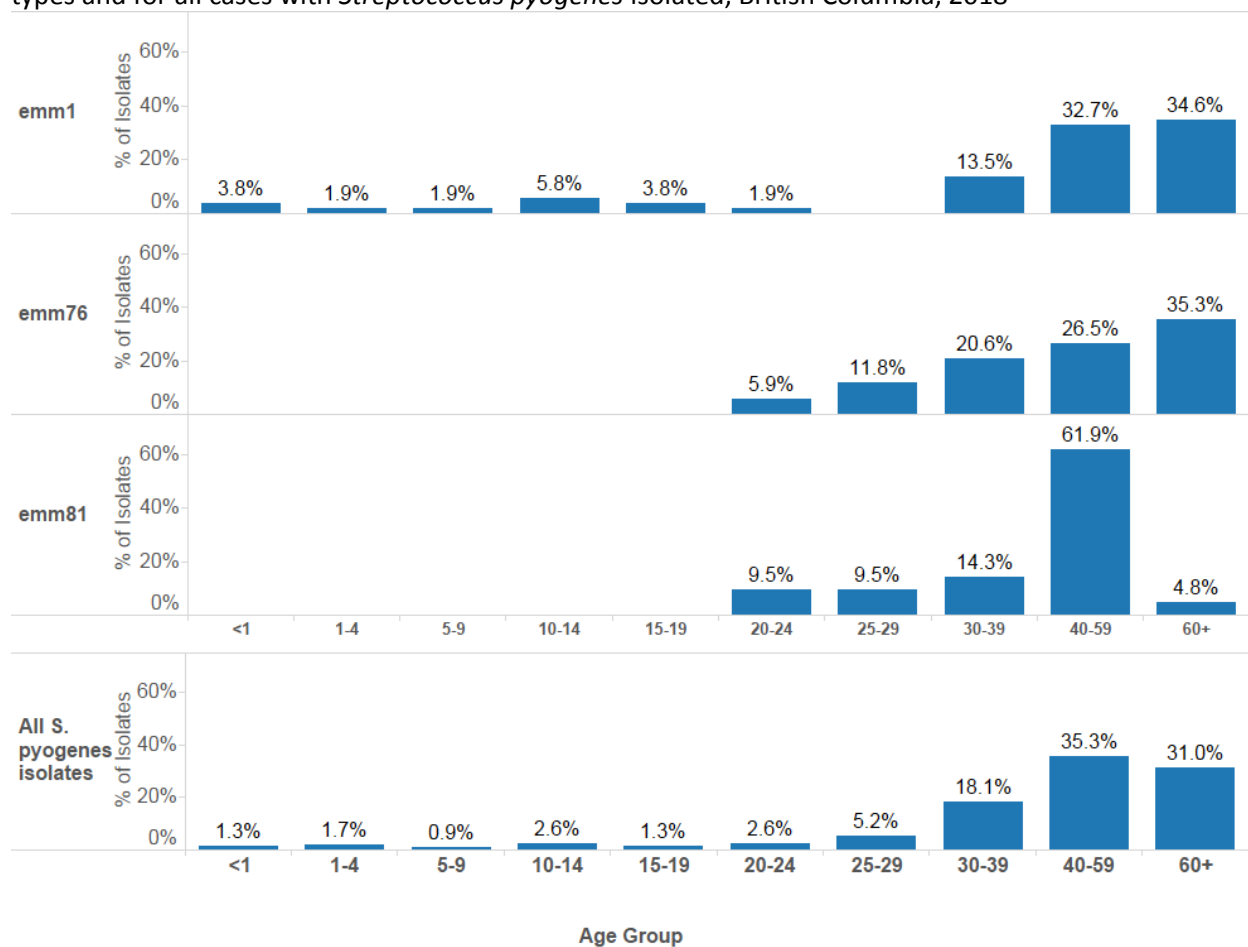
emm Type	Date Specimen Collected							
	2011	2012	2013	2014	2015	2016	2017	2018
1	56	42	27	28	19	28	72	52
101	1	1	1	13	11	38	39	11
102	1		2			2		1
11	1	3	7	11	11	8	5	
12	22	8	11	6	12	12	23	7
2	7	3	3	3	2	7	9	5
22	3		8	2	4	1	1	
28	14	14	14	14	14	6	8	2
3	1			3	7	9	7	4
4	4	10	10	12	11	10	9	3
41				1	1		10	14
44	1	2	1				1	
53	3			2		3	12	7
58	2	2	1	1			2	
59	7	1		1	1	1	5	2
6	5	2	1	4	1	1	3	1
73		1		2	1	1	1	
74					6	12	2	1
75	3	1	1	2		1	3	2
76	1		1	2	2	2	50	34
77	6	5	10	2	8	10	9	
80	5	2	12	12	8	3	1	1
81		3	1	3	8	9	28	21
82	2			4	15	45	25	6
83	2	4	1	4	3	6	11	1
87	3	3	5	6	6	10	5	2
89	18	11	20	20	13	10	20	7
9	1			1			4	
92				1			6	3
93		1			1	4	2	

* The top 30 *emm* types (by count) since 2011 are included. Data for specimens collected in 2018 are as of July 18, 2018.

The age distribution of cases varied by *emm* type with a larger proportion of *emm1* cases among young children, a larger proportion of *emm76* cases in the 60+ year age group, and a larger proportion of *emm81* cases in the 40-59 year age group (Figure 10).

Since the beginning of 2016, the *emm* type distribution has varied month to month (Figure 11).

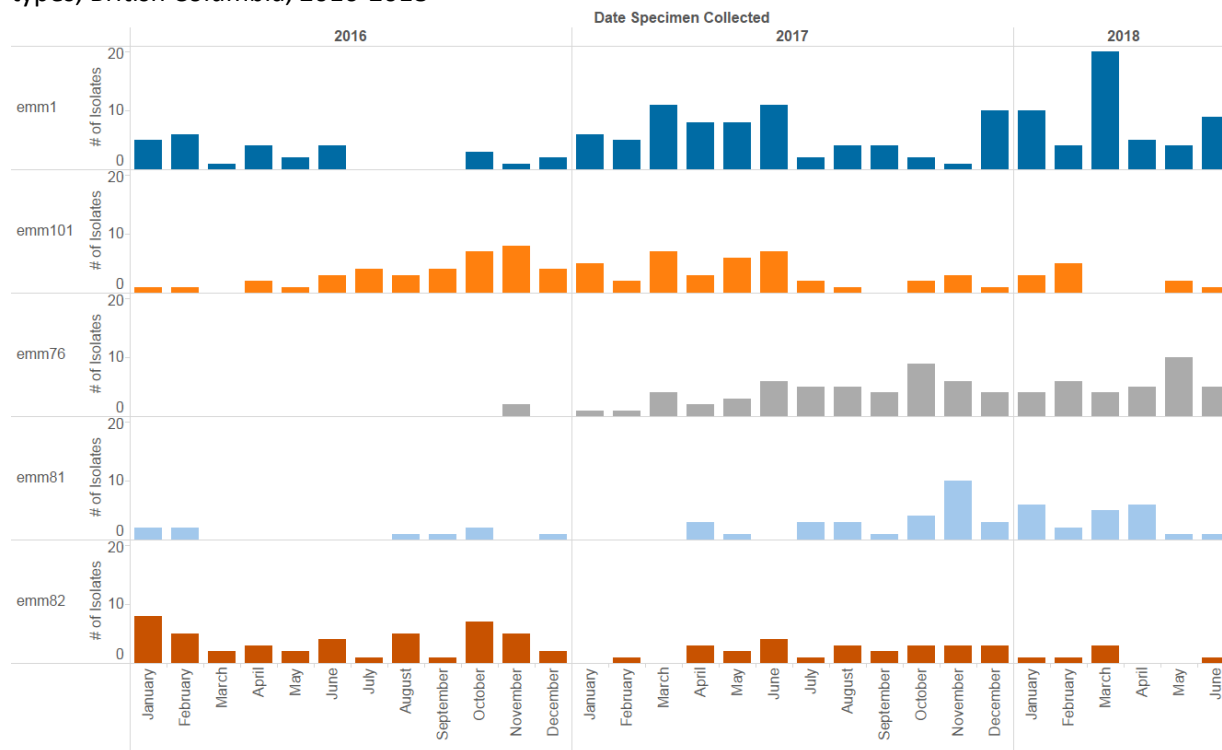
Figure 10. Age distribution of cases for the most frequently identified *Streptococcus pyogenes* emm types and for all cases with *Streptococcus pyogenes* isolated, British Columbia, 2018*



Note: The number of isolates was 190 for all *S. pyogenes*, 52 for *emm1*, 34 for *emm76*, and 21 for *emm81*.

*Data for specimens collected in 2018 are as of July 18, 2018.

Figure 11. Number of *Streptococcus pyogenes* isolates by *emm* type and month collected, top 5 *emm* types, British Columbia, 2016-2018*



*Data for specimens collected in 2018 are as of July 18, 2018.

Conclusions

- The high incidence rates observed in 2016-17 have continued into the first half of 2018, with incidence rate surpassing those observed previously in BC.
- No unusual clustering by date of onset or age group was identified in the provincial data set.
- Injection drug use and/or homelessness/under-housing were reported risk factors among a large proportion of cases, particularly among cases with *emm76* and *emm81*.
- *Emm* type 1 was the most frequently identified in 2018, particularly in pediatric cases; however, it is not as common in the homeless/under-housed and injection drug using populations.
- An increase in cases with multiple iGAS infections has been observed, particularly among those who are injection drug users, homeless/under-housed, and/or have wounds.
- No single *emm* type explained the increased incidence; *emm* type distribution varies month to month.

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