Invasive Group A Streptococcal Disease (iGAS) in British Columbia
2018 Quarter 3: July 1 – September 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 July 1 to September 30, 2018 was prepared with data reported to the BCCDC by October 16, 2018, and includes National Microbiology Laboratory data. 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 three quarters of 2018, 322 confirmed iGAS cases were reported in BC. The year-to-date (YTD) incidence rate was 8.8 cases per 100,000 population per year (Figure 1). In the previous ten years, 103-312 (median = 134) cases were reported in the first nine months of the year and the annual incidence rates ranged from 3.1 to 8.7 (median = 3.9) case per 100,000 population.

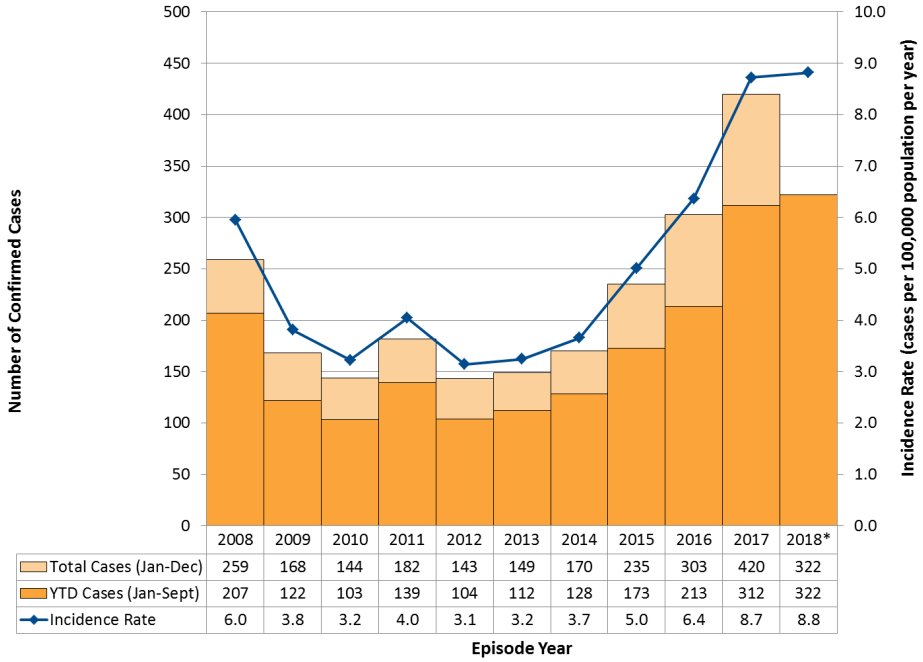
As of the end of September, the YTD incidence rate for 2018 is similar to 2017. In the first quarter of 2018, the numbers of cases reported each month exceeded the maximum numbers reported during the same months in the previous ten years (Figure 2). In April through August, the monthly numbers of cases reported were below the historic maximums; however, these remained above the medians.

Geographic Distribution

In the first three quarters of 2018, the YTD Health Authority incidence rates ranged from 7.2 to 13.6 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 Northern Health Authorities, and decreased in the Interior and Vancouver Coastal 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: October 16, 2018].

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018*
Total Cases (Jan-Dec)	259	168	144	182	143	149	170	235	303	420	322
YTD Cases (Jan-Sept)	207	122	103	139	104	112	128	173	213	312	322
Incidence Rate	6.0	3.8	3.2	4.0	3.1	3.2	3.7	5.0	6.4	8.7	8.8

* The 2018 incidence rate has been calculated as an annual incidence rate, without adjusting for seasonality. The 2008-2017 incidence rates are based on annual case counts.

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

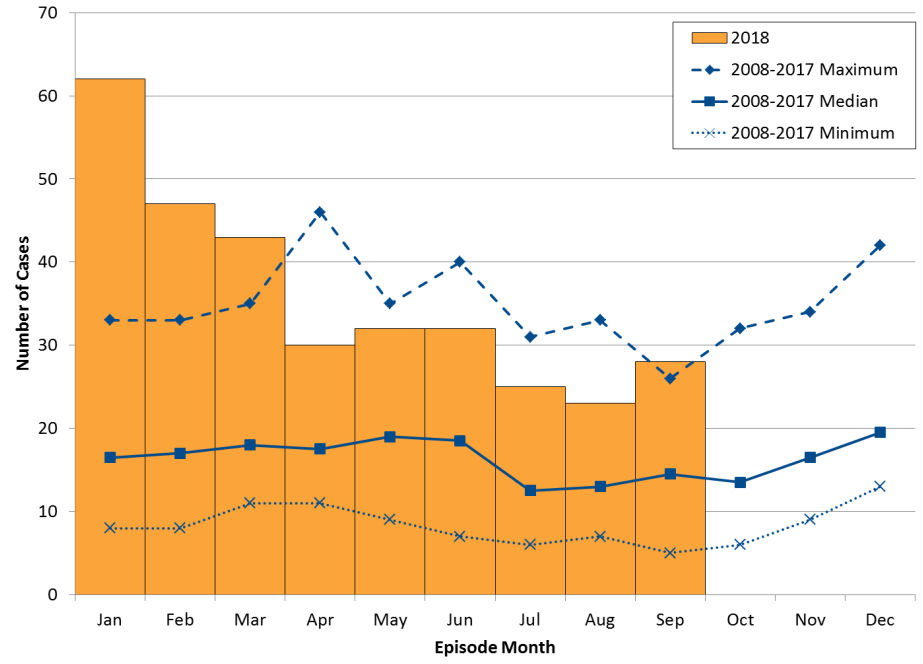
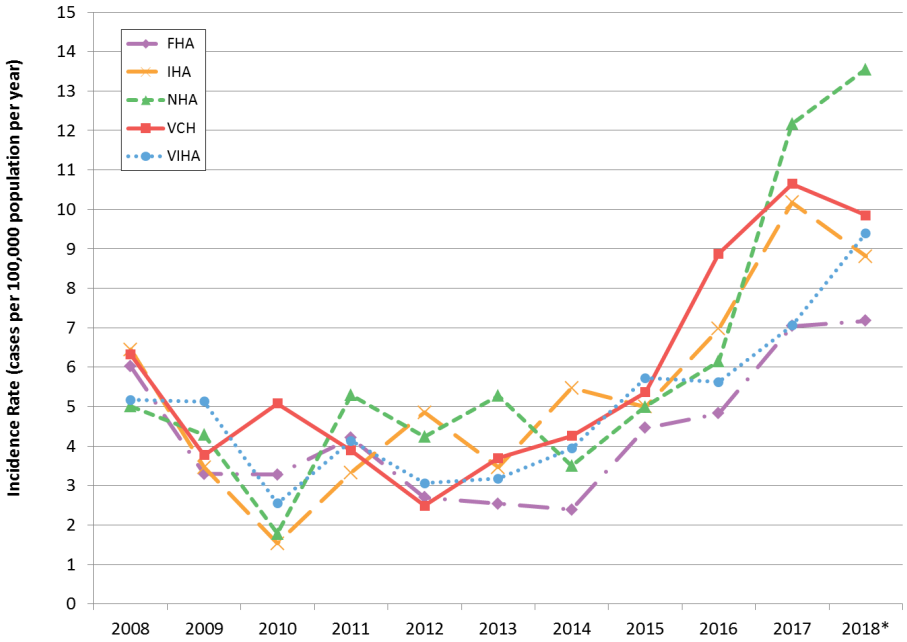


Figure 3. Invasive group A streptococcal disease incidence rates* by health authority and year, British Columbia, 2008-2018



* The 2018 incidence rates have been calculated as annual incidence rates, without adjusting for seasonality. The 2008-2017 incidence rates are based on annual case counts.

Age distribution

To date in 2018, cases ranged in age from 2 to 101 years (median 48.5 years). In the previous ten years, the age range of cases was 0-104 years (median 47 years). Similar to previous 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 30-39 and 60+ years age groups.

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).

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 because it is not reported or reported as "unknown" for over 40% of fatal cases. As such, all cases where death was reported as the outcome were included. To date in 2018, 30% 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).

To date in 2018, a larger proportion of cases were reported with 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).

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

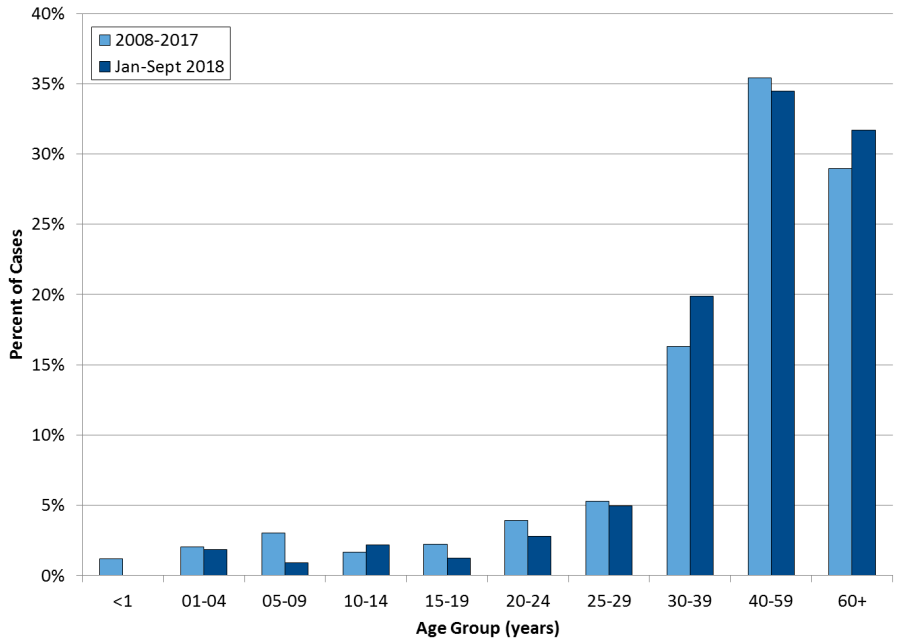
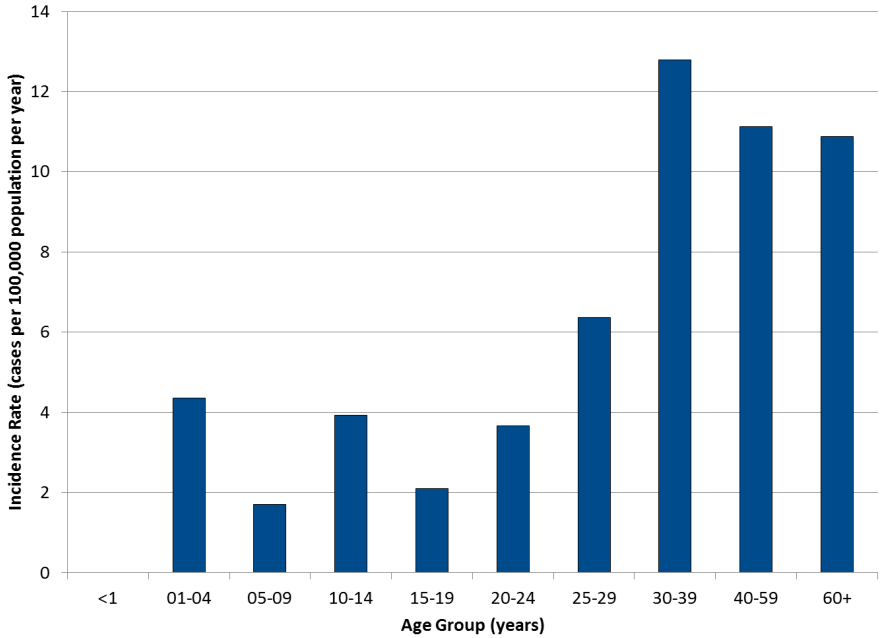
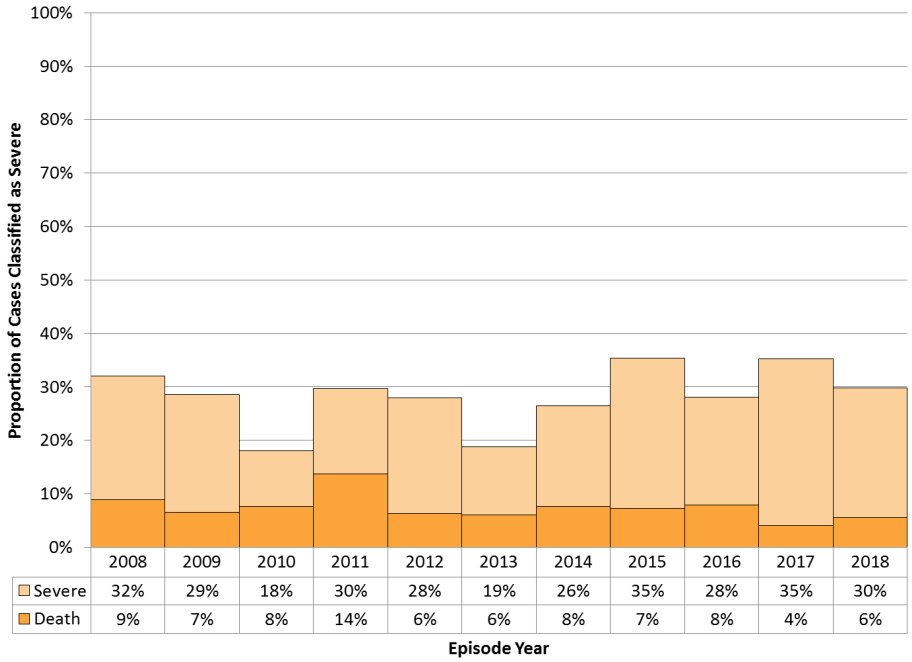


Figure 5. Invasive group A streptococcal disease incidence rates* by age group, British Columbia, January-September 2018



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

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



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Severe	32%	29%	18%	30%	28%	19%	26%	35%	28%	35%	30%
Death	9%	7%	8%	14%	6%	6%	8%	7%	8%	4%	6%

Eighteen cases were reported with death as the outcome (case fatality rate=6%). In the previous decade, annual case fatality rates ranged from 4% to 14% (median 7%) (Figure 6). Case fatality rates vary by age group, with the highest rates in the 10-19 year age group (2 of 11 cases), followed by the 60+ year age group (Table 2).

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

Presentation	2018 YTD		2008-2017		
	#	%	Median	Minimum	Maximum
Soft tissue necrosis	23	7%	8%	4%	10%
Toxic shock syndrome	41	13%	7%	2%	11%
Pneumonia	46	14%	11%	5%	18%
Meningitis	0	0%	1%	0%	2%
Death	18	6%	7%	4%	14%
Any severe presentation	96	30%	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.

Four confirmed case of puerperal fever due to group A streptococcus have been reported to date in 2018. One case followed a spontaneous abortion; three were associated with live births. In the previous ten years, 1-5 (median=3) confirmed cases of puerperal fever due to group A streptococcus were reported each year.

Table 2. iGAS case fatality rates by age group, British Columbia, 2018 (January-September) 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	11	2	18%	7%
20-39	89	0	0%	3%
40-59	111	6	5%	7%
60+	102	10	10%	11%
Total	**322**	**18**	**6%**	**7%**

Risk Factors and Predisposing Conditions

Larger proportions of 2018 cases reported all risk factors and predisposing conditions, except 'immunocompromise', when compared to cases in the previous ten years (Table 3). It is unclear whether these increases 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.

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

Risk Factor / Predisposing Condition	2008-2017	2018 YTD
Alcoholism	11.8%	13.4%
Chronic Cardiac Condition	13.5%	25.5%
Diabetes	12.6%	19.9%
Homeless/under-housed	10.4%	25.2%
Injection Drug Use	19.8%	23.9%
Immunocompromise	13.9%	9.9%
Chronic respiratory/pulmonary condition	6.3%	11.5%
Skin Infection	21.6%	32.3%
Wound	32.7%	33.9%

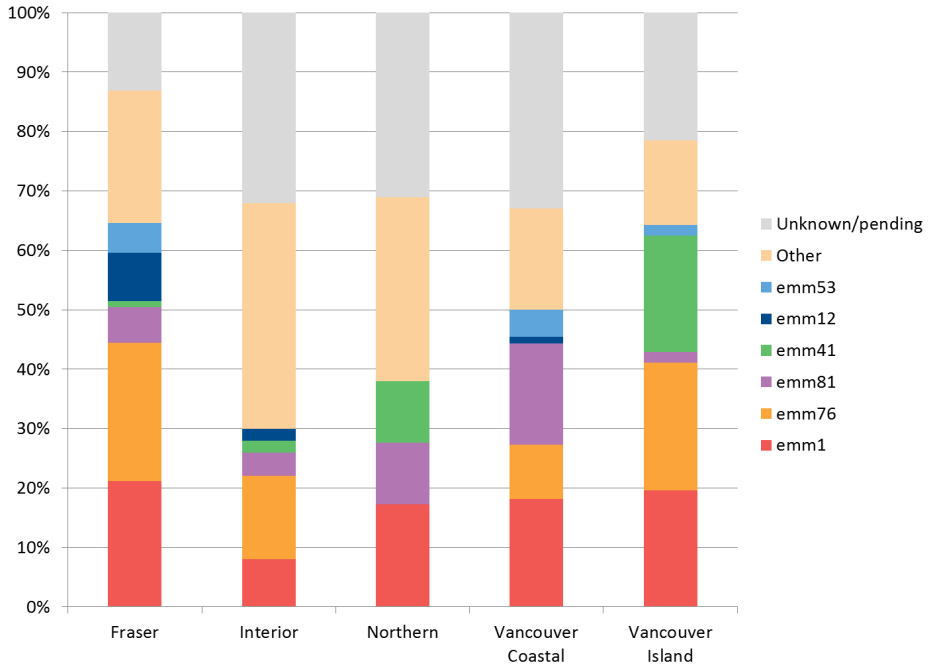
Clusters and Investigations

No outbreaks have been notified to BCCDC. None of the cases reported in 2018 reported prior contact with a known iGAS case. In the previous ten years, 0-3 cases (median=0.5 cases) reported prior contact with a known iGAS case annually.

Emm Typing

The BCCDC Public Health Laboratory provided National Microbiology Laboratory *emm* typing results for 243 of the cases reported to date in 2018. The three most common *emm* types in 2018 are *emm*1 (n=57; 23% of known *emm* types), *emm*76 (n=50; 21%) and *emm*81 (n=27; 11%). The *emm* distribution varies by Health Authority (Figure 7).

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



The age distribution of cases varied by *emm* type with a larger proportion of *emm*1 cases among young children and in 60+ years age group, a larger proportion of *emm*76 cases in the 60+ year age group, and a larger proportion of *emm*81 cases in the 40-59 year age group (Figure 8).

Case risk factor profiles varied by *emm* type. Larger proportions of *emm*76 cases reported homelessness/under-housing, injection drug use, immunocompromise, wounds and skin infections (Table 4). Larger proportions of *emm*81 cases reported homelessness/under-housing, injection drug use and wounds. Larger proportions of *emm*41 cases reported alcoholism, chronic conditions (cardiac, diabetes, immunocompromise, respiratory/pulmonary) and skin infections. Almost one in five *emm*1 cases had no underlying risk factors or predisposing conditions.

Cases with *emm*1 were more likely to have severe presentations (particularly toxic shock syndrome) with a case fatality rate of 18% (Table 5).

Figure 8. Age distribution of cases by *Streptococcus pyogenes emm* type, British Columbia, 2018 (January-September)

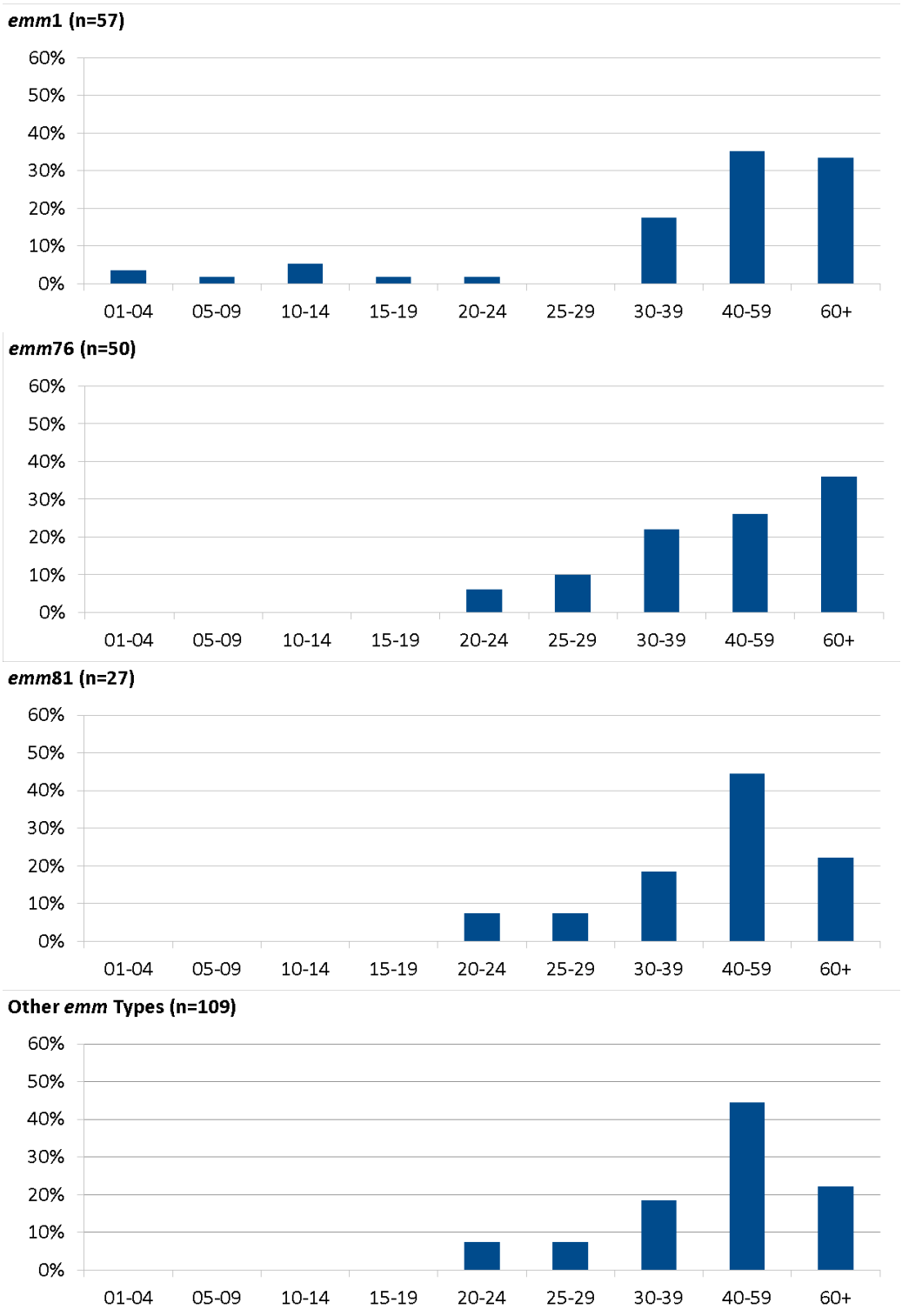


Table 4. Proportions of iGAS cases reporting risk factors and predisposing conditions by *emm* type, British Columbia, 2018 (January-September)

Risk Factor / Predisposing Condition	*emm*1	*emm*41	*emm*76	*emm*81	Other	Unknown	Total 2018
Alcoholism	7.0%	18.8%	12.0%	14.8%	16.1%	13.9%	13.4%
Chronic Cardiac Condition	19.3%	50.0%	26.0%	29.6%	26.9%	21.5%	25.5%
Diabetes	21.1%	37.5%	20.0%	11.1%	18.3%	20.3%	19.9%
Homeless/under-housed	12.3%	18.8%	36.0%	63.0%	20.4%	21.5%	25.2%
Injection Drug Use	12.3%	6.3%	42.0%	59.3%	21.5%	15.2%	23.9%
Immunocompromise	8.8%	12.5%	12.0%	7.4%	9.7%	10.1%	9.9%
Chronic respiratory/pulmonary condition	7.0%	18.8%	12.0%	14.8%	11.8%	11.4%	11.5%
Wound	26.3%	31.3%	40.0%	37.0%	31.2%	38.0%	33.9%
Skin Infection	15.8%	56.3%	58.0%	29.6%	22.6%	35.4%	32.3%
Responded "No" for all risk factors and predisposing conditions	19.3%	0.0%	0.0%	0.0%	4.3%	3.8%	5.6%

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

	emm Type												Total	
	1 n=57		41 n=16		76 n=50		81 n=27		Other n=93		Unknown n=79		n=322	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Death	10	18%	0	0%	0	0%	0	0%	6	6%	2	3%	18	6%
Soft tissue necrosis	6	11%	0	0%	5	10%	2	7%	2	2%	8	10%	23	7%
Toxic shock syndrome	21	37%	1	6%	5	10%	0	0%	10	11%	4	5%	41	13%
Pneumonia	12	21%	1	6%	4	8%	6	22%	14	15%	9	11%	46	14%
Any severe presentation	30	53%	2	13%	11	22%	8	30%	24	26%	21	27%	96	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.

Conclusions

- The high incidence rates observed in 2016-17 have continued into 2018; however incidence may be leveling off.
- 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 *emm*81 and *emm*76.
- *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. It is associated with the highest case fatality rate and severe clinical presentations.
- No single *emm* type explained the increased incidence; *emm* type distribution varies by health region.

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