

## Invasive Group A Streptococcal Disease (iGAS) in British Columbia 2017 Annual Summary

### Background

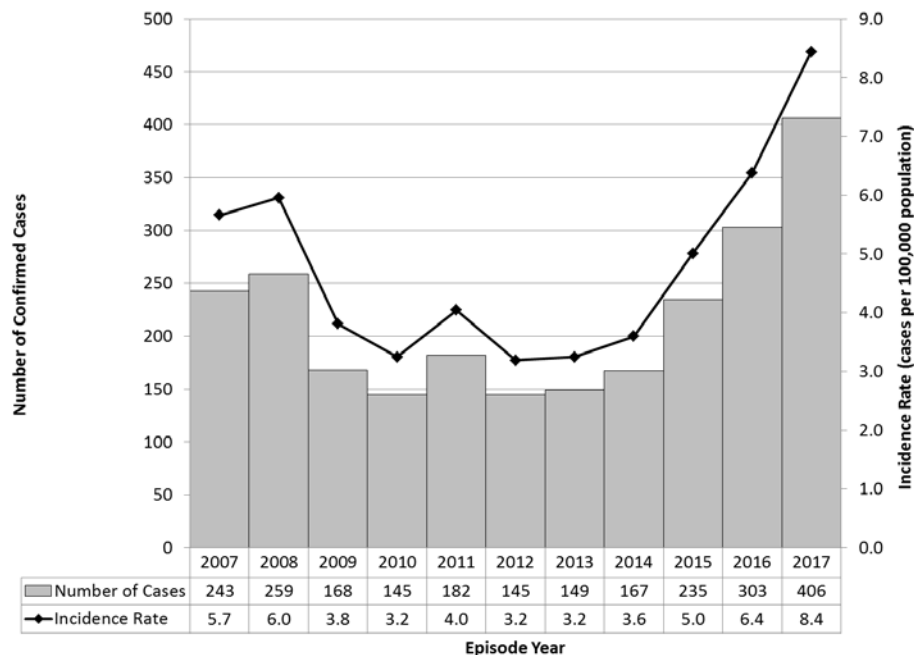
In 2016, BC experienced a higher incidence of iGAS than observed in 2009 through 2015, with a rate surpassing the incidence observed in the prior peak year of 2008. No unusual clustering by date of onset, severity or age group was identified in the provincial data set. High incidence rates have continued through 2017. Epidemiologic summaries are being prepared regularly to monitor iGAS trends in BC. This epidemiologic summary was prepared with data reported to the BCCDC by January 16, 2018 and National Microbiology Laboratory data available to January 19, 2018.

### Surveillance Data

#### Confirmed Case Reports

In total, 406 confirmed iGAS cases were reported in 2017 (Figure 1). In the previous ten years, 145-303 (median = 175) cases were reported annually.

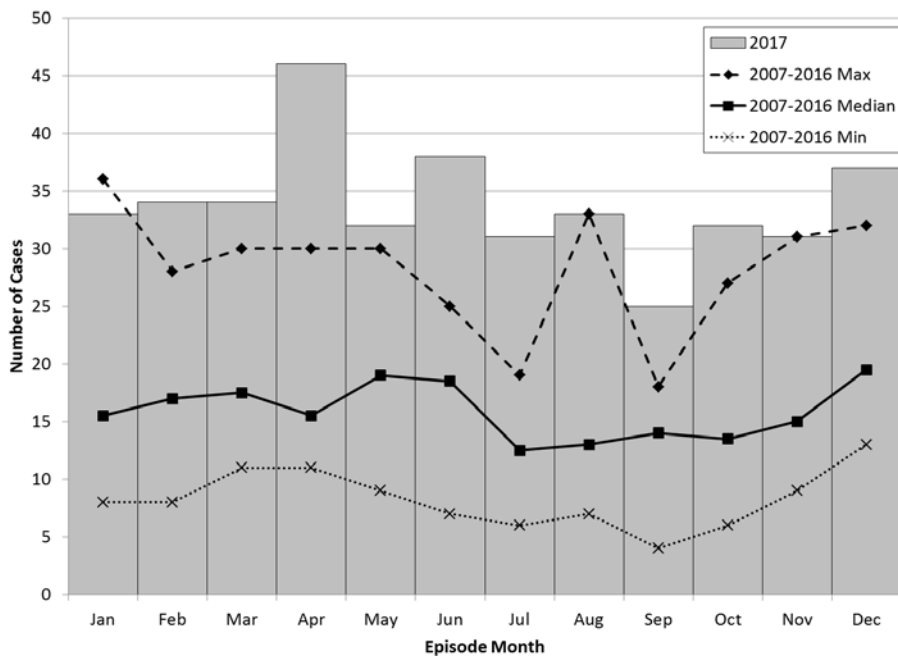
**Figure 1.** Invasive group A streptococcal disease cases and incidence rates by year, British Columbia, 2007-2017



The incidence rate for 2017 is 8.4 cases per 100,000 population, which is the highest rate of iGAS in BC since it became reportable in 1997. In 2007-2016, annual incidence rates ranged from 3.2 to 6.4 (median=3.9) cases per 100,000 population (Figure 1).

The numbers of iGAS cases reported by month in 2017 met or exceeded the maximum numbers reported in the same months during the previous ten years (Figure 2). Case counts for the final months of 2017 may increase due to reporting lag times.

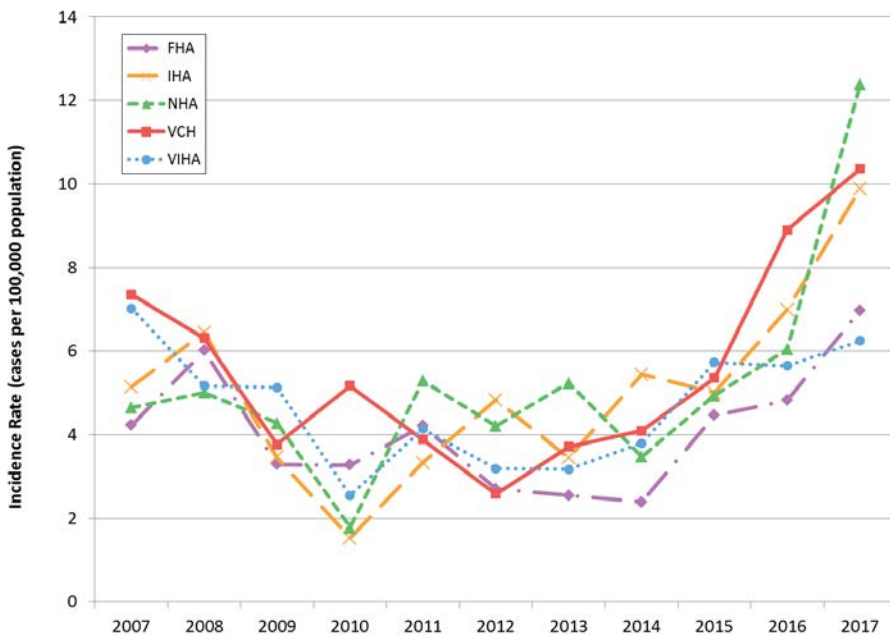
**Figure 2.** Number of invasive group A streptococcal disease cases by month, British Columbia, 2007-2016 and 2017



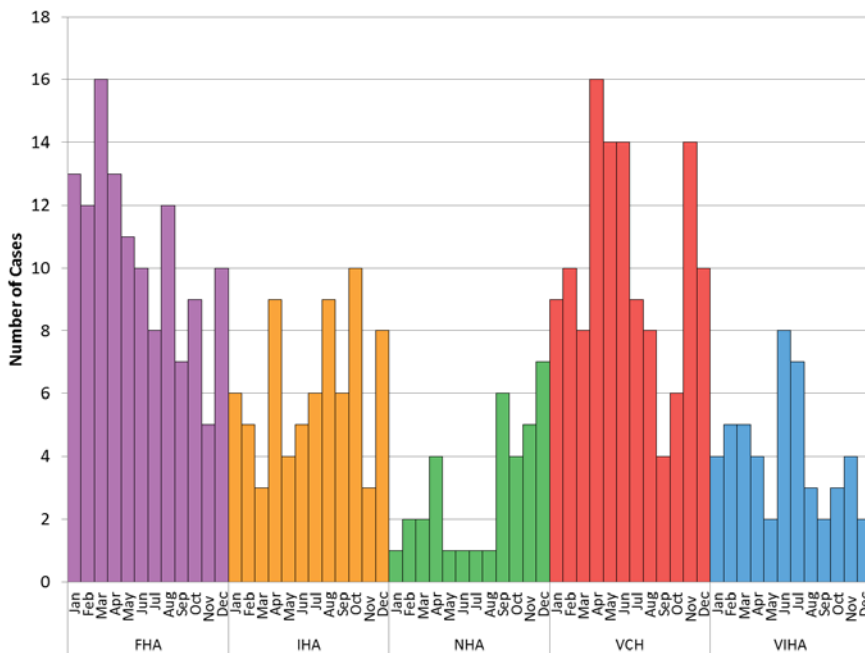
**Geographic distribution**

The Health Authority 2017 annual incidence rates ranged from 6.2 to 12.4 cases per 100,000 population (Figure 3). The number of cases reported by month in each Health Authority is shown in Figure 4.

**Figure 3.** Invasive group A streptococcal disease incidence by health authority, British Columbia, 2007-2017



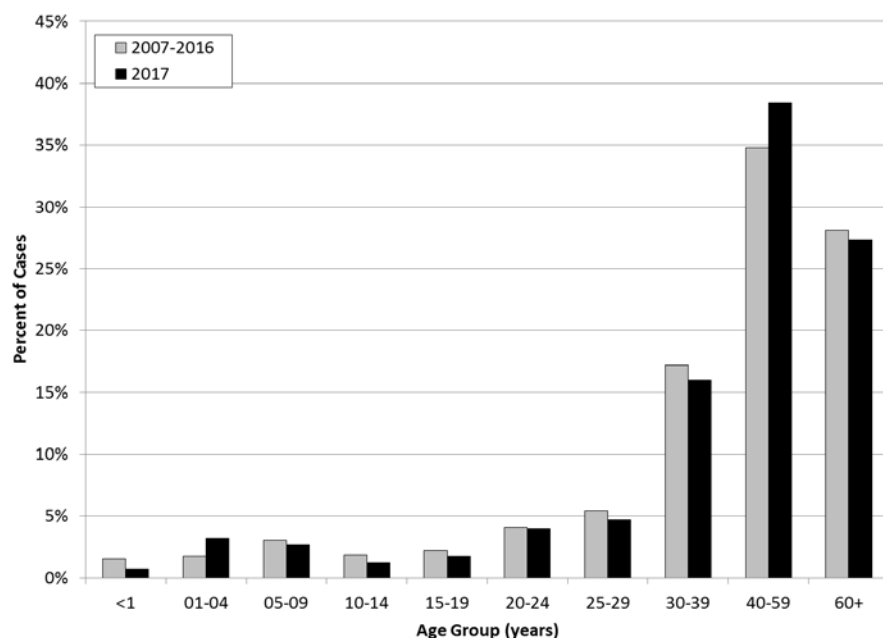
**Figure 4.** Number of invasive group A streptococcal disease cases by month and health authority, British Columbia, 2017



### Age distribution

In 2017, cases ranged in age from 0 to 95 years (median 49 years). In the previous ten years, the age range of cases was 0-104 years (median 46 years). The largest proportions of cases were in the 40-59 and 60+ year age groups (Figure 5). The age distribution of cases in 2017 is similar to the age distribution of cases in prior years; however there are increases in the proportions of cases in the 1-4 year and 40-59 year age groups.

**Figure 5.** Age distribution of invasive group A streptococcal disease cases, British Columbia, 2007-2016 and 2017



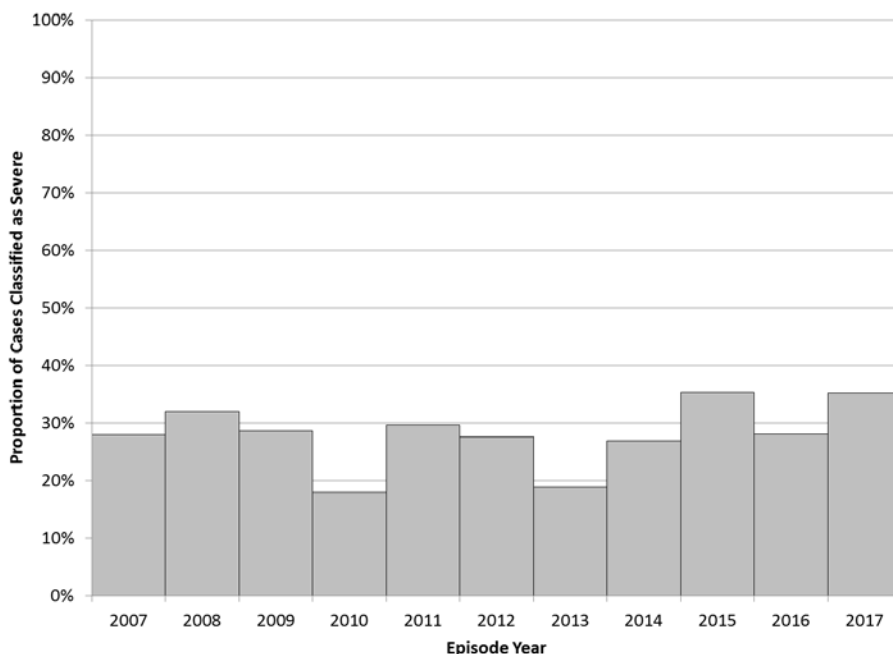
### Severity

Severe cases were defined as those reported with toxic shock syndrome, soft tissue necrosis (necrotizing fasciitis/myositis/gangrene), GAS pneumonia, meningitis or death. Attribution of death to GAS infection could not be determined from the surveillance data; all cases where death was reported as the outcome were included. In 2017, 35% of cases were classified as severe; in the previous decade 2007-2016, 28% (annual range 18-35%) were severe (Figure 6).

Sixteen cases were reported with death as the outcome (case fatality rate=3.9%). In the previous decade, annual case fatality rates ranged from 6.0% to 13.7% (median 7.4%). Case fatality rates vary by age group (Table 1).

Three cases of puerperal fever were reported in 2017. One infant was not affected; infant outcomes were not reported for the other two cases.

**Figure 6.** Proportion of invasive group A streptococcal disease cases classified as severe, British Columbia, 2007-2017



**Table 1.** iGAS case fatality rates by age group, British Columbia, 2017 and 2007-2016

Age Group (years)	2017*			2007-2016
	Cases	Deaths	Case Fatality Rate	Case Fatality Rate
<5	16	2	13%	8%
05-09	11	0	0%	8%
10-19	12	0	0%	7%
20-39	100	0	0%	3%
40-59	156	6	4%	8%
60+	111	8	7%	12%
<b>Total</b>	<b>406</b>	<b>16</b>	<b>4%</b>	<b>8%</b>

***Risk Factors and Predisposing Conditions***

A higher proportion of cases in 2017 compared to prior years reported the following risk factors and predisposing conditions: alcoholism, chronic cardiac condition, diabetes, homelessness/under-housing, injection drug use, immunocompromising condition, skin infections and wounds than in previous years (Table 2). 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’. Changes to reporting now require selection of one of the following responses yes/ no/ asked but unknown/declined to answer/not assessed, for each risk factor and predisposing condition.

**Table 2.** Risk factors and predisposing conditions reported for iGAS cases, British Columbia, 2007-2016 and 2017

<b>Risk Factor / Predisposing Condition</b>	<b>2007-2016</b>	<b>2017*</b>
Alcoholism	10.3%	17.2%
Chronic Cardiac Condition	11.8%	18.2%
Diabetes	11.5%	15.8%
Homeless/under-housed	6.4%	24.4%
Injection Drug Use	19.4%	26.8%
Immunocompromised	13.5%	14.8%
Skin Infection	18.2%	35.5%
Wound	32.6%	37.9%

### ***Clusters and Investigations***

In March 2017, two pediatric cases of iGAS were identified in children from the same elementary school classroom in Vancouver Coastal Health. Isolates from both cases were typed as *emm* 1 and were determined to be related to each other, and different from other iGAS isolates, by whole genome sequence analysis.

The Interior Health Authority investigated increased iGAS rates between November 2016 and January 2017. While a large proportion of cases reported homelessness or contact with shelters in Kelowna or Kamloops, multiple *emm* types were detected among cases.

### ***Emm Typing***

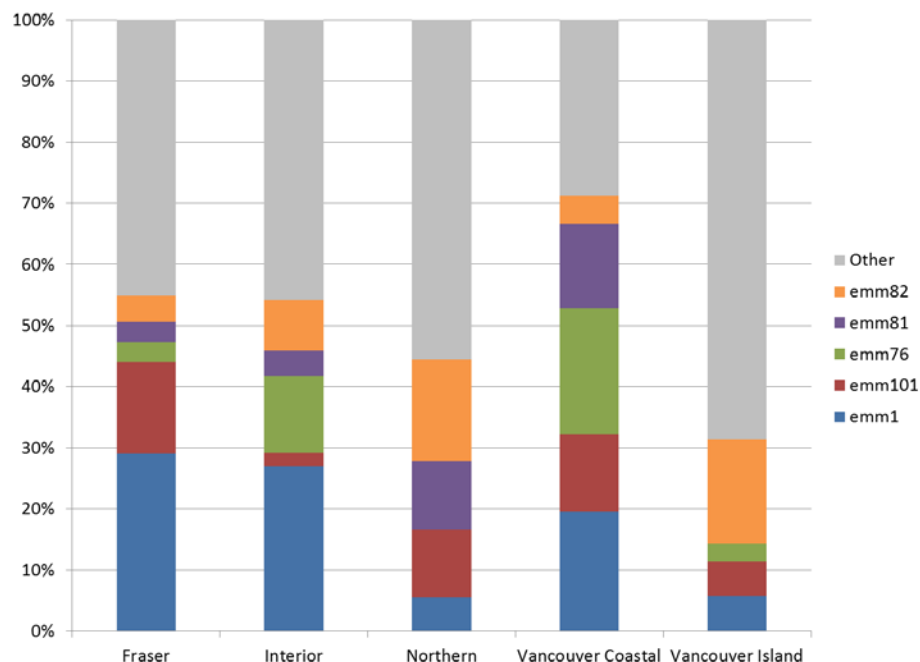
The BCCDC Public Health Laboratory provided National Microbiology Laboratory *emm* typing results for 281 of the cases reported in 2017. The most common *emm* types in 2017 were *emm*1 (n=60; 21% of known *emm* types), *emm*101(n=30; 11%) and *emm*76 (n=28; 10%).

The *emm* distribution varied by Health Authority (Figure 7).

Case risk factor profiles varied by *emm* type. Large proportions of *emm*101 and *emm*76 cases reported homelessness/under-housing, injection drug use, skin infections and wounds (Table 3).

Cases with *emm*1 were more likely to have severe presentations. The highest case fatality rate was in those with *emm*76 (Table 4).

**Figure 7.** iGAS *emm* type distribution by health authority, British Columbia, 2017



**Table 3.** Proportions of iGAS cases reporting risk factors and predisposing conditions by *emm* type, British Columbia, 2017

Risk Factor / Predisposing Condition	emm1 (n=60)	emm101 (n=30)	emm 76 (n=28)	Other (n=163)	Unknown (125)	Total 2017 (n=406)
Alcoholism	15.0%	36.7%	14.3%	15.3%	16.8%	17.2%
Chronic Cardiac Condition	18.3%	23.3%	25.0%	18.4%	15.2%	18.2%
Diabetes	8.3%	13.3%	10.7%	19.6%	16.0%	15.8%
Homeless/under-housed	1.7%	50.0%	57.1%	19.0%	28.8%	24.4%
Injection Drug Use	5.0%	60.0%	57.1%	20.2%	31.2%	26.8%
Immunosuppressive condition	16.7%	36.7%	17.9%	13.5%	9.6%	14.8%
Chronic respiratory/pulmonary condition	13.3%	23.3%	14.3%	13.5%	11.2%	13.5%
Skin Infection	26.7%	43.3%	60.7%	31.3%	37.6%	35.5%
Wound	31.7%	46.7%	53.6%	38.7%	34.4%	37.9%

**Table 4.** Indicators of severity by *emm* type, British Columbia, 2017

	<i>emm</i> Type										Total (n=406)	
	<i>emm1</i> (n=60)		<i>emm101</i> (n=30)		<i>emm76</i> (n=28)		Other (n=163)		Unknown (n=125)			
	#	%	#	%	#	%	#	%	#	%	#	%
Death	2	3.3%	1	3.3%	3	10.7%	5	3.1%	5	4.0%	16	3.9%
Necrotizing fasciitis	9	15.0%	3	10.0%	3	10.7%	8	4.9%	15	12.0%	38	9.4%
Toxic shock syndrome	13	21.7%	4	13.3%	4	14.3%	11	6.7%	14	11.2%	46	11.3%
Any severe presentation	30	50.0%	7	23.3%	11	39.3%	48	29.4%	47	37.6%	143	35.2%

### Laboratory Data

As of January 19, 2018, the National Microbiology Laboratory had provided *emm* typing for 315 British Columbia *Streptococcus pyogenes* isolates from 2017 (Figure 8). The most common *emm* types in 2017 were *emm1* (n=60; 19%), *emm76* (n=40; 13%), and *emm101* (n=36; 11%). The most common *emm* types in 2011-2016 were *emm1* (n=200; 20%), *emm89* (n=90; 9%) and *emm28* (n=76; 8%).

The age distribution of cases varied by *emm* type with a larger proportion of *emm1* cases among young children and a larger proportion of *emm101* cases in the 40-59 year age group (Figure 9).

Since the beginning of 2016, the *emm* type distribution has varied by month (Figure 10).

### Conclusions

- The high incidence rate observed in 2016 has continued in 2017, with a rate surpassing those observed previously in BC.
- No unusual clustering by date of onset or age group was identified in the provincial data set.
- A higher proportion of cases reported severe presentation in 2017 (compared to previous years); however the case fatality rate was lower.
- A number of risk factors and predisposing conditions were reported in greater frequency in 2017. It is not clear whether this is a true increase or due to improved reporting.
- *Emm* type 1 was the most frequently identified in 2017, particularly in pediatric cases. This is a shift from 2016, when *emm* 82 and 101 were predominant.
- No single *emm* type explained the increased incidence; *emm* type distribution varies by month.
- A large proportion of cases report injection drug use and/or homelessness/under-housing, particularly among cases with *emm101* and *emm76*.

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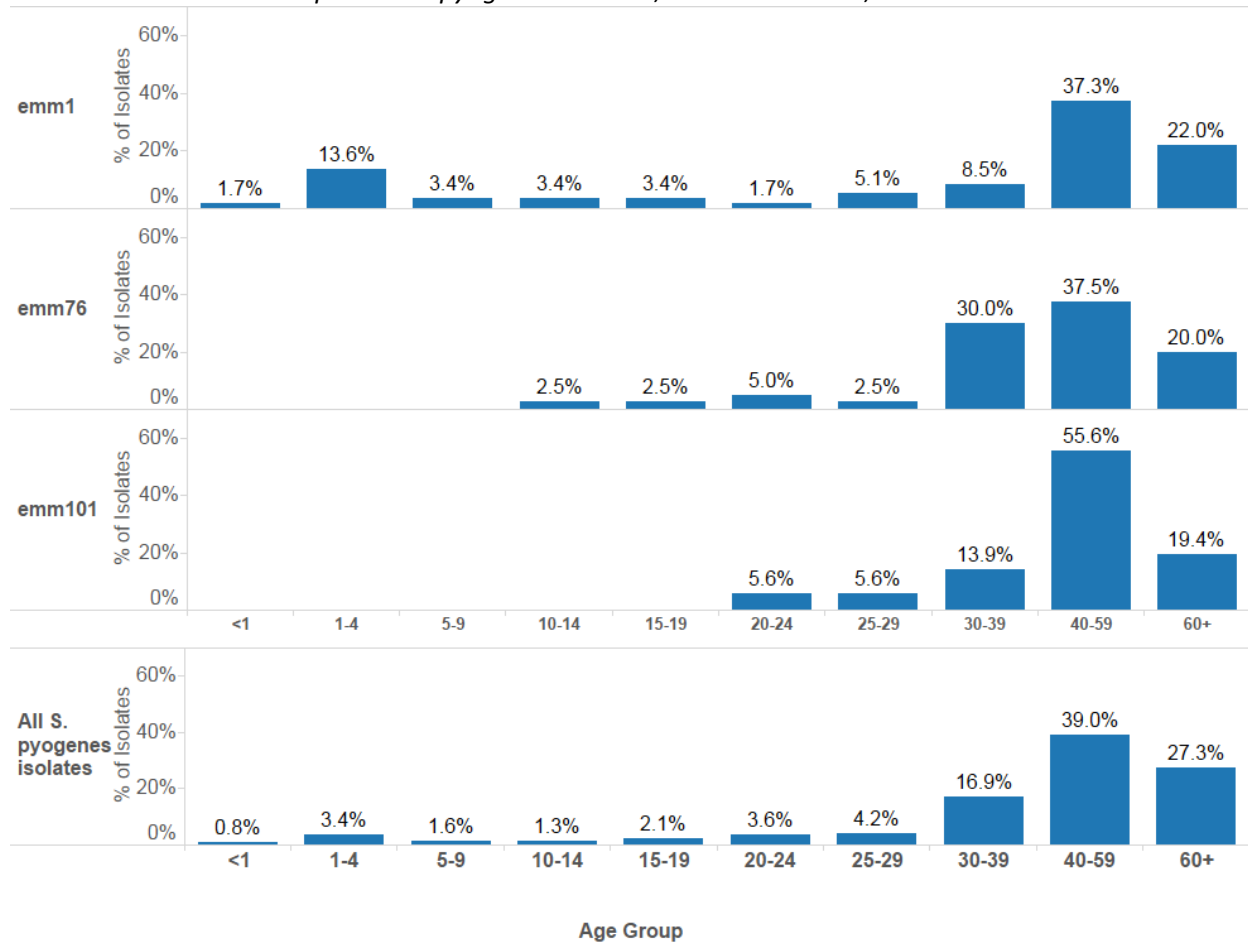


Figure 8. *Streptococcus pyogenes* emm types by year, British Columbia, 2011-2017\*

emm Type	Date Specimen Collected						
	2011	2012	2013	2014	2015	2016	2017
1	56	42	27	28	19	28	60
101	1	1	1	13	11	38	36
102	1		2		2		1
11	1	3	7	11	11	8	4
12	22	8	11	6	11	12	22
2	7	3	3	3	2	6	8
22	3		8	2	4	1	1
28	14	14	14	14	14	6	7
3	1			3	7	9	5
4	4	10	10	12	11	10	8
41				1	1		6
44	1	2	1				1
53	3			2		3	11
58	2	2	1	1			1
59	7	1		1	1	1	5
6	5	2	1	4	1	1	
73		1		2	1	1	1
74					6	12	1
75	3	1	1	2		1	3
76	1		1	2	2	2	40
77	6	5	10	2	8	10	8
80	5	2	12	12	8	3	1
81		3	1	3	8	9	15
82	2			4	15	45	19
83	2	4	1	4	3	6	9
87	3	3	5	6	6	10	4
89	18	11	20	20	12	9	19
9	1			1			4
92				1			6
93		1			1	4	2

\* The top 30 emm types (by count) since 2011 are included. Data for specimens collected in 2017 are not complete due to time lag between specimen collection and completion of laboratory typing.

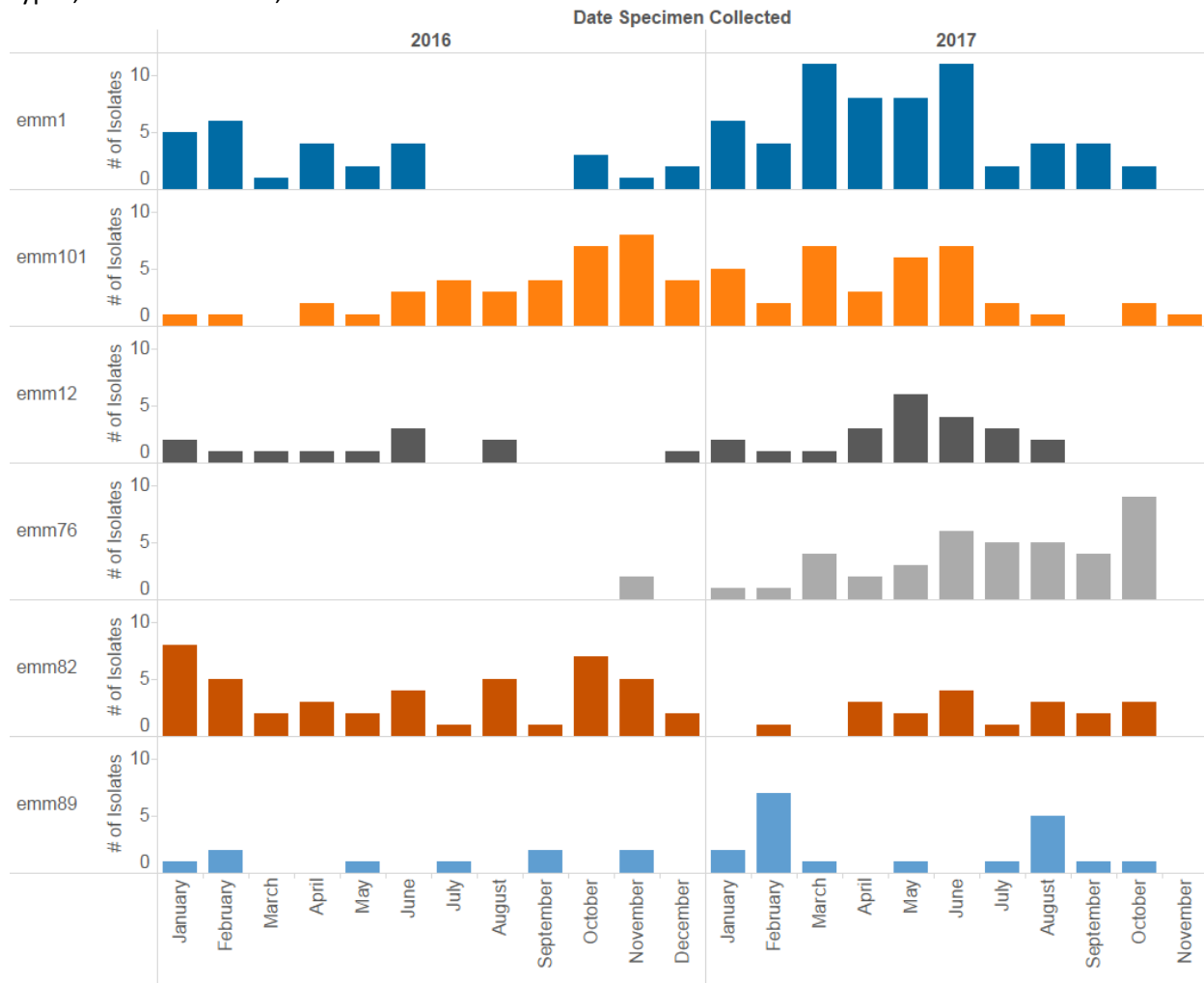
**Figure 9.** Age distribution of cases for the most frequently identified *Streptococcus pyogenes* emm types and for all cases with *Streptococcus pyogenes* isolated, British Columbia, 2017\*



Note: The number of isolates was 385 for all *S. pyogenes*, 59 for *emm1*, 40 for *emm76*, and 36 for *emm101*.

\*Data for specimens collected in 2017 are not complete due to time lag between specimen collection and completing of laboratory typing.

**Figure 10.** Number of *Streptococcus pyogenes* isolates by emm type and month collected, top 6 emm types, British Columbia, 2016-2017\*



\*Data for specimens collected in 2017 are not complete due to time lag between specimen collection and completion of laboratory typing.