Invasive Group A Streptococcal Disease (iGAS) in British Columbia
Preliminary 2022 Annual Summary
(to December 13, 2022)

Summary of iGAS in 2022

As of December 13, 2022, the incidence rate of invasive group A streptococcal disease for the year is lower than the median of the previous 5 years, over which period incidence has been higher compared to prior years, but remained relatively stable. However, December is a high incidence month and the final number and corresponding incidence of iGAS is expected to increase by the end of 2022. A higher proportion of cases have been reported in those aged ≥40 years compared with cases reported in 2017-2021; there has been no notable increase in paediatric infections.

The case fatality rate in 2022 is higher than in the previous five years. The largest number of deaths have been in those aged ≥60 years. There was no significant increase in the number of deaths among those ≤20 years old, with a single death reported in this age group.

Background

In 2017, BC experienced the highest reported incidence of iGAS since this disease became notifiable in 1997. Since then, incidence of iGAS has remained higher than in previous years, including throughout the COVID-19 pandemic period since 2020.

In early December 2022, several European countries reported recent increases in iGAS, including a higher frequency of severe infections in children.[2] This prompted a review of trends in iGAS in BC using data reported up to December 13, 2022.

Confirmed case reports

In 2022, 391 confirmed iGAS cases[1] have been reported in BC, with a year-to-date (YTD) incidence rate of 7.4 cases per 100,000 population (Figure 1). Prior to 2017, iGAS incidence was increasing slowly from 3.1 cases per 100,000 population in 2012 to 6.2 cases per 100,000 population in 2016. Since 2017, when the incidence increased by 37% over 2016, the incidence rate has remained above 6.5 cases per 100,000 population (6.9 to 8.5 per 100,000 population, median 7.8).

In May, September, and November of 2022, the number of iGAS cases exceeded the previous five-year maximum for the corresponding month; for November, 56 cases were reported in 2022, with a previous maximum for this month of 41 in 2021, Figure 2).

[1] Based on BC case definition for invasive Group A Streptococcal diseases available at http://www.bccdc.ca/health-professionals/clinical-resources/case-definitions/streptococcal-disease-invasive-group-a

[2] World Health Organization (15 December 2022). Disease Outbreak News; Increased incidence of scarlet fever and invasive Group A Streptococcus infection - multi-country. Available at: https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON429 [Accessed December 15, 2022]

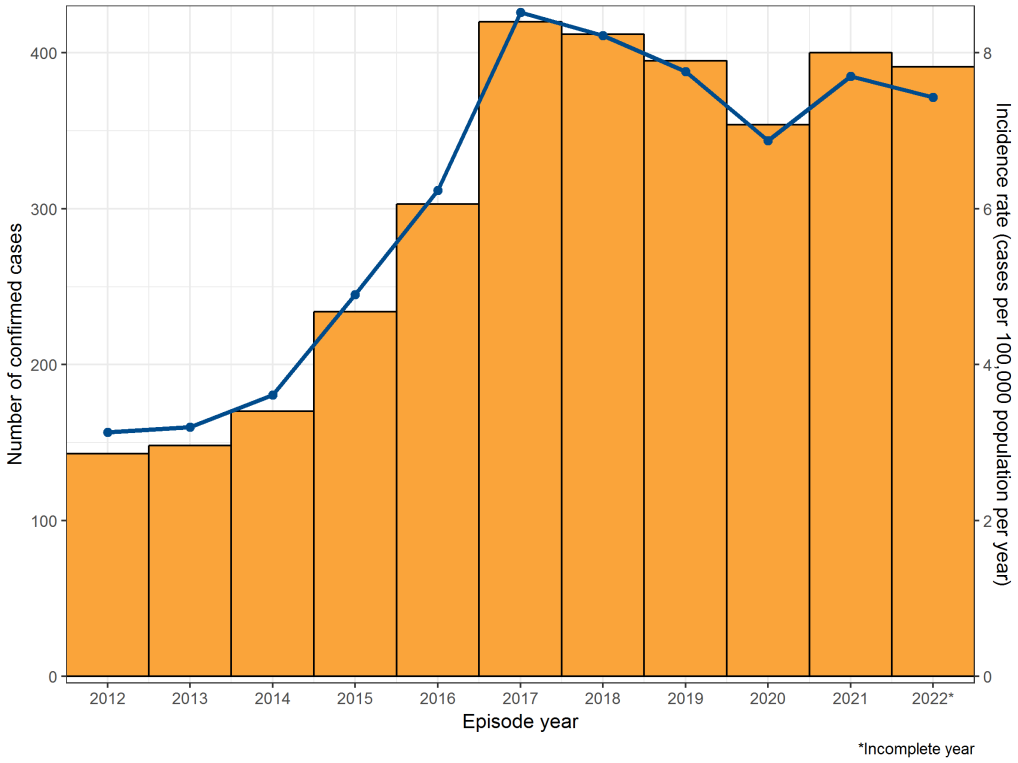

Figure 1. Invasive group A streptococcal disease cases and incidence rates by year, British Columbia, 2012–2022

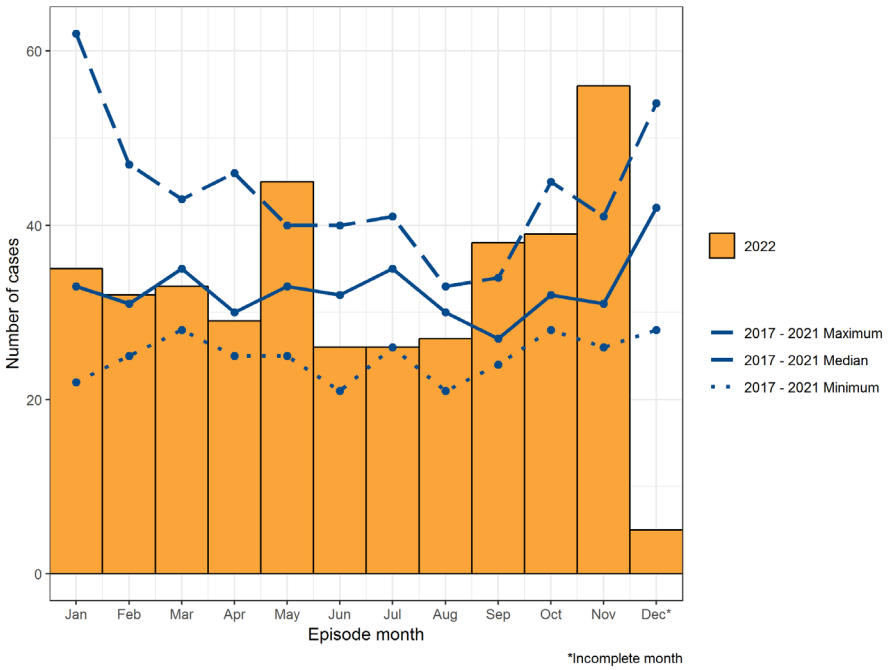

Figure 2. Invasive group A streptococcal disease case counts by month, British Columbia, 2017-2021 and 2022

Geographic distribution

In 2022, the YTD health authority incidence rates ranged from 5.5 to 9.5 cases per 100,000 population (Figure 3), with the lowest rate in Fraser Health and the highest in Vancouver Island Health. Vancouver Island Health and Fraser Health reported increasing incidence since 2019 and 2020, respectively, although Fraser remains the lowest incidence region in BC. There has been an overall decrease in iGAS incidence in Northern, Vancouver Coastal and Interior Health Authorities from 2017 through 2022.

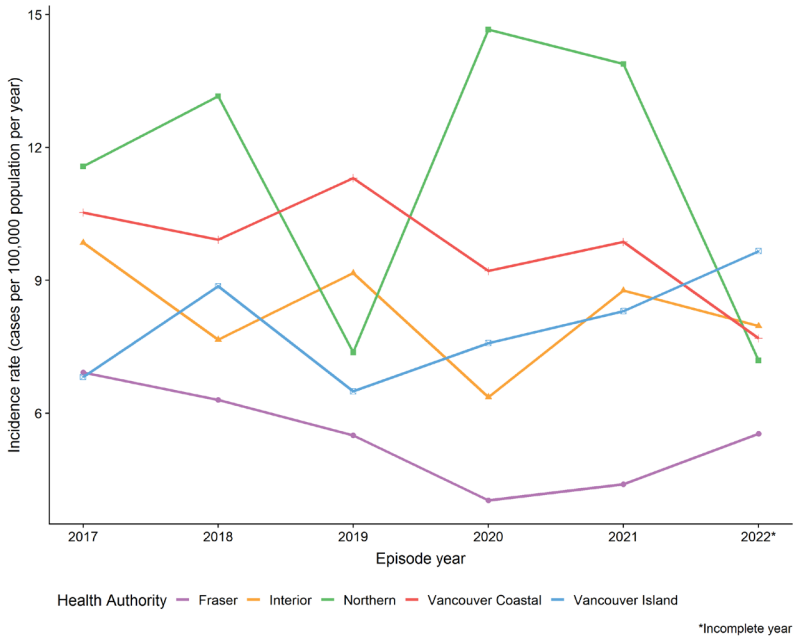

Figure 3. Invasive group A streptococcal disease incidence rates by health authority and year, British Columbia, 2017-2022

Age distribution

In 2022, cases ranged in age from 0 to 97 years (median 53 years), which is similar to the distribution in the previous 5 years (median 49, range 0-101). There has been a higher proportion of cases in those aged ≥40 years in 2022 compared with cases reported from 2017-2021 (Figure 4).

The highest age-specific rate for 2022 YTD is in the 40-59 age group, followed by ≥60 years and <1 year age groups (Figure 5), as has been seen in recent years.

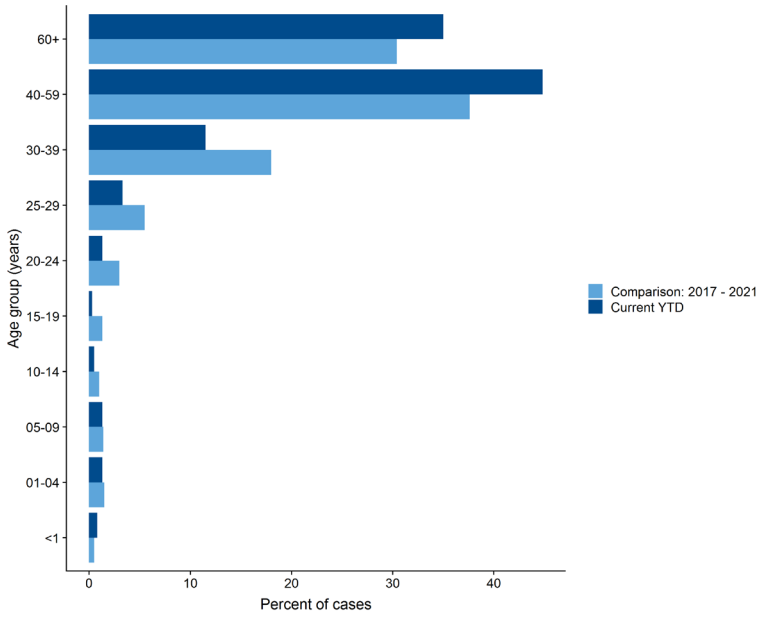

Figure 4. Age distribution of invasive group A streptococcal disease cases, British Columbia, 2017-2021 and 2022 (to December

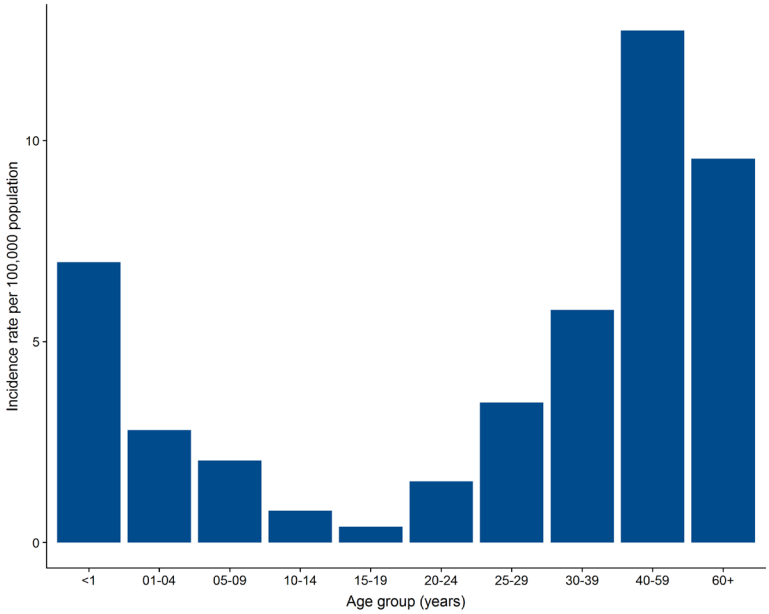

Figure 5. Invasive group A streptococcal disease incidence rates by age group, British Columbia, 2022 (to December 13 2022)

Severity

Severe cases are defined as confirmed cases reported with toxic shock syndrome, soft tissue necrosis (necrotizing fasciitis/myositis/gangrene), group A streptococcal pneumonia, meningitis, or death due to iGAS. For this analysis, all cases where the outcome was reported as death were classified as severe.

In 2022, 25.1% of cases were classified as severe (Table 1). This is similar to the median proportion of severe cases from 2017-2021 (26.6%). A larger proportion of cases were reported with toxic shock syndrome (13.3%) compared to the previous 5 years. The proportion of reported cases with pneumonia has decreased since 2017 (Figure 6).

Table 1. Severe presentations of iGAS cases, British Columbia, 2017-2021 and 2022 (to December 13 2022)

Presentation	2017-2021			2022	
	Median	Minimum	Maximum	n	%
Soft-tissue necrosis	8.5%	7.0%	11.0%	32	8.2%
Toxic shock syndrome	11.2%	9.9%	12.4%	52	13.3%
Pneumonia	13.1%	7.5%	17.9%	31	7.9%
Meningitis	0.5%	0.2%	0.7%	1	0.3%
Death	5.0%	4.0%	7.3%	30	7.7%
Any severe presentation	26.6%	22.5%	35.2%	98	25.1%

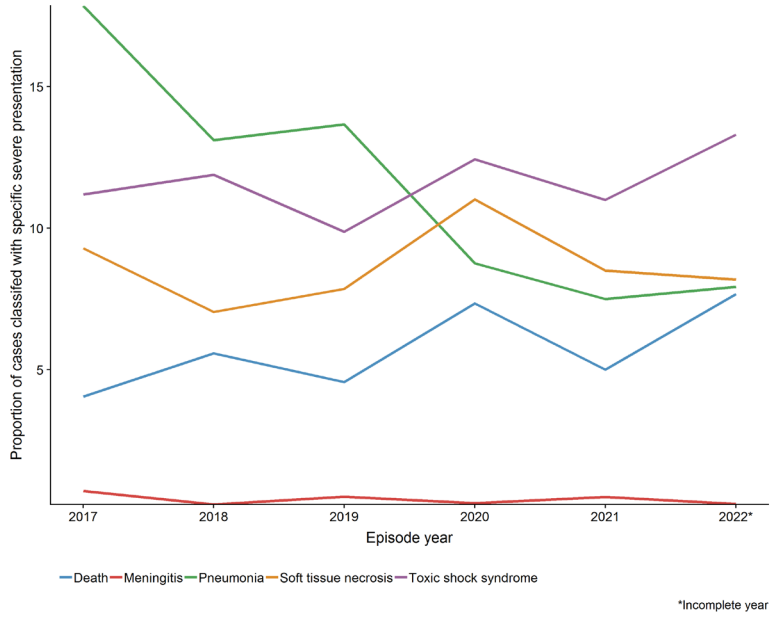

Figure 6. Proportion of invasive group A streptococcal disease cases with severe presentation, British Columbia, 2017-2022 (to December 13 2022)

The case fatality rate in 2022 was 8%. In the previous five years, the annual case fatality rate ranged from 4% -7% (median 5%). The highest case fatality rate was in the 5-9 year age group but based on a single death (Table 2). The next highest case fatality rate was in those ages ≥60 years (12%).

Table 2. iGAS case fatality rates by age group, British Columbia, 2017-2021 and 2022

Age group (years)	2017-2021	2022		
	Case fatality rate	Cases	Deaths	Case fatality rate
<5	5%	8	0	0
5-9	0%	5	1	20%
10-19	4%	3	0	0
20-24	2%	5	0	0
25-29	2%	13	1	8%
30-39	2%	45	2	4%
40-59	5%	175	10	6%
60+	9%	137	16	12%
Total	5%	391	30	8%

Risk Factors and Predisposing Conditions

Table 3 shows the frequency of risk factors in cases reported in 2022 and the preceding 5 year period. More than one risk factor/predisposing condition can be reported for a case. Alcohol use disorder was reported more frequently for iGAS cases in 2022, compared with cases in 2017-2021. Immunocompromising medical conditions were reported for a smaller proportion of cases in 2022.

Table 3. Risk factors and predisposing conditions reported for iGAS cases, British Columbia, 2017-2021 and 2022

Risk factor/predisposing condition	**2017-2021**			**2022**
	Median	Minimum	Maximum	
Alcohol use disorder	16.7%	12.9%	22.3%	23.3%
Chronic cardiac condition	18.3%	18.1%	25.5%	21.7%
Diabetes	16.1%	14.4%	20.2%	16.4%
Experiencing homelessness	32.9%	23.3%	36.3%	32.7%
Injection drug use	27.8%	25.7%	34.4%	22.3%
Immunocompromised	10.1%	8.8%	15.0%	7.4%
Chronic respiratory/pulmonary condition	13.1%	9.9%	17.2%	13.3%
Skin infection	36.8%	32.3%	41.8%	35.3%
Wound	36.7%	35.3%	44.5%	42.5%

***Emm* typing**

As of December 13 2022, the BCCDC Public Health Laboratory has received *emm* typing results for 275 of the iGAS cases from 2022 (70.3%). Over the previous 5 years, the proportion of missing *emm* types ranged from 10.9% in 2018 to 14.4% in 2020.

The four most common *emm* types in 2022 were *emm*49 (n = 67, 24% of known *emm* types), *emm*74 (n = 58, 21%), *emm*92 (n = 25, 9%) and *emm*59 (n = 22, 8%). The *emm* type distributions varied somewhat by health authority (Figure 7).

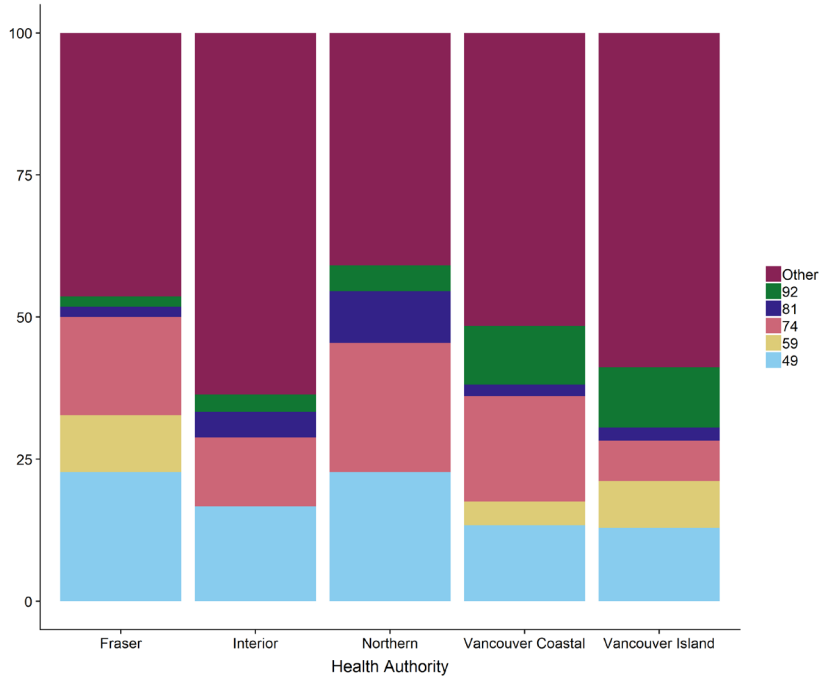

Figure 7. iGAS *emm* type distribution by health authority, British Columbia, 2022

The dominant *emm* type has changed several times throughout the past 6 years (Figure 8). In 2017 and 2018, the most frequent *emm* types were *emm*1 and *emm*76. In 2019 and 2020, *emm*81 and *emm*41 were the most common, and *emm*1 was still present in larger numbers. *Emm*1 has been associated with more severe iGAS disease in the literature. In 2021, the majority of infections were *emm*49 (104/341 available results or 30.5%). In 2022 *emm*49 and 74 were the most frequently identified in BC isolates, with only a single *emm*1 identified to date.

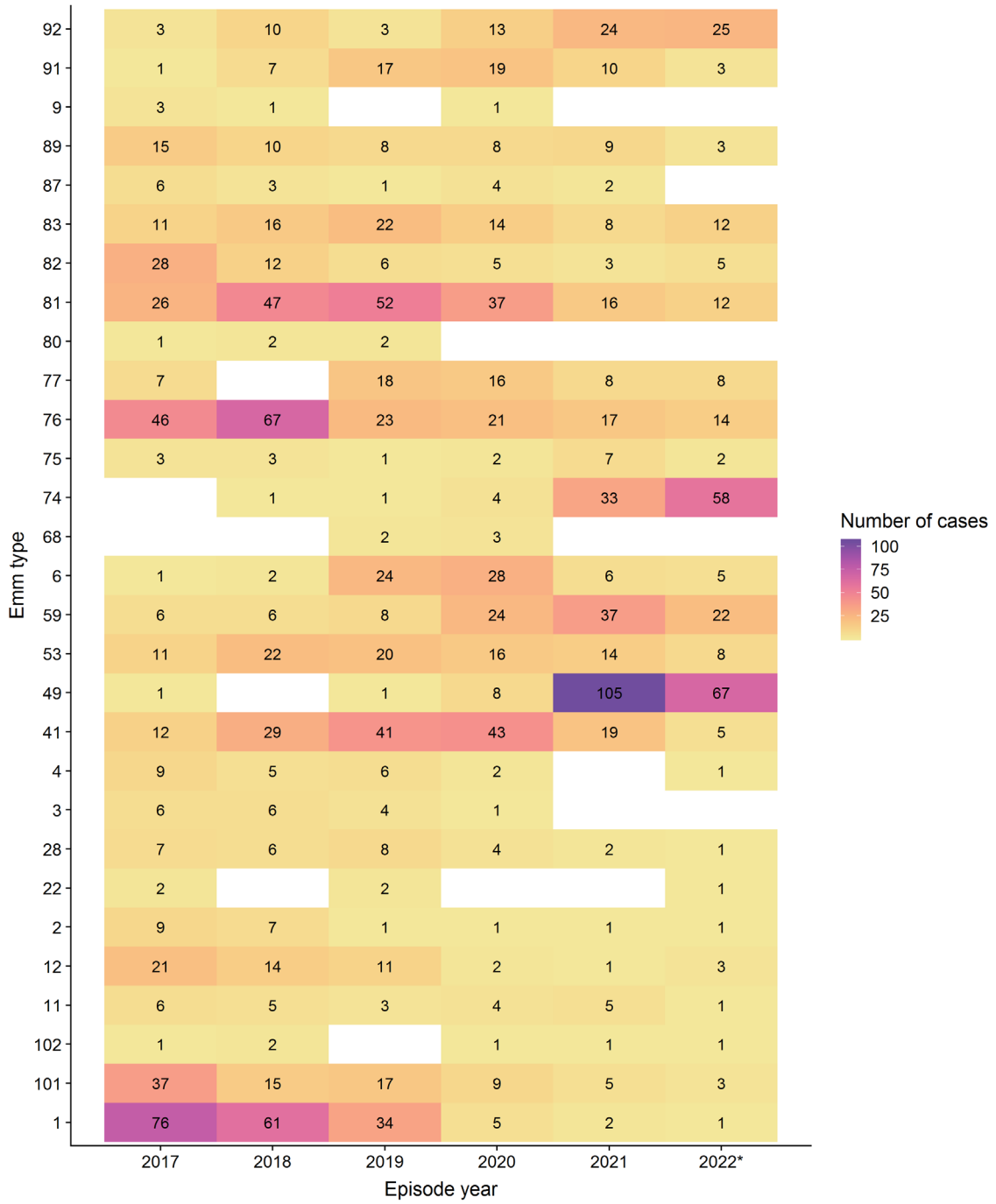

Figure 8. iGAS *emm* type counts by year, British Columbia, 2017-2022

Case risk factor varied by *emm* type (Table 4). A larger proportion of *emm*74, *emm*92 and *emm*49 cases had recent history of injection drug use or were experiencing homelessness or were under-housed, particularly compared to cases with other *emm* types. A larger proportion of *emm*92 cases reported wounds and diabetes, compared with other cases.

Table 4. Reported risk factors and predisposing conditions among iGAS cases by *emm* type, British Columbia, 2022

Risk factor/predisposing condition	***Emm49*** N = 67	***Emm*59** N = 22	***Emm*74** N = 58	***Emm*92** N = 25	**Other** N = 103	**Total** N = 391
Alcoholism	25%	41%	29%	16%	25%	23%
Chronic cardiac condition	25%	27%	12%	24%	26%	22%
Diabetes	15%	23%	14%	28%	12%	16%
Experiencing homelessness or under-housed	37%	23%	50%	44%	22%	33%
Injection drug use	30%	23%	34%	32%	13%	22%
Immunocompromised	9%	0%	9%	8%	3%	7%
Chronic respiratory/pulmonary condition	12%	27%	17%	20%	10%	13%
Skin infection	33%	32%	36%	32%	31%	35%
Wound	39%	45%	48%	56%	29%	42%
“No” for all risk factors and predisposing conditions	4%	9%	0%	8%	0%	4%

Cases with *emm*59 were more likely to have severe presentation of infection, particularly toxic shock syndrome and soft-tissue necrosis (Table 5). Pneumonia was reported slightly more frequently for *emm*49 cases.

Table 5. Indicators of severity by *emm* type, British Columbia, 2022

	Emm49 N = 67		***Emm*59** N = 22		***Emm*74** N = 58		***Emm*92** N = 25		**Other** N = 103		**Total** N = 391	
	n	%	n	%	n	%	n	%	n	%	n	%
Soft-tissue necrosis	4	6%	4	18%	4	7%	3	12%	7	7%	32	8%
Toxic shock syndrome	12	18%	5	23%	9	16%	2	8%	11	11%	52	13%
Pneumonia	8	12%	1	5%	3	5%	2	8%	8	8%	31	8%
Meningitis	0	0%	0	0%	0	0%	0	0%	0	0%	1	0%
Death	5	7%	2	9%	3	5%	3	12%	10	10%	30	8%
Any severe presentation	17	25%	7	32%	14	24%	6	24%	26	25%	98	25%

We acknowledge the BCCDC Public Health Laboratory, the National Microbiology Laboratory and all BC health authorities in the contribution of information for this report.

Prepared by:
Immunization Programs and Vaccine Preventable Diseases Service
BC Centre for Disease Control, 655 West 12th Avenue, Vancouver, BC Canada V5Z 4R4
vpd.epi@bccdc.ca | Phone: 604-707-2519

Data Sources

British Columbia Aggregate Level Data

Invasive group A streptococcal disease (iGAS) data for 2012-2019 were sourced from case report forms submitted to the BCCDC from BC regional health authorities, which were reconciled with laboratory data. Data for 2020-2022 were sourced from case report forms submitted by BC regional health authorities, where available, and supplemented with data extracted from the BCCDC Vaccine Preventable Disease (VPD) Data Mart (a linked data set which contains reports from Panorama, the information system used for notifiable disease reporting in BC, and laboratory data) when case report forms were not available (43 records from 2020, 27 records from 2021 and 20 records from 2022).

Population Level Data

Population level data was extracted from BC Stats Population Estimates & Projections https://bcstats.shinyapps.io/popApp/.

Data Notes

- Inclusion criteria for reporting: confirmed cases who are residents of BC.
- Cases are aggregated by episode date.
    - For data from case report forms, the episode date is the onset of illness date, if reported. If onset date was not reported, the earliest of hospital admission date, specimen collection date, reported date, and date of death was used.
- For the purpose of surveillance reporting, instances when a client presented with invasive disease on two separate occasions more than 30 days apart were considered separate episodes, even if the *emm* types were the same.
- Data for the production of 2017-2018 annual reports underwent a routine data reconciliation process against both laboratory data review by health authorities. Due to the resource requirements of the COVID-19 response, data for 2019-2021 were reconciled only against laboratory data but not reviewed by health authorities following reporting and prior to report production. 2022 data have not yet been fully reconciled.
- Supplementary surveillance data (risk factors, predisposing conditions, severity and outcome) are not available for VPD Data Mart records from Fraser Health and Vancouver Coastal Health Authority, where Panorama is not the system used for notifiable disease reporting, and whose regional systems do not transmit all items required for surveillance. This gap affects 12 records from FH and 17 records from VCH in the current report.
- Severe cases were identified using a combination of the severe indicator from the case report form and the presence of any of the following clinical presentations: toxic shock syndrome, soft tissue necrosis (necrotizing fasciitis/myositis/gangrene), GAS pneumonia, meningitis or death.
- Attribution of death to GAS infection could not be conclusively determined from the surveillance data, therefore all cases where death was reported as the outcome were included in both case fatality and severity metrics. From 2017-2022, the proportion of fatal cases for which cause of death was not reported or was reported as “unknown” ranged from 25% to 50%. Therefore, inclusion of all deaths may overestimate both case fatality and the proportion of severe cases.