

Vaccine Preventable Diseases and Invasive Group A Streptococcal Disease 2019 Quarter 4: October 1 – December 31, 2019

Highlights

- A case of rubella was reported; the first case in British Columbia since 2016
- The number of confirmed mumps cases in 2019 doubled compared to 2018
- IPD incidence decreased provincially, while rates in Northern and Vancouver Island health authorities increased
- iGAS annual incidence declined in three regions, but increased to the highest observed in Vancouver Coastal
- The serogroup W ST-11 clonal clade continues to predominate among invasive meningococcal disease cases

Rubella

A single case of rubella was reported in the fourth quarter of 2019 in a resident of the Richmond Health Service Delivery Area. The case was an adult male who reported receiving childhood immunizations but did not have a vaccination record. Illness onset was at the end of November. This case reported no travel during his exposure period, and the source of infection remains unknown. No secondary cases have been reported in the six weeks (two full rubella incubation periods) since the date that the case was last infectious. The National Microbiology Laboratory identified rubella genotype 1E. The strain had an identical sequence to other rubella viruses reported to the World Health Organization this year from Japan and China.

This marks the first time a rubella case has been reported in BC since 2016, when a single case occurred in an individual who acquired rubella in Vietnam.

Invasive Pneumococcal Disease

One hundred fifty-two cases of invasive pneumococcal disease (IPD) were reported in the fourth quarter of 2019. Altogether, 533 cases of IPD were reported in BC in 2019 (10.6 cases per 100,000 population). This was a decrease from 2018, when the highest IPD rates were observed in the province (Figure 1).

While the overall provincial rate declined in 2019, trends differed by health authority (Figure 2). Of note, the Vancouver Island and Northern Health Authorities recorded the highest rates in those respective regions in the previous ten years.

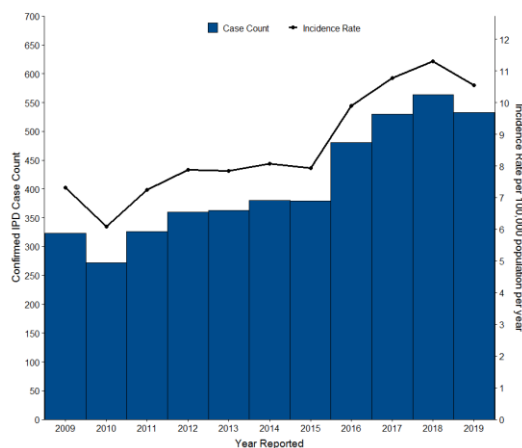


Figure 1. IPD counts and incidence rates by year, BC, 2009-2019

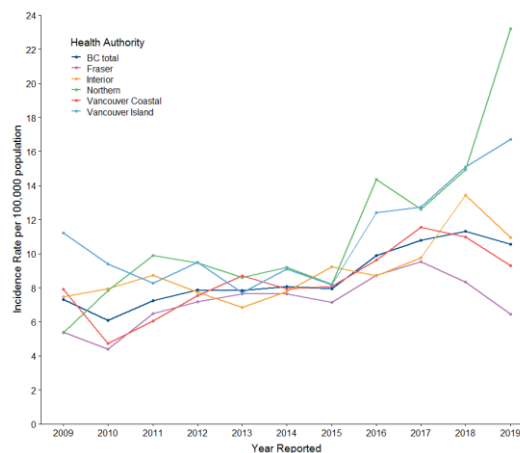


Figure 2. IPD incidence rates by year and health authority, BC, 2009-2019

The vast majority of cases in 2019 (93.4%) were adults (aged 17 and older) with most cases (60.2%) falling into the 17-64 years age group (Figure 3). Compared to 2018, a slightly higher proportion of cases in 2019 were pediatric (age 16 years and younger).

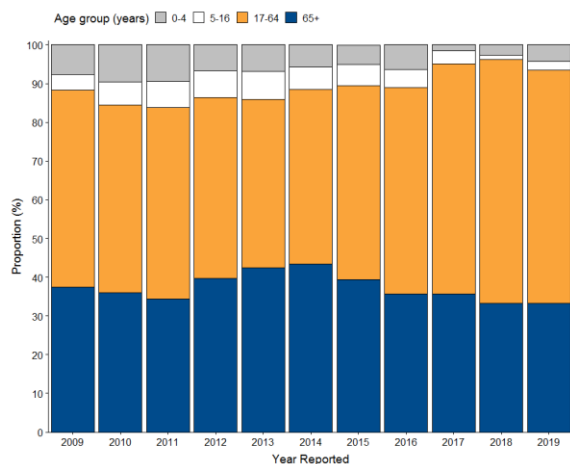


Figure 3. Proportion of total IPD cases by age group and year, BC, 2009-2019

In the fourth quarter, seven pediatric cases were reported, four of whom were under five years of age (Table 1). None of the pediatric cases were preventable.

Five cases had non-vaccine serotypes. Two had vaccine-preventable serotypes but were completely up to date with their pneumococcal immunizations.

The BCCDC Public Health Laboratory provided National Microbiology Laboratory serotype results, which were available for 492 (92%) of the cases in 2019. The most commonly identified serotype (16.7% of cases with known serotype) was serotype 4, a consistent finding since 2016 (Figure 4).

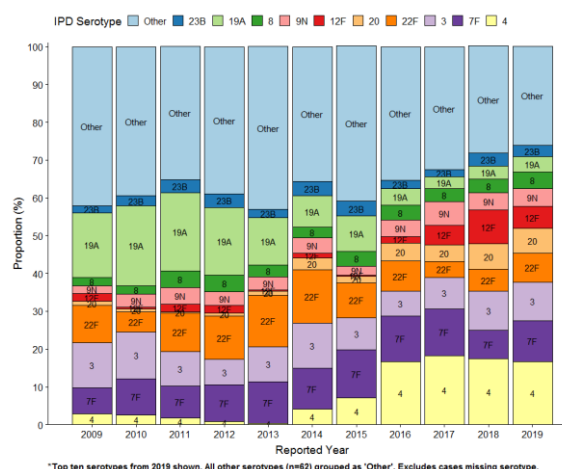


Figure 4. Proportion of total IPD cases by serotype and year, BC, 2009-2019

Table 1. Serotype distribution of confirmed invasive pneumococcal disease cases, by age group, BC, 2019

Serotype	Vaccine type†	Quarter 4 (Oct - Dec 2019)					2019 Total (Jan - Dec 2019)				
		<5 years	5-16 years	17-64 years	65+ years	Q4 Total	<5 years	5-16 years	17-64 years	65+ years	YTD Total
4	PCV13	-	-	18	4	22	-	-	67	15	82
7F	PCV13	-	-	18	1	19	1	-	47	5	53
3	PCV13	-	-	9	4	13	2	-	27	21	50
22F	PPV23	-	-	3	9	12	4	-	16	18	38
20	PPV23	-	-	8	4	12	-	-	24	8	32
12F	PPV23	-	-	8	0	8	1	-	23	5	29
9N	PPV23	-	-	3	4	7	-	-	12	11	23
8	PPV23	-	-	2	3	5	-	-	15	6	21
19A	PCV13	-	-	2	1	3	-	1	10	9	20
23B	NVT	-	-	2	2	4	4	-	8	3	15
Other‡	-	4	3	16	11	34	8	5	53	63	129
Unknown	-	-	-	8	5	13	3	6	19	13	41

Abbreviations: PCV13, 13-valent pneumococcal conjugate vaccine; PPV23, 23-valent pneumococcal polysaccharide vaccine; NVT, non-vaccine type

‡The top 10 serotypes of 2019 are shown. All other serotypes (n=28) are grouped as “Other”.

†Serotypes in both PCV13 and PPV23 are denoted as PCV13

Mumps

There were 17 confirmed cases of mumps in the fourth quarter of 2019, bringing the total number of cases in 2019 to 41 confirmed, 11 probable, and one suspect. The incidence rate for confirmed cases in 2019 (0.8 cases per 100,000 population) was twice as high as what was observed in the previous year (0.4 cases per 100,000 population). However, rates remained significantly lower than 2017, which had the highest observed rate in the past eleven years (Figure 5).

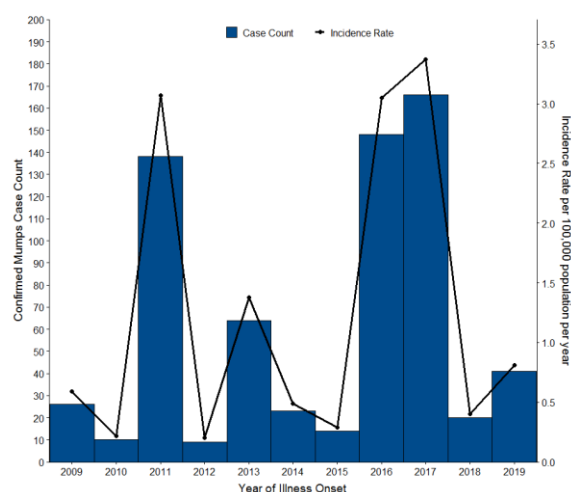


Figure 5. Mumps confirmed case counts and incidence rates by year, BC, 2009–2019

One cluster of mumps cases occurred in the fourth quarter of 2019 in Vancouver Coastal Health Authority, involving one laboratory confirmed and four epidemiologically linked confirmed cases. Transmission from the index case to the four secondary cases occurred at an event held in a private dwelling. Mumps genotype G was identified from the lab confirmed case by the National Microbiology Laboratory.

Of all the 2019 confirmed mumps cases, over half (58.5%) were between the ages of 20 and 39 years, with the highest number of cases (n=8) in the 30-34 years age group (Figure 6). Less than a quarter of cases (22%) had vaccination records, with 17% having received two documented doses of mumps-containing vaccine (Table 2). Genotype G, considered the endemic mumps strain in Canada, was identified in the majority of confirmed cases with known genotypes (73.7%).

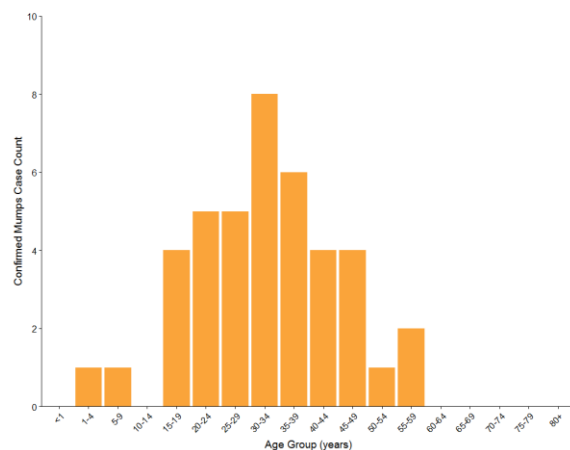


Figure 6. Mumps confirmed case counts by age group, BC, 2019

Table 2. Characteristics of confirmed mumps cases, BC, 2019

Characteristic	n	%
Sex		
Male	17	41.5
Female	24	58.5
Vaccination history with mumps-containing vaccine		
0 doses	2	4.9
1 dose, undocumented	5	12.2
1 dose, documented	2	4.9
2 doses, undocumented	4	9.8
2 doses, documented	7	17.1
Undocumented childhood vaccines	3	7.3
Unknown	18	43.9
Genotype		
C	6	14.6
G	22	53.7
H	2	4.9
Not identified	11	26.8

Haemophilus influenzae type b

In the fourth quarter of 2019, one case of *Haemophilus influenzae* type b (Hib) was reported in an adult from the Central Vancouver Island Health Service Delivery Area. The two cases reported earlier in 2019 were both unimmunized children under five years old. Since the introduction of Hib vaccine in the early 1990s, Hib incidence has declined dramatically, with a small residual burden of illness almost exclusively in adults and unimmunized children.

Invasive Group A Streptococcal Disease

One hundred fifteen cases of invasive group A streptococcal disease (iGAS) were reported in the fourth quarter of 2019. In total, 387 confirmed cases were reported in 2019 (7.7 cases per 100,000 population) (Figure 7). At the provincial level, incidence rates peaked in 2017 and have demonstrated small declines annually since then. Incidence rate trends have varied by health authority, with VCH reporting the highest incidence rate ever recorded in that region in 2019 (Figure 8).

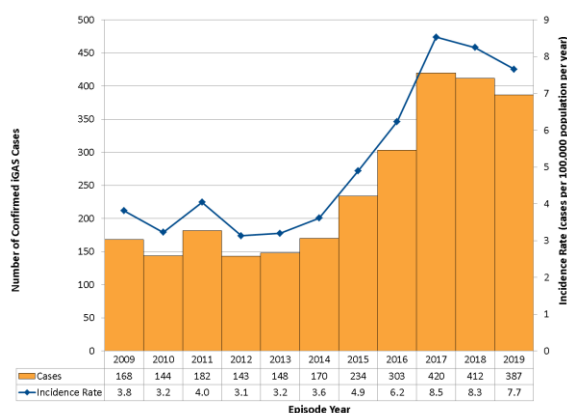


Figure 7. iGAS case counts and incidence rates by year, BC, 2009–2019

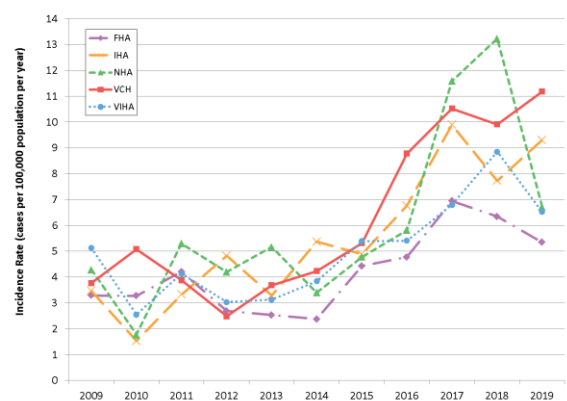


Figure 8. iGAS incidence rates by health authority and year, BC, 2009–2019

Twenty-seven (23%) cases from quarter four were classified as severe (involving streptococcal toxic shock syndrome, soft tissue necrosis, meningitis, pneumonia, and/or death); six (5%) were fatal. In all of 2019, 98 (25%) cases were severe and 17 (4%) were fatal. In the previous ten years, 28% of cases

(annual range 19-35%) were severe and 7% (annual range 4-14%) were fatal.

The most commonly reported risk factors and predisposing conditions in the fourth quarter were skin infections, injection drug use, wounds, and homelessness/under-housing (Table 3).

Table 3. Risk factors and predisposing conditions reported by iGAS cases, BC, 2009-2018 and 2019

Risk Factor / Predisposing Condition	2019 Q4	2019 Total	2009-2018
Skin Infection	38.3%	38.8%	24.3%
Injection Drug Use	36.5%	34.1%	20.3%
Wound	33.9%	36.7%	32.4%
Homeless/under-housed	32.2%	32.3%	14.3%
Chronic Cardiac Condition	17.4%	19.4%	16.4%
Alcoholism	15.7%	12.7%	12.3%
Chronic respiratory/pulmonary condition	14.8%	17.6%	7.8%
Diabetes	13.9%	14.5%	14.2%
Immunocompromised	9.6%	9.6%	13.6%

No epidemiological links were identified between cases in the fourth quarter.

To date, the BCCDC Public Health Laboratory has provided National Microbiology Laboratory *emm* typing results for 72 (63%) of the cases reported in the fourth quarter of 2019. Twenty different *emm* types were identified. The most common were *emm81* (12 cases), *emm1* (12 cases) and *emm41* (11 cases). *Emm* distributions varied by health authority (data not shown). Eight (29%) of the fourth quarter VCH cases with *emm* typing results were *emm6*.

A more detailed analysis of the BC iGAS surveillance data for 2019 will soon be available at: <http://www.bccdc.ca/health-professionals/data-reports/communicable-diseases> under Respiratory Diseases.

Invasive Meningococcal Disease

Five confirmed cases of invasive meningococcal disease (IMD) were reported in the fourth quarter of 2019; three were serogroup W, one was serogroup B and one was non-typeable. These brought the total number of IMD cases reported in 2019 to 26 (0.51 cases per 100,000 population) (Figure 9). In the previous ten years, 9-27 (median 14) cases were reported annually and annual incidence rates ranged

between 0.19 and 0.54 (median=0.30) cases per 100,000 population.

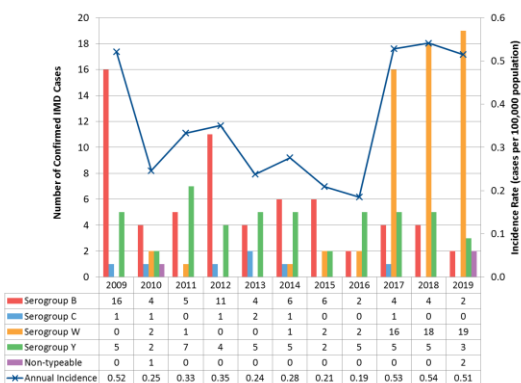


Figure 9. IMD case counts by serogroup, BC, 2009-2019

The five new cases in the fourth quarter were from the Fraser (2 serogroup W, 1 serogroup Y) and Vancouver Island (1 serogroup W, 1 non-typeable) health authorities. Nineteen of the 26 cases reported in 2019 were serogroup W. Serogroup W cases were from all regional health authorities (Table 4).

Table 4. IMD case counts by serogroup and health authority, BC, 2019

Health Authority	Serogroup			Total
	B	W	NT	
Interior	-	4	-	4
Fraser	-	5	1	9
Vancouver Coastal	-	5	-	5
Vancouver Island	2	4	1	7
Northern	-	1	-	1

The three new serogroup W cases were all in the 25-29 years age group. The serogroup Y case was over 60 years of age and the non-typeable case was under one year old. When considering all cases from 2019, three were children under five years of age (Figure 10). Serogroup W cases occurred among all of the adult age groups and in one young child.

None of the cases in 2019 reported risk factors for invasive meningococcal disease that warranted consideration of meningococcal immunization beyond the routine immunization program.

None of the cases reported in the fourth quarter reported travel outside of Canada or epidemiologic links with other IMD cases. Three of the cases reported earlier in 2019 (one serogroup B, two serogroup W) reported travel outside of Canada during their exposure periods; travel locations were

in the United States, Europe and Asia. Two of the earlier serogroup W cases were household contacts.

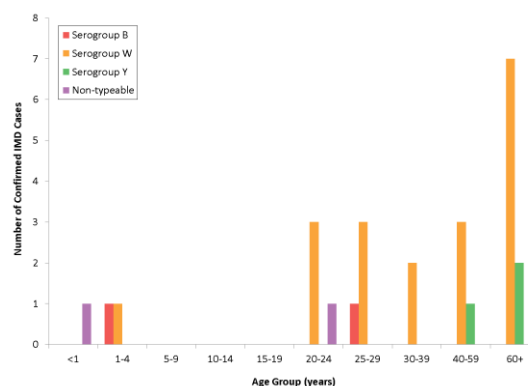


Figure 10. IMD cases by serogroup and age group, BC, 2019

Clonal complex results are not yet available for the new serogroup W cases. To date in 2019, 14 of the 19 serogroup W cases had clonal complex results. All were ST-11cc. This is the strain that caused an outbreak among adolescents in the Interior Health Authority in 2017 and accounted for 12 of the 13 serogroup W cases with clonal complex results in 2018.

Additional BCCDC Reports

Influenza Surveillance Reports:

<http://www.bccdc.ca/health-professionals/data-reports/communicable-diseases/influenza-surveillance-reports>

Invasive Group A Streptococcal Disease (iGAS) in British Columbia, 2018 Quarterly reports:

<http://www.bccdc.ca/health-professionals/data-reports/communicable-diseases> see Respiratory Diseases

Measles and Mumps Epidemiological Summaries:

<http://www.bccdc.ca/health-professionals/data-reports/communicable-diseases> see Vaccine Preventable Diseases

BC Reportable Diseases Data Dashboard:

<http://www.bccdc.ca/health-professionals/data-reports/reportable-diseases-data-dashboard>

Data Notes

Data for invasive meningococcal disease, invasive group A streptococcal disease, measles, mumps, and rubella are sourced from reporting by BC health authorities using forms specifically designed for each disease, and sometimes reconciliation with laboratory data.

Data for all other diseases are sourced from the health authorities' investigation reports in the provincial public health information system (Panorama), with the exception of third and fourth quarter statistics from Fraser Health Authority (FHA), whose data were not available in Panorama at the time of this report. Third and fourth quarter pertussis case counts for FHA were obtained from down-time file transfer reports provided by FHA to BCCDC. Third and fourth quarter diphtheria, *Haemophilus influenzae*, invasive pneumococcal disease, and tetanus case counts for FHA were obtained from laboratory information system data in the Public Health Reporting Data Warehouse.

Unless otherwise specified, only cases meeting the confirmed case definition were included in this report. Case definitions are available at: <http://www.bccdc.ca/health-professionals/clinical-resources/case-definitions>.

Population numbers used in incidence rate calculations for years prior to 2019 were from the BC Stats Population Estimates (updated April 2019). Population numbers for 2019 were from the BC Stats P.E.O.P.L.E. (Population Extrapolation for Organizational Planning with Less Error) Projection (updated September 2019).

Cases were assigned to a year and quarter based on dates available in each data source. For the diseases reported using case report forms, disease-specific algorithms were used to identify the best approximation of the onset date from the various dates reported (e.g., onset date, specimen collection date, hospitalization date, reported date). For data sourced from Panorama or health authority files, the date the case was reported to public health was used. When laboratory information system data were used, the earliest available laboratory date associated with the investigation was used (e.g., collection date, result date).

Numbers in this report were generated January 15-16, 2020 and are subject to change due to possible late reporting and/or data clean up.

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Summary Table of Select Reportable Diseases

Disease		Quarter 4 (October 1-December 31, 2019)						2019 Total (January 1-December 31, 2019)					
		FHA	IHA	NHA	VCHA	VIHA	BC	FHA	IHA	NHA	VCHA	VIHA	BC
Diphtheria - carrier	Count	-	-	-	-	-	-	1	-	-	1	-	2
	Incidence*	-	-	-	-	-	-	0.1	-	-	0.1	-	0.0
<i>Haemophilus influenzae</i> , type a	Count	-	-	-	-	2	2	3	-	1	-	3	7
	Incidence*	-	-	-	-	0.9	0.2	0.2	-	0.3	-	0.4	0.1
<i>Haemophilus influenzae</i> , type b	Count	-	-	-	-	1	1	1	1	-	-	1	3
	Incidence*	-	-	-	-	0.5	0.1	0.1	0.1	-	-	0.1	0.1
<i>Haemophilus influenzae</i> , type d	Count	-	-	-	-	-	-	-	1	-	-	-	1
	Incidence*	-	-	-	-	-	-	-	0.1	-	-	-	0.0
<i>Haemophilus influenzae</i> , type e	Count	-	-	-	-	1	1	-	1	1	-	1	3
	Incidence*	-	-	-	-	0.5	0.1	-	0.1	0.3	-	0.1	0.1
<i>Haemophilus influenzae</i> , type f	Count	1	1	-	-	-	1	2	3	1	-	2	8
	Incidence*	0.2	0.5	-	-	-	0.1	0.1	0.4	0.3	-	0.2	0.2
Haemophilus influenzae, non-typeable	Count	3	6	2	5	1	14	13	14	5	13	8	53
	Incidence*	0.6	3.0	2.7	1.6	0.5	1.1	0.7	1.8	1.7	1.1	0.9	1.0
<i>Haemophilus influenzae</i> , type unknown	Count	-	-	-	1	2	3	1	-	-	1	2	4
	Incidence*	-	-	-	0.3	0.9	0.2	0.1	-	-	0.1	0.2	0.1
Invasive group A streptococcal disease	Count	33	13	4	47	18	115	101	74	20	137	55	387
	Incidence*	7.0	6.5	5.4	15.3	8.5	9.1	5.3	9.3	6.7	11.2	6.5	7.7
Invasive pneumococcal disease	Count	35	25	16	23	53	152	122	87	69	114	141	533
	Incidence*	7.4	12.6	21.5	7.5	25.1	12.0	6.5	10.9	23.2	9.3	16.7	10.6
Invasive meningococcal disease	Count	3	-	-	-	2	5	9	4	1	5	7	26
	Incidence*	0.6	-	-	-	0.9	0.4	0.5	0.5	0.3	0.4	0.8	0.5
Measles	Count	-	-	-	-	-	-	10	2	-	11	8	31
	Incidence*	-	-	-	-	-	-	0.5	0.3	-	0.9	0.9	0.6
Mumps	Count	5	1	1	10	-	17	12	1	2	19	7	41
	Incidence*	1.1	0.5	1.3	3.3	-	1.3	0.6	0.1	0.7	1.6	0.8	0.8
Pertussis	Count	2	8	2	17	21	50	68	70	15	66	99	318
	Incidence*	0.4	4.0	2.7	5.6	10.0	4.0	3.6	8.8	5.0	5.4	11.7	6.3
Rubella	Count	-	-	-	1	-	1	-	-	-	1	-	1
	Incidence*	-	-	-	0.3	-	0.1	-	-	-	0.1	-	0.0
Tetanus	Count	-	-	-	-	-	-	-	-	-	-	1	1
	Incidence*	-	-	-	-	-	-	-	-	-	-	0.1	0.0

* Quarterly and year-to-date incidence rates are calculated as annual incidence rates (cases per 100,000 population per year), without adjusting for seasonality.

Notes

No cases were reported for the following diseases: acute diphtheria, poliomyelitis, and *Haemophilus influenzae* type c. Influenza surveillance data are provided in the British Columbia [Influenza Surveillance Reports](#). Data sources for Fraser Health Authority changed in quarters 3 and 4 (see [Data Notes](#)).