Vaccine Preventable Diseases and Invasive Group A Streptococcal Disease
2019 Quarter 3: July 1 – September 30, 2019

Highlights

- Two clusters of mumps occurred in the third quarter of 2019
- Invasive pneumococcal disease incidence increased in Northern Health Authority
- Two new measles cases were reported in the third quarter of 2019
- One case of *Haemophilus influenzae* type b was reported in an unimmunized child
- Fewer invasive group A streptococcal disease cases in most health authorities
- The serogroup W ST-11 clonal clade continues to predominate among invasive meningococcal disease cases

Mumps

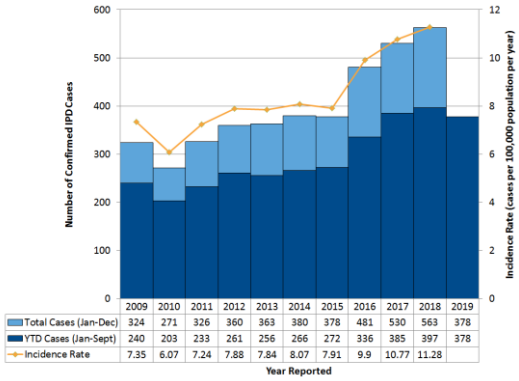
Nine confirmed, three probable, and one suspect case of mumps were reported in the third quarter of 2019, bringing the year-to-date (YTD) total case counts to 24 confirmed, 11 probable, and one suspect.

Two notable clusters of cases occurred in the third quarter. The first took place over August to the beginning of September and involved five confirmed cases – two lab-confirmed and three epidemiologically-linked confirmed. Cases consisted of family members and one workplace contact in a small community on Vancouver Island. The National Microbiology Laboratory identified mumps genotype G in the confirmed cases. This strain was different (by seven nucleotides) from the G strain endemic to Canada.

The second cluster took place at the end of August and beginning of September and included four cases (one lab confirmed, two probable, and one suspect). Three of the four cases had attended a cadet training camp hosted in Alberta during July and August, and the last case was a sibling of one of the camp attendees. Youth from multiple Canadian provinces and territories as well as from the United Kingdom were present at the camp. Although no index case was identified, cases also occurred in individuals from Saskatchewan and Quebec who attended the camp.

Invasive Pneumococcal Disease

There were 68 cases of invasive pneumococcal disease (IPD) in the third quarter of 2019. To date this year, 378 cases of IPD have been reported in BC (Figure 1). This was a decrease from 2018, when the highest IPD rates were observed in the province.



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total Cases (Jan-Dec)	324	271	326	360	363	380	378	481	530	563	378
YTD Cases (Jan-Sept)	240	203	233	261	256	266	272	336	385	397	378
Incidence Rate	7.35	6.07	7.24	7.88	7.84	8.07	7.91	9.9	10.77	11.28	

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

Just over half (55%) of the 2019 IPD cases were male, and the average age of cases was 53.2 years (range: 0-95). Three (4%) of the cases in the third quarter were pediatric (aged 16 and younger).

When comparing the YTD incidence rates* for IPD by health authority, Northern Health Authority (NHA) had the highest YTD rates this year at 23.8 cases per 100,000 population (Figure 2). Of all cases in 2019, 14% (n=53) have been reported by NHA, while 6% of the BC population resides in the same region. Furthermore, the NHA YTD rate* increased substantially from 2018, while the rates for three of

* Incidence rates marked with an asterisk have been annualized based on the first three quarters of the year without adjustment for seasonality.

the other regional health authorities decreased. Despite this increase in NHA, no obvious clustering or epidemiological links between cases had been identified.

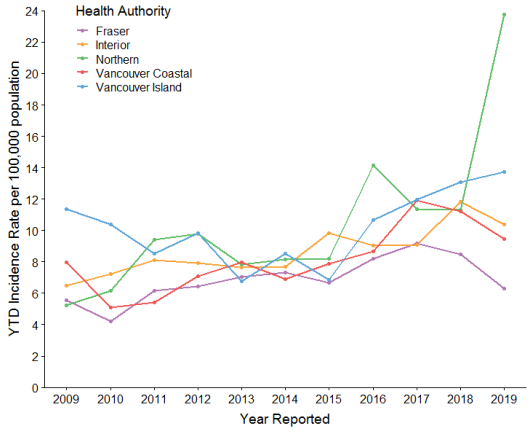


Figure 2. IPD YTD incidence rates* per year and by health authority, BC, 2009-2019

The most commonly identified serotype for NHA in 2019 was serotype 4. While this serotype was also the most common across all of BC (which was consistent with 2018), 35% of NHA cases were serotype 4, compared to 14% of cases in the other four health authorities combined (Figure 3).

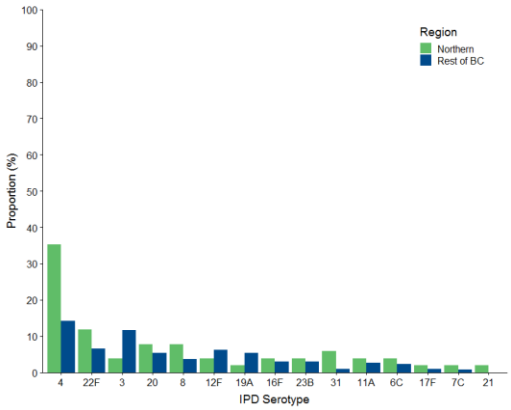


Figure 3. Proportion of total IPD serotypes, Northern Health compared to the rest of BC, 2019

The BCCDC Public Health Laboratory provided National Microbiology Laboratory serotype results, which were available for 353 (93%) of the cases to date in 2019 (Table 1).

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

Serotype	Vaccine type†	Quarter 3 (July - Sept 2019) <5 years	5-16 years	17-64 years	65+ years	Q3 Total	2019 YTD (Jan - Sept 2019) <5 years	5-16 years	17-64 years	65+ years	YTD Total
4	PCV13	-	-	8	3	11	-	-	49	12	61
3	PCV13	-	-	3	1	4	2	-	18	17	37
7F	PCV13	-	-	7	1	8	1	-	29	4	34
22F	PPV23	1	-	3	2	6	4	-	13	9	26
12F	PPV23	1	-	1	1	3	1	-	15	5	21
20	PPV23	-	-	3	-	3	-	-	16	4	20
19A	PCV13	-	-	-	1	1	-	1	8	8	17
9N	PPV23	-	-	2	1	3	-	-	9	7	16
8	PPV23	-	-	5	1	6	-	-	13	2	15
23B	NVT	-	-	-	-	-	4	-	6	1	11
Other‡	-	-	1	11	7	19	4	3	37	51	95
Unknown	-	-	-	4	-	4	3	5	10	7	25

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=24) are grouped as "Other".

†Serotypes in both PCV13 and PPV23 are denoted as PCV13

* Incidence rates marked with an asterisk have been annualized based on the first three quarters of the year without adjustment for seasonality.

Measles

Two confirmed measles cases were reported in the third quarter of 2019, both in the month of July (Figure 4). These brought the total number of cases this year to 31. This has been the highest number of measles cases reported in a year since 2014, when over 340 individuals were infected during an outbreak in the Fraser Valley.

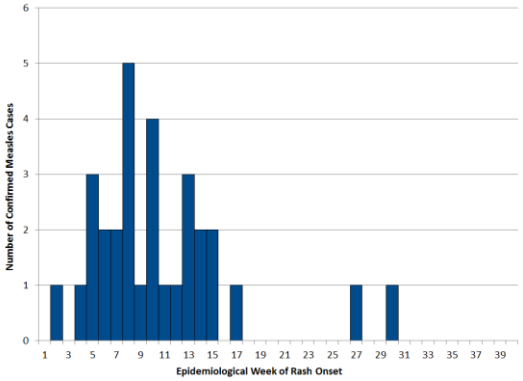


Figure 4. Measles case counts per epidemiological week, BC, January-September 2019

Both of these new cases acquired measles during travel outside of Canada and were not epidemiologically linked to any of the previous BC cases this year.

The first case, with rash onset in the week of June 30th, was an individual from Vancouver Coastal Health who travelled to the Philippines but was also potentially exposed to measles on a return flight to Canada. The National Microbiology Laboratory identified Genotype B3. The second case in the week of July 21st was a Fraser Health resident who also travelled to, and likely acquired measles in, the Philippines. Genotype B3 was again isolated. No secondary transmission occurred from these cases.

Slightly more than one in four cases (26%) reported so far in 2019 were between 10 and 14 years of age. However, the age group with the highest YTD incidence* at 6.1 cases per 100,000 population was those less than one year of age (Figure 5).

Of the 31 cases, 11 (36%) reported never receiving a measles-containing vaccine (Table 2). Nine cases (29%) reported being fully immunized with two or more documented doses of measles-containing vaccine, an expected finding in a population with high vaccine coverage.[1]

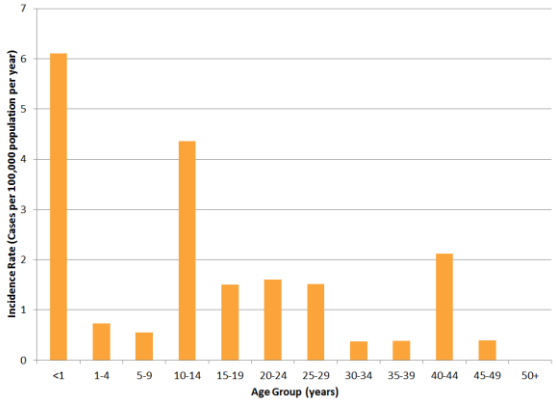


Figure 5. Measles year-to-date incidence rates* by age group, BC, January-September 2019

Table 2. Measles vaccination history for confirmed measles cases, BC, January-September 2019

Measles Vaccination History	Confirmed Cases	
	N	(%)
0 doses	11	(36)
1 dose undocumented	2	(7)
2 dose undocumented	6	(19)
1 dose documented	3	(10)
2+ doses documented	9	(29)

Haemophilus influenzae type b

One case of *Haemophilus influenzae* type b (Hib) was reported in an unimmunized 2-year old from the Okanagan Health Service Delivery Area in the third quarter of 2019. This was the second Hib case reported in 2019; the first case was an unimmunized 9-month 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.

[1] World Health Organization. Six common misconceptions about immunization: https://www.who.int/vaccine_safety/initiative/detection/immunization_misconceptions/en/index2.html

* Incidence rates marked with an asterisk have been annualized based on the first three quarters of the year without adjustment for seasonality.

Invasive Group A Streptococcal Disease

Ninety cases of invasive group A streptococcal disease (iGAS) were reported in the third quarter of 2019, bringing the total number of cases reported in the first three quarters of 2019 to 266 (Figure 6). This was less than the number of cases reported provincially in the first three quarters of 2018 and 2017. Decreased case counts were seen in all health authorities, except the Interior Health Authority (IHA) (Figure 7).

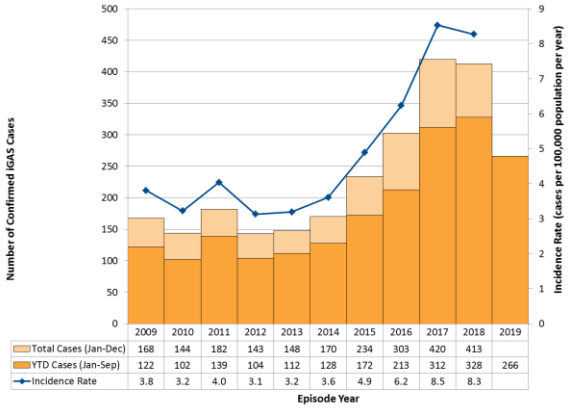


Figure 6. iGAS case counts and incidence rates by year, BC, 2009–2019 September 30

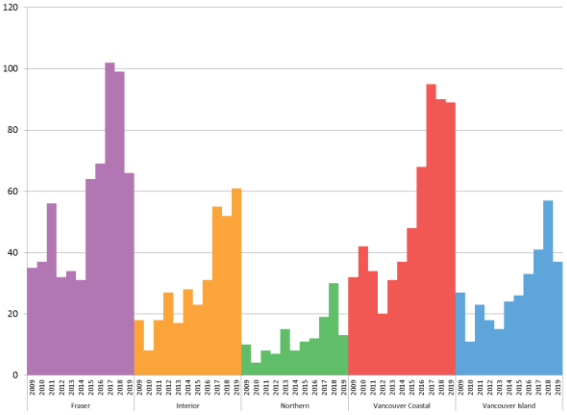


Figure 7. iGAS case counts in January-September by health authority and year, BC, 2009–2019

Seventy (26%) cases from 2019 were classified as severe (involving streptococcal toxic shock syndrome, soft tissue necrosis, meningitis, pneumonia, and/or death); ten (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 to date in 2019 were skin infections, wounds, injection drug use, and homelessness/under-housing (Table 3).

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

Risk Factor / Predisposing Condition	2009-2018	2019 (Jan-Sep)
Skin Infection	24.3%	39.5%
Wound	32.3%	37.6%
Injection Drug Use	20.3%	32.7%
Homeless/under-housed	14.4%	32.0%
Chronic Cardiac Condition	16.4%	20.3%
Chronic respiratory/pulmonary condition	7.8%	18.8%
Diabetes	14.2%	15.0%
Alcoholism	12.3%	11.7%
Immunocompromised	13.6%	9.4%

IHA identified a cluster of three invasive and two non-invasive *emm*81 cases in the same long term care facility in July 2019. No other clustering by onset date or age group was identified in the provincial dataset in the third quarter of 2019.

The BCCDC Public Health Laboratory provided National Microbiology Laboratory *emm* typing results for 216 (81%) of the cases reported in the first three quarters of 2019. Twenty-six different *emm* types were identified. The most common *emm* types were *emm*81 (35 cases), *emm*41 (28 cases) and *emm*76 (20 cases). The *emm* distribution varied by health authority (Figure 8).

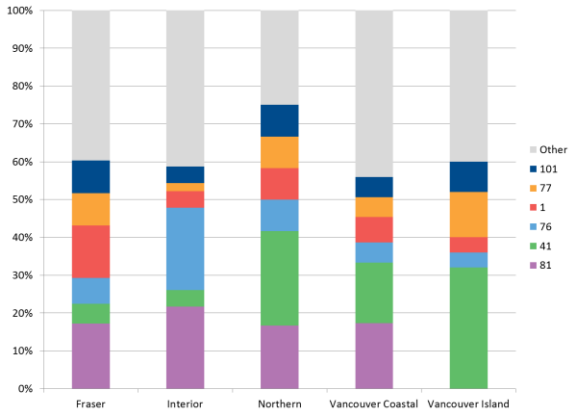
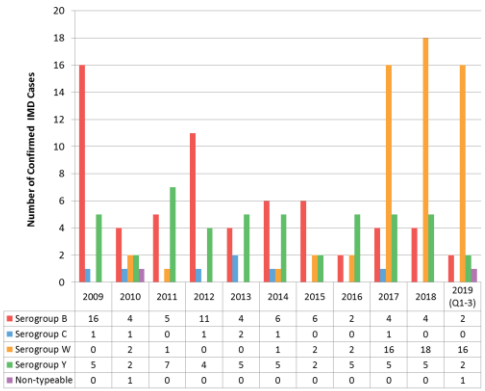


Figure 8. iGAS *emm* type distribution by health authority, January-September 2019

Invasive Meningococcal Disease

Five confirmed cases of invasive meningococcal disease (IMD) were reported in the third 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 to date in 2019 to 21 (Figure 9). In the previous ten years, 5-22 (median 10.5) cases were reported between January 1 and September 30.



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019 (Q1-3)
Serogroup B	16	4	5	11	4	6	6	2	4	4	2
Serogroup C	1	1	0	1	2	1	0	0	1	0	0
Serogroup W	0	2	1	0	0	1	2	2	16	18	16
Serogroup Y	5	2	7	4	5	5	2	5	5	5	2
Non-typeable	0	1	0	0	0	0	0	0	0	0	1

Figure 9. IMD case counts by serogroup, BC, 2009-2019 September 30

Sixteen of the 21 cases reported to date 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	Y	NT	
Interior	-	4	-	-	4
Fraser	-	3	2	1	6
Vancouver Coastal	-	5	-	-	5
Vancouver Island	2	3	-	-	5
Northern	-	1	-	-	1

Two of the 2019 cases were children aged 1-4 years (Figure 10). Seven (44%) of the serogroup W cases were 60 years of age or older.

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

Three of the 21 cases (one serogroup B, two serogroup W) reported travel outside of Canada during their exposure periods. The travel locations were in the United States, Europe and Asia.

Two serogroup W cases were household contacts; none of the other cases were epidemiologically linked.

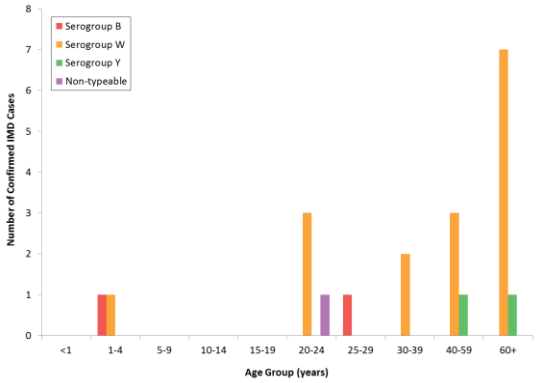


Figure 10. IMD cases by serogroup and age group, BC, January-September 2019

To date in 2019, 14 of the 16 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.

Data Notes

Data for invasive meningococcal disease, invasive group A streptococcal disease, measles, and mumps 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 quarter statistics from Fraser Health Authority (FHA) and Vancouver coastal Health Authority (VCHA), whose data were not available in Panorama at the time of this report. Third quarter pertussis case counts for FHA and VCHA were obtained from down-time file transfer reports provided by those health authorities to BCCDC. Third quarter diphtheria, *Haemophilus influenzae*, invasive pneumococcal disease, and tetanus case counts for FHA and VCHA were obtained from laboratory information system data in the Public Health Reporting Warehouse.

Unless otherwise specified, only cases meeting the confirmed case definition were included. 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 the various data sources. 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 October 16-November 1, 2019 and are subject to change due to possible late reporting and/or data clean up.

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

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Summary Table of Select Reportable Diseases

Disease		Quarter 3 (July 1-September 30, 2019)						2019 Year to Date (January 1-September 30, 2019)					
		FHA	IHA	NHA	VCHA	VIHA	BC	FHA	IHA	NHA	VCHA	VIHA	BC
Diphtheria - carrier	*Count*	-	-	-	1	-	1	1	-	-	1	-	2
	*Incidence**	-	-	-	0.3	-	0.1	0.1	-	-	0.1	-	0.1
Haemophilus influenzae, type a	*Count*	-	-	1	-	1	2	3	-	1.0	-	1.0	5
	*Incidence**	-	-	1.3	-	0.5	0.2	0.2	-	0.4	-	0.2	0.1
Haemophilus influenzae, type b	*Count*	-	1	-	-	-	1	1	1	-	-	-	2
	*Incidence**	-	0.5	-	-	-	0.1	0.1	0.2	-	-	-	0.1
Haemophilus influenzae, type d	*Count*	-	-	-	-	-	-	-	1	-	-	-	1
	*Incidence**	-	-	-	-	-	-	-	0.2	-	-	-	0.0
Haemophilus influenzae, type e	*Count*	-	-	1	-	-	1	-	1	1	-	-	2
	*Incidence**	-	-	1.3	-	-	0.1	-	0.2	0.4	-	-	0.1
Haemophilus influenzae, type f	*Count*	1	-	-	-	2	3	1	2	1	-	2.0	6
	*Incidence**	0.2	-	-	-	0.9	0.2	0.1	0.3	0.4	-	0.3	0.2
Haemophilus influenzae, non-typeable	*Count*	1	1	2	1	2	7	10	8	3	8	7	36
	*Incidence**	0.2	0.5	2.7	0.3	0.9	0.6	0.7	1.3	1.3	0.9	1.1	1.0
Haemophilus influenzae, type unknown	*Count*	-	-	-	-	-	-	1	-	1	-	-	2
	*Incidence**	-	-	-	-	-	-	0.1	-	0.4	-	-	0.1
Invasive group A streptococcal disease	*Count*	19	21	5	33	10	88	66	60	13	88	37	264
	*Incidence**	4.0	10.6	6.7	10.8	4.7	7.0	4.7	10.1	5.8	9.6	5.8	7.0
Invasive pneumococcal disease	*Count*	15	12	10	19	12	68	89	62	53	87	87	378
	*Incidence**	3.2	6.0	13.4	6.2	5.7	5.4	6.3	10.4	23.7	9.5	13.8	10.0
Invasive meningococcal disease	*Count*	2	-	-	-	3	5	6	4	1	5	5	21
	*Incidence**	0.4	-	-	-	1.4	0.4	0.4	0.7	0.4	0.5	0.8	0.6
Measles	*Count*	1	-	-	1	-	2	10	2	-	11	8	31
	*Incidence**	0.2	-	-	0.3	-	0.2	0.7	0.3	-	1.2	1.3	0.8
Mumps	*Count*	-	-	1	3	5	9	7	-	1	9	7	24
	*Incidence**	-	-	1.3	1.0	2.4	0.7	0.5	-	0.4	1.0	1.1	0.6
Pertussis	*Count*	27	12	9	14	21	83	64	67	13	32	81	257
	*Incidence**	5.7	6.0	12.1	4.6	10.0	6.6	4.5	11.2	5.8	3.5	12.8	6.8
Tetanus	*Count*	-	-	-	-	1	1	-	-	-	-	1	1
	*Incidence**	-	-	-	-	0.5	0.1	-	-	-	-	0.2	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, rubella, and *Haemophilus influenzae* type c. Influenza surveillance data are provided in the British Columbia Influenza Surveillance Reports. Data sources for Fraser and Vancouver Coastal Health Authorities changed in quarter 3 (see Data Notes).