



LABORATORY TRENDS



March 15, 2013

International Accreditation

The British Columbia Public Health Microbiology & Reference Laboratory (BCPHMRL) was recently inspected by a team of experts for the College of American Pathologists (CAP). CAP inspections are done on a 2-year accreditation cycle but are unannounced - the CAP Team can appear without much notice! This has been the third inspection for the BCPHMRL, having already been through two successful audits in 2009 and 2011 and achieved certification status.

Our Quality Management System is the framework from which ongoing activities are performed to systematically support patient and community safety as well as continual improvements. These unannounced inspections challenge laboratories to always be ready and drive ongoing planning and change needed to continually improve. These inspections therefore are important in maintaining a continual focus on quality and are opportunities for improvement.

While staff are normally involved in preparations for inspections, the level of engagement during this cycle was enhanced to include a select group of quality-committed folks. These *CAP Champions* met regularly to support each other during internal inspections and follow up, and pledged to continue as quality representatives for their Programs. They developed a strategic Quality Plan with priorities for next year.

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The recent CAP Inspection Team originated from Oregon, Washington State and California and was comprised mainly of peers from acute health care with select specialized expertise in reference and public health microbiology. Over the 2-day inspection, our operations were evaluated for compliance to CAP international standards. Noted comments expressed during this time included, "stellar labs, stellar direction", "outstanding laboratory", "real asset to the patients of BC", "extremely well run, great team", "we really had to look hard to find anything to suggest improvement on" and "well done". The CAP Team noted overall how helpful and cooperative our staff were.

While there are some opportunities for improvement, this inspection also resulted in useful recommendations that we will work towards implementing as we strive to maintain the highest laboratory standards and quality of care for the patients and communities of British Columbia.





Laboratory Testing for Novel Coronavirus

Reported by: Alan McNabb, Section Head, Virology and Molecular Microbiology & Genomics Program

Since the emergence of a novel coronavirus (NCoV) in humans in September 2012, 14 cases have been reported worldwide, with 8 deaths. Of these cases, 7 were in Saudi Arabia (5 deaths), 2 in Qatar (both survived), 2 in Jordan (both died) and 3 in the United Kingdom (one death, one recovered and one currently on treatment (<http://www.cdc.gov/coronavirus/ncv/overview.html>). To date, all of the recorded cases had influenza-like illness which included signs and symptoms of pneumonia, but may have also included coughing, mucous, shortness of breath, malaise, chest pain and/or fever.

In the UK, the primary case had traveled to Pakistan and Saudi Arabia (<http://www.phac-aspc.gc.ca/tmp-pmv/thn-csv/n-coronavirus-eng.php>), but secondary cases are believed to be due to person-to-person spread. Based on the limited number of cases the risk of person-to-person spread remains low. Investigation of suspect NCoV cases has been divided into three categories by the Centers for Disease Control and Prevention: a person under investigation, a probable case, and a confirmed case.

Case Definition: "Person Under Investigation" A person who has the following signs and symptoms is considered a 'person under investigation.' These signs and symptoms include: acute respiratory infection, possible fever of 100.4°F or higher, and cough. A patient under investigation also has to have suspicion of unexplained pneumonia or acute respiratory distress syndrome and they also must have traveled to or are residents of the Arabian Peninsula. Should more cases be identified the case definition of a person under investigation will evolve.

Novel Virus: "Probable Case" A probable case exists where a person meets the requirements for a patient under investigation, but has not been confirmed by laboratory testing; this could be because the patient or samples are not available or testing is not available. A probable case can also include a person who is in close contact with someone who does have a laboratory confirmed case who is experiencing unexplained pneumonia or acute respiratory distress.

Coronavirus: "Confirmed Case" A confirmed case exists when a patient has had laboratory testing which is positive for the novel coronavirus.

Since Vancouver is a major terminus for travel from the Middle and Far East the Virology Program and Molecular Microbiology and Genomics Program (MMGP) laboratories at the BCPHMRL have developed a RT-PCR test for NCoV based on previous published protocols. Our current RT-PCR testing algorithm follows the World Health Organization (WHO) recommendations (Figure 1) and targets the NCoV E protein gene (*upE*) for screening followed by testing for the open reading frame 1b (ORF 1b) gene and the open reading frame 1a (ORF 1a) gene. The assay for the *upE* target is considered highly sensitive, with the ORF 1a assay considered of equal sensitivity.

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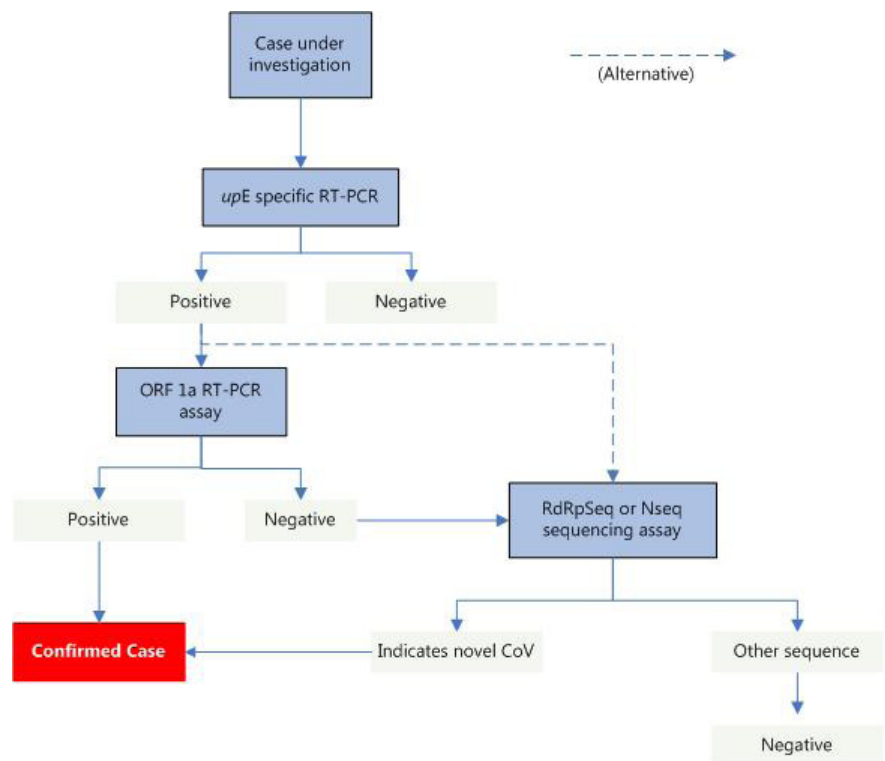


Laboratory Testing for Novel Coronavirus

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From February 28 to March 8, 2013 the MMGP in cooperation with the Virology laboratory tested all respiratory samples submitted to the PHMRL by RT-PCR screening for the E protein gene (*upE*) to determine the possible presence of the NCoV in British Columbia. None of the samples tested positive in this initial screening program; NCoV testing will now be by request only. Given that influenza and other respiratory viruses can cause clinical symptoms indistinguishable from NCoV, it is important to rule out other respiratory agents prior to requesting testing for the NCoV. If an individual meets the case definitions for NCoV please inform the Virology laboratory and NCoV testing will be expedited.

Figure 1 Current testing algorithm based on WHO recommendations (WHO, 2012).



References

Centers for Disease Control and Prevention. Case Definition and Guidance. (2013). Accessed February 26, 2013.

World Health Organization. Laboratory testing for novel coronavirus. (2012). Accessed February 26, 2013.



Carbapenem-Resistant Enterobacteriaceae (CRE) Surveillance

Reported by: Dr. Linda Hoang, Program Head, Public Health Advanced Bacteriology & Mycology Program and Yin Chang, Laboratory Surveillance & Outbreak Coordinator

The latest counts for cases of carbapenem-resistant Enterobacteriaceae (CRE) in BC can be found in Table 1 (updated from our October 2012 issue). To date, there have been 39 patients with carbapenem-resistant organisms: 25 harboured the New Delhi Metallo-β-lactamase-1-gene (NDM-1), 9 cases with OXA-48 carbapenemase and 2 with the *Klebsiella pneumoniae* carbapenem (KPC) β-lactamase gene; some patients had multiple resistance factors including two patients with NDM-1 and OXA-48 carbapenemase and one other case with the KPC β-lactamase gene as well as the Verona integron-encoded metallo-β-lactamase (VIM) gene (Table 1). To date, NDM-1-producing isolates are the predominant CRE, comprising 64% of the cases, followed by OXA-48-producing (26%), KPC-producing (7%) and VIM-producing (2%) isolates.

Table 1 Carbapenem-resistant Enterobacteriaceae detected since 2010, Bacteriology & Mycology Program, BCPHMRL. Counts include one patient* with KPC and VIM, two patients^ with NDM-1 and OXA-48 in the same year and one patient^ with NDM in 2008 and 2009 (n=43).

Type	Collection Year					
	2008	2009	2010	2011	2012	2013
NDM-1	1 [§]	1 [§]	3	7	13 [^]	3
KPC			1 [*]	1	1	
VIM			1 [*]			
IMP						
OXA-48				1	10 [^]	

Where there was a reported travel history, South Asia was identified as the predominant location. The age range of patients with carbapenem-resistance were from 23 years to 97 years, with the majority (85%) above 60 years old (Figure 2). A variety of CRE organisms were isolated, including *Klebsiella pneumoniae*, *E. coli*, *Citrobacter freundii* and *Enterobacter cloacae* (Figure 3). *K. pneumoniae* has been the most frequently isolated (70%), followed by *E. coli* (20%).

This work is possible through the combined efforts of microbiology laboratories across the province through the British Columbia Association of Medical Microbiologists, the BCPHMRL Public Health Advanced Bacteriology & Mycology Program and Dr. Michael Mulvey at the National Microbiology Laboratory, who provides protocols and technical support.

Figure 2 Age distribution of patients harbouring carbapenem-resistance genes, isolated since 2010, Public Health Advanced Bacteriology & Mycology Program, BCPHMRL.

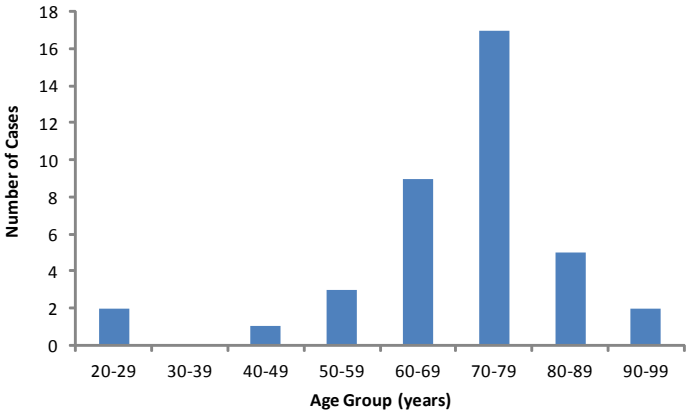
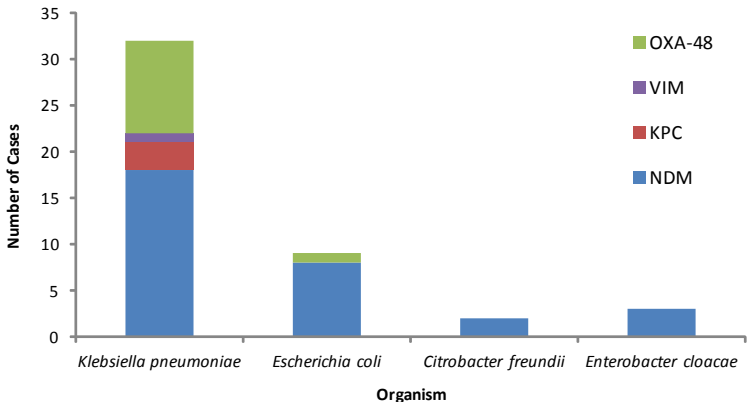


Figure 3 Organisms producing carbapenem-resistance genes, isolated since 2010, Public Health Advanced Bacteriology & Mycology Program, BCPHMRL. Includes patients with more than one resistance factor and organism isolated.



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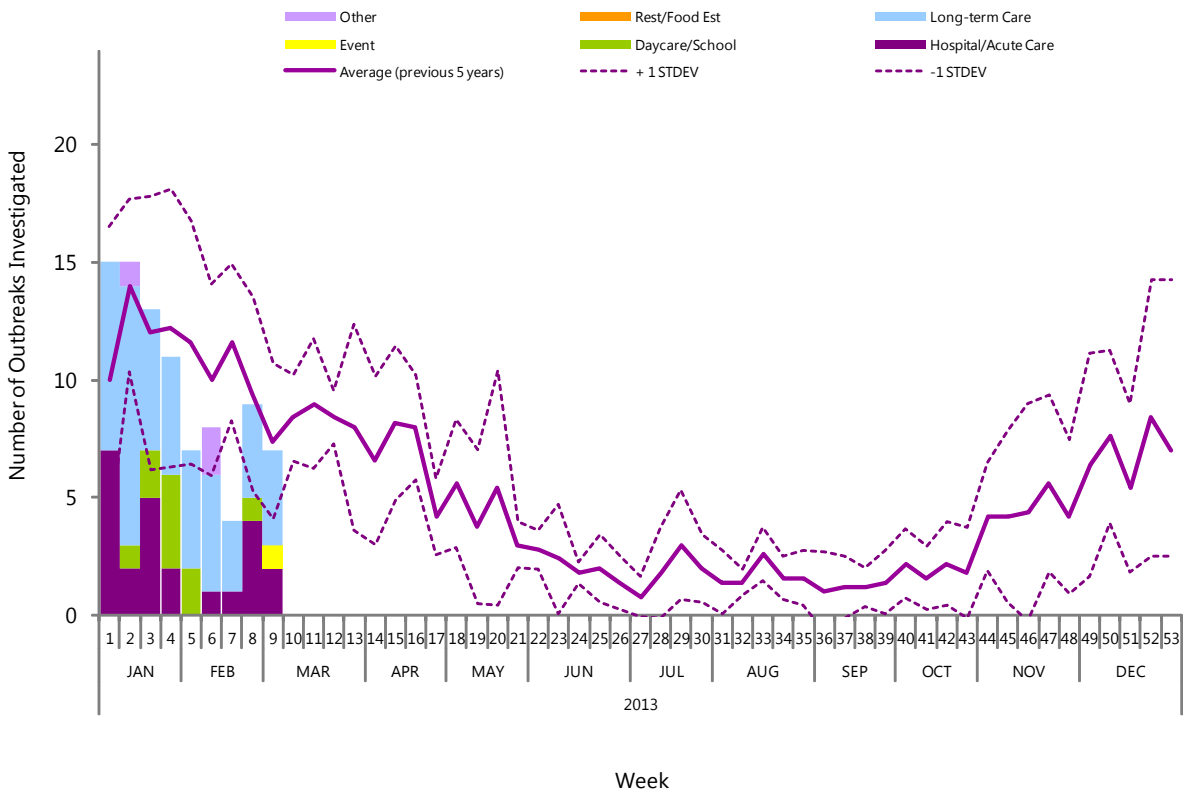
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Gastrointestinal Outbreaks

The Environmental Microbiology Program at the BCPHMRL investigated 27 gastrointestinal (GI) outbreaks in February 2013; this is consistent with what has typically been observed at this time over the past 5 years (Figure 4). Outbreaks were identified from 16 long-term care facilities, 8 hospitals, 1 daycare/school, and 3 other facility/event types (Figure 4). Samples for laboratory testing to date were submitted for 25 (93%) of these outbreaks. Of these, norovirus was confirmed in 21 (84%) of these outbreaks at 12 long-term care facilities, 7 hospitals and 2 other facility/event types; 3 (12%) outbreaks had unknown etiologies.

Figure 4
Gastrointestinal outbreaks investigated* since January, 2013, Environmental Microbiology, Bacteriology & Mycology, Parasitology and Virology Programs, BCPHMRL.



* The data available are from outbreaks in which the BCPHMRL has been notified. Some acute care microbiology laboratories are also testing for norovirus in the province and these data may not include outbreaks from all Health Authorities. Given the nature of GI outbreaks, samples are not always available for testing.

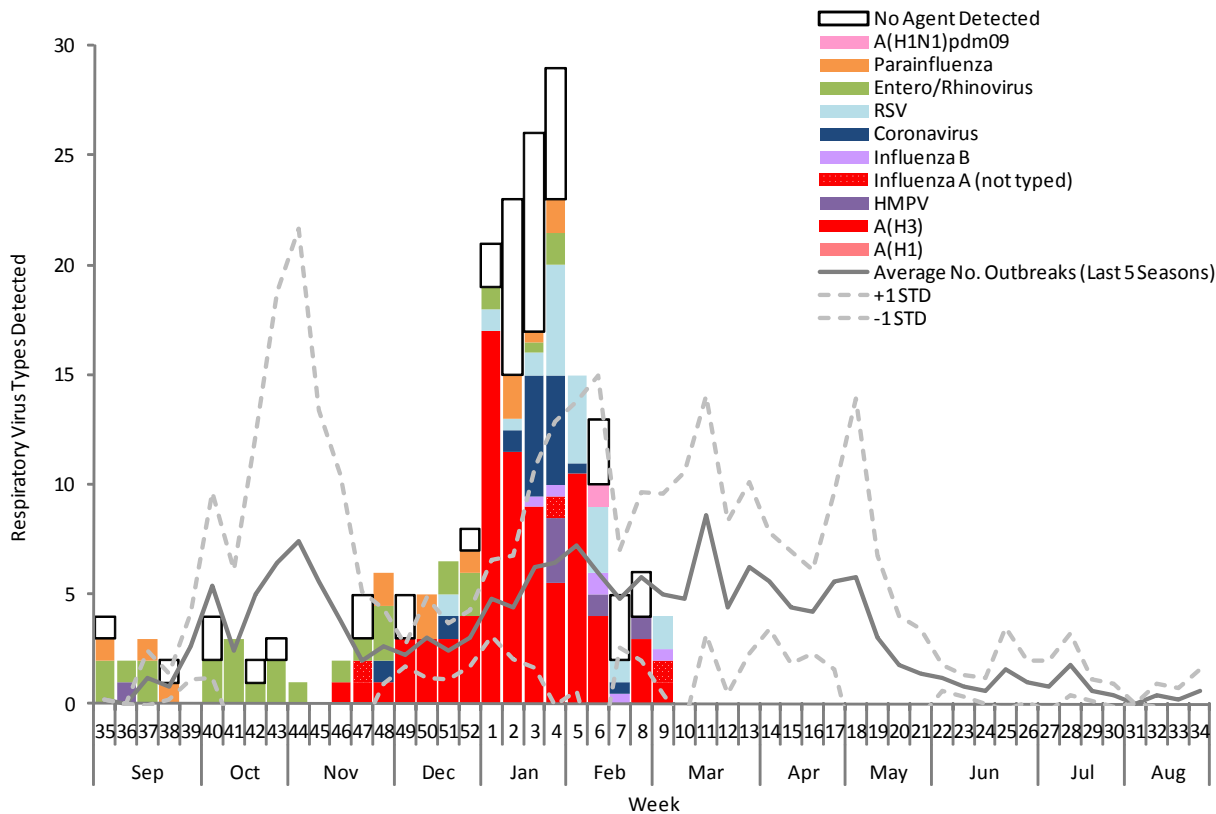


Respiratory Outbreaks

In February, samples were submitted for 32 outbreak investigations at the BCPHMRL from 26 long-term care facilities, 3 hospitals, 2 community clinics and 1 unknown facility type (Figure 5). The number of outbreaks investigated in the early weeks of February has been on the high end of what has been historically observed before decreasing in the latter half of the month (Figure 5).

Influenza A has been detected in 11 (34%) of these outbreaks. Using PCR and Luminex methods, RSV was detected in 9 outbreaks from 5 long-term care facilities, 2 hospitals, 1 community and 1 unknown facility type; influenza A(H3) was detected in 8 outbreaks from long-term care facilities; influenza B was detected in 3 outbreaks from 2 communities and 1 long-term care facility; HMPV was detected in 2 long-term care facilities; coronavirus was detected in 1 long-term care facility; and, A(H1N1)pdm09 was detected in another hospital. Four outbreaks had more than one respiratory virus detected.

Figure 5
Respiratory outbreaks investigated* by respiratory season, Virology Program, BCPHMRL.



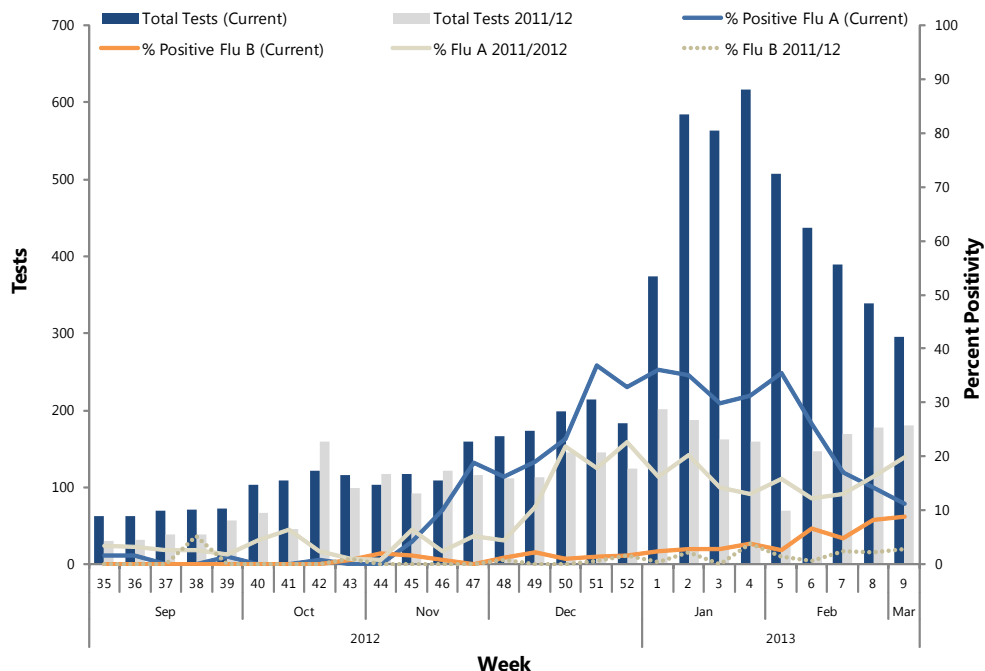
* Figure 4 reflects respiratory sample results submitted for investigation to the PHMRL and may not be representative of respiratory outbreaks in the entire BC community.



Respiratory Surveillance

Test volumes for respiratory testing in the BCPHMRL Virology Laboratory decreased over the weeks of February but remained on average about 120% higher than the same weeks from the 2011/12 season (Figure 6). Influenza A positivity rates declined from 36% to 11% over the month; these have also been higher than rates seen at this time in the previous season until week 8 (Figure 4). Influenza B rates increased steadily in February with detection rates of 3-9%, compared to 1-3% in the 2011/12 season (Figure 6). RSV positivity rates have also been steadily increasing since December and reached 14-21% in February (not shown).

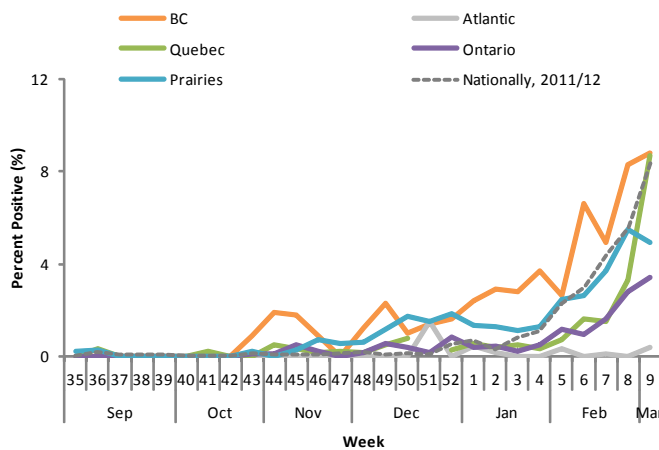
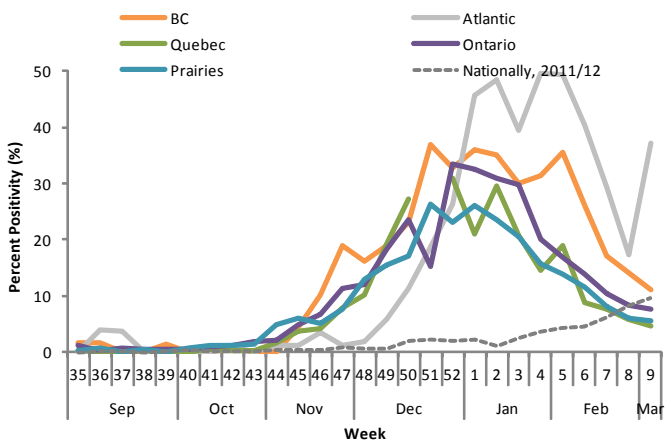
Figure 6 Respiratory testing volumes and influenza percent positivity, Virology Program, BCPHMRL.



Nationally, influenza A activity generally decreased in all provinces during the weeks of February (Figure 7). In contrast, influenza B rates increased in all provinces in February, at a high of nearly 9% in Quebec and BC, and 3-5% in Ontario and the Prairies (Figure 8).

Figure 7 Influenza A percent positivity across Canada, 2012/2013 season. Source: FluWatch, Public Health Agency of Canada

Figure 8 Influenza B percent positivity across Canada, 2012/2013 season. Source: FluWatch, Public Health Agency of Canada





A Report of the BC Public Health Microbiology & Reference Laboratory, Vancouver, BC

The BC Public Health Microbiology Reference Laboratory (BCPHMRL) at the BCCDC site provides consultative, interpretative, testing and analyses for clinical and environmental infectious diseases in partnership with other microbiology labs and public health workers across the province and nationally. The PHMRL is the provincial communicable disease detection, fingerprinting and molecular epidemiology centre providing advanced and specialized services along with international defined laboratory core functions province-wide.

This report may be freely distributed to your colleagues. If you would like more specific information or would like to include any figures for other reporting purposes, please contact us.

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