



LABORATORY TRENDS



February 14, 2014

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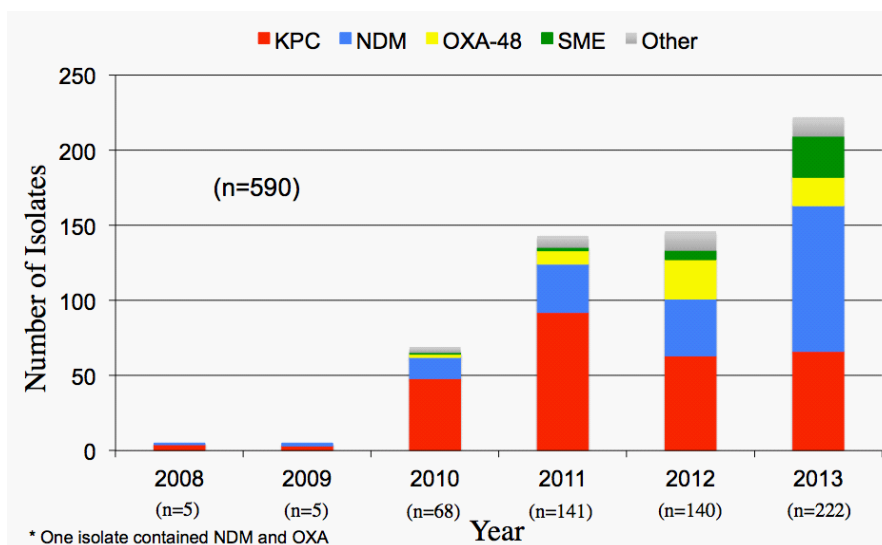
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Carbapenemase-Producing Organisms

Since 2010, BC microbiology laboratories have been on the watch for carbapenem-resistant organisms and the BC Public Health Microbiology & Reference Laboratory (BCPHMRL) has been testing for the presence of key resistance genes including *Klebsiella pneumoniae* carbapenemase- β -lactamase (KPC), New Delhi Metallo- β -lactamase (NDM-1) and OXA-48. Other important genes that are monitored include the *Serratia marcescens* enzyme (SME), Verona integron-encoded metallo- β -lactamase (VIM) and IMP-type carbapenemases. Since the first confirmed case of a patient with a KPC-gene-carrying organism was detected in 2008 in Canada, cases of carbapenemase-producing organisms (CPOs) have increasingly been identified each year in BC as well as the rest of Canada (Figure 1). These CPOs include bacteria mainly belonging to the Enterobacteriaceae family (known as carbapenemase resistant Enterobacteriaceae, CRE) but also include non-Enterobacteriaceae bacteria. In addition to the CPO genes, BCPHMRL also detects Extended-spectrum β -lactamase and AmpC type β -lactamase genes to complete the antibiotic-resistant profiles of these organisms. Follow up with travel and/or contact history is performed when possible to determine transmission routes of infection. Initially, many of these cases were returning travelers from CPO endemic regions that have had exposure to health care there. However, more recently, evidence of noscomial transmission in BC is evident.

Currently, the predominant strains in BC are NDM-1 from *K. pneumoniae* and *Enterobacter cloacae* (see the latest summary in the [December 2013](#) issue of *Laboratory*

Figure 1 Carbapenemase-resistant Enterobacteriaceae in Canada from 2008-2013 (Canadian Public Health Laboratory Network).



Trends). This surveillance has been ongoing since 2010 and involves health authority as well as National Microbiology Laboratory partners. As CPOs are now part of our routine microbiological landscape, there is work underway through the Provincial Infection Control Network of BC to develop provincial standards related to CPO case definitions and outbreak management.

The recent Grand Rounds presentation by Dr. Linda Hoang can provide further details about this topic and can be accessed at: <http://www.bccdc.ca/util/about/UBCCDC/GrandRounds/default.htm>.





First Case of H5N1 Avian Influenza in Canada

In January the first case and death due to influenza A(H5N1) infection in North America was reported in a Canadian resident who had returned from a trip to China (Beijing). The high virulence of this pathogen was demonstrated as the case rapidly declined in health following respiratory and cerebral complications and passed away seven days post symptom onset. Unusually, there was no apparent exposure to poultry made during the visit to Beijing. Contacts of the case have remained symptom-free.

The genome of the avian influenza A(H5N1) virus has been recently sequenced and demonstrates a reassortment of the polymerase basic 2 gene with most similarity to avian influenza A H9N2 viruses from China. Other features also suggest that this is a previously undescribed genotype of influenza A(H5N1). The full report can be accessed at: http://wwwnc.cdc.gov/eid/article/20/5/14-0164_article.htm.

Medical microbiology laboratories should work closely with public health for suspect cases with severe acute respiratory illness. All suspect avian influenza samples should be sent to BCPHMRL for testing after consultation with the Medical Microbiologist On-Call (604-661-7033).

Diphtheria and Tetanus Serological Testing

by Quantine Wong and Dr. Muhammad Morshed, Zoonotic Diseases & Emerging Pathogens Program

Diphtheria is an acute respiratory or cutaneous illness caused by *Corynebacterium diphtheriae*. Respiratory diphtheria has a case fatality rate of 5 to 10 percent. Tetanus is a nervous system disorder characterized by muscle spasms. It is caused by *Clostridium tetani*, a toxin-producing anaerobe. It is known that routine immunization provides complete protection against these fatal diseases. Mortality is increased among unvaccinated persons. If adequate immunization records are not available, depending on their age, the *Canadian Immunization Guide* recommends a primary diphtheria and tetanus immunization schedule for patients. Some immune deficient children may not develop antibody levels after vaccination and, in certain patients, adverse reactions to these vaccines can also occur. These situations can be monitored by diphtheria and tetanus serological testing; patients can be re-immunized if needed. Many practicing physicians also use these markers to assess immune dysfunction of patients and to evaluate humoral immunity as well. The Zoonotic Diseases & Emerging Pathogens Program at BCPHMRL recently validated and implemented diphtheria and tetanus serological testing for patients < 17 years old and for organ transplant patients. Availability of these two tests in-house will provide a quicker turnaround-time for BC patients. There are no changes to specimen collection requirements and culture remains available through the Public Health Advanced Bacteriology & Mycology Program for the recovery of these organisms.



Pertussis Health Resources

The Public Health Agency of Canada has recently published new content for pertussis. For information about pertussis surveillance in Canada, recent vaccination guidelines and recommendations and other resources, visit the [Pertussis for Health Professionals](#) page.



Influenza Surveillance

The Virology Program at the BCPHMRL responded to high respiratory testing demands in January. Over 1000 samples were tested in each of weeks 2 and 3 followed by high detection rates of influenza A, the peak of which hit week 1 at nearly 40% positivity (Figure 2). The latter half of the month saw the detection rate drop to where it currently sits at about 20% positivity. Test volumes in January exceeded what was seen at this time the previous season; detection rates were also higher this season but remained higher for a longer number of weeks in the 2012-2013 season. Influenza A(H1N1)pdm09 has been the dominant subtype this season with over 90% of influenza A detected being this subtype. Influenza B has been detected at rates of less than 2% of all respiratory specimens tested.

Nationally, all provinces had a similar trend of rapid increases in influenza A activity early on in January with peak detection rates with the exception of the Atlantic Provinces who had peak detection at the end of January. BC had high influenza A rates before detection rates decreased to levels comparable to the other provinces (with the exception of the Atlantic Provinces) (Figure 3). Influenza B rates have been below 4% across the country thus far in the influenza season.

Figure 2
Respiratory testing volumes and influenza detection rates, Virology Program, BCPHMRL.

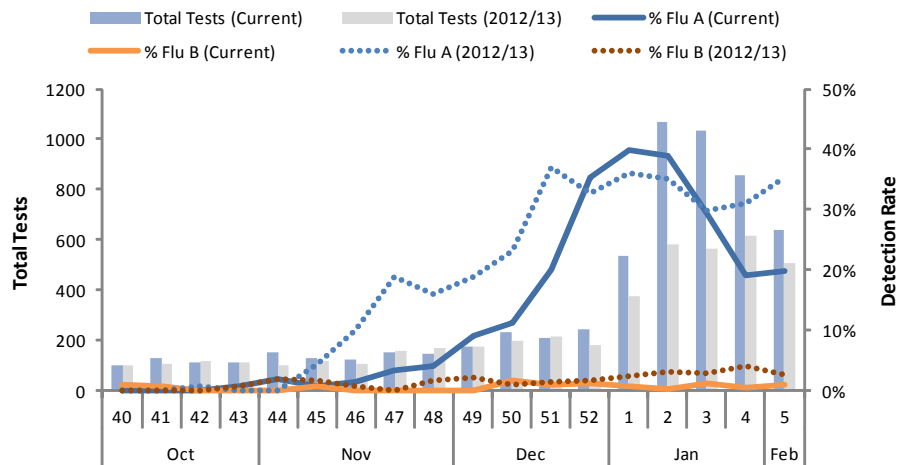
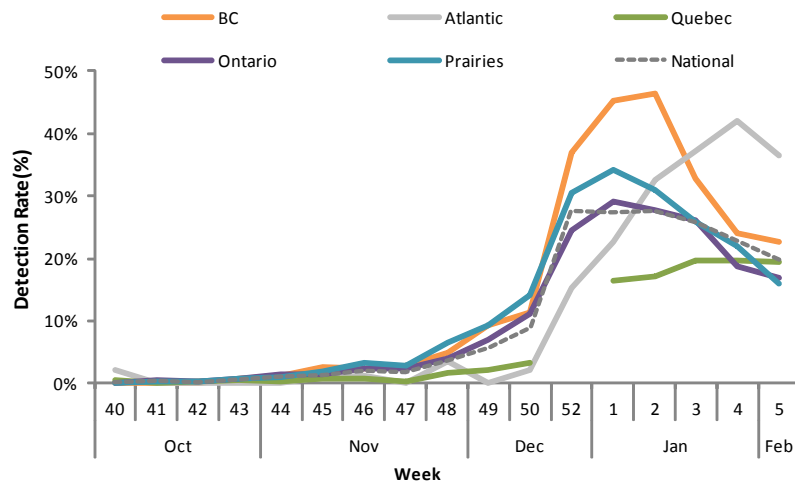


Figure 3
Influenza A detection rates across Canada, October 2013 to present. Data derived from FluWatch reports.



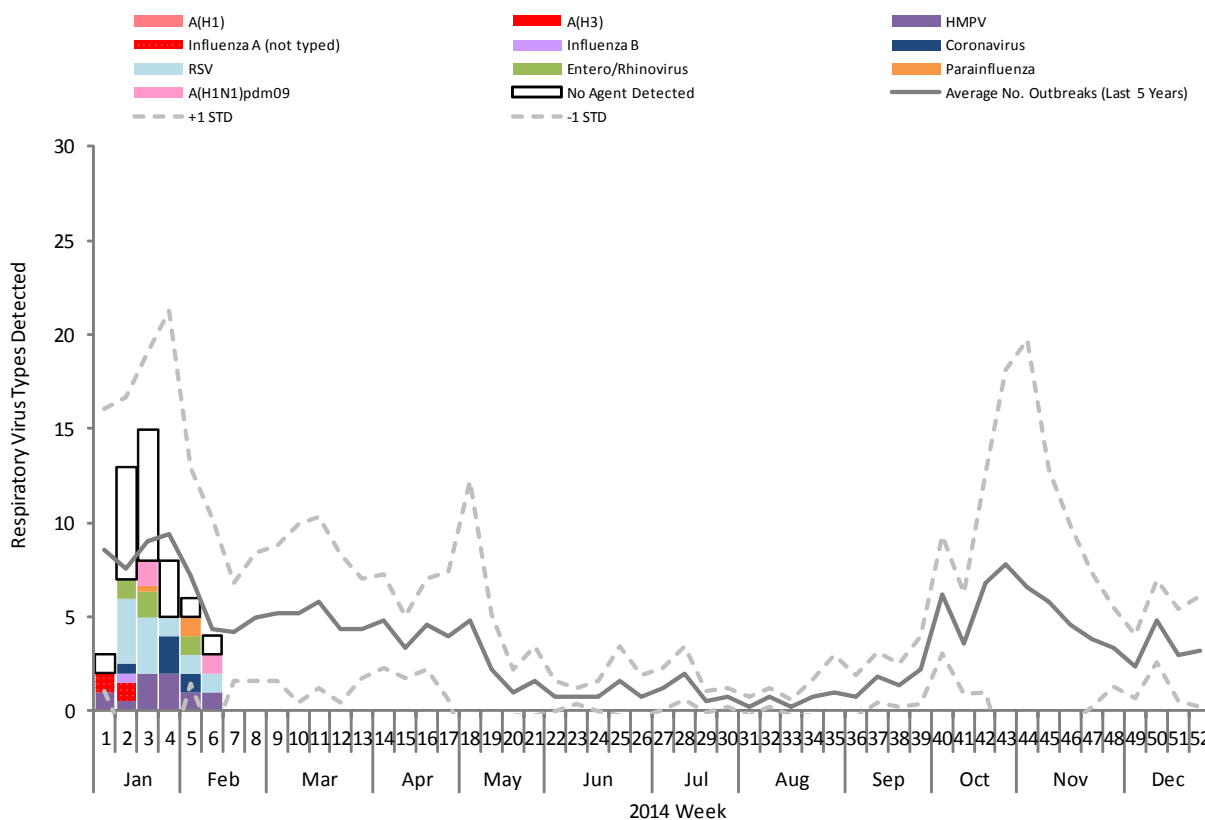


Respiratory Outbreaks

In January, samples were submitted to the BCPHMRL for 45 respiratory outbreak investigations from 36 (80%) longterm care (LTC) facilities, seven (16%) hospitals and two (4%) communities. A variety of different respiratory pathogens were detected at the LTC facilities, including: respiratory syncytial virus (RSV) (16%; 8), human metapneumovirus (HMPV) (14%; 7), coronavirus (12%; 6), enterovirus/rhinovirus (4%; 2), influenza A (2%; 1), influenza A(H1N1)pdm09 (2%; 1) and parainfluenza (2%; 1). From the hospital outbreak investigations, enterovirus/rhinovirus (2%; 1) and influenza A (2%; 1) were detected. Three LTC facilities had cases with multiple respiratory infections including one facility with RSV and influenza B, another facility with coronavirus and HMPV and another facility with influenza A(H1N1)pdm09, parainfluenza and enterovirus/rhinovirus detected (Figure 4).

The numbers of outbreaks for weeks 2 and 3 in January are above the expected average based on previous years' investigations but are below what was experienced last season (see [February 2013 Laboratory Trends](#) report).

Figure 4
Respiratory outbreaks investigated* in 2014, Virology Program, BCPHMRL.



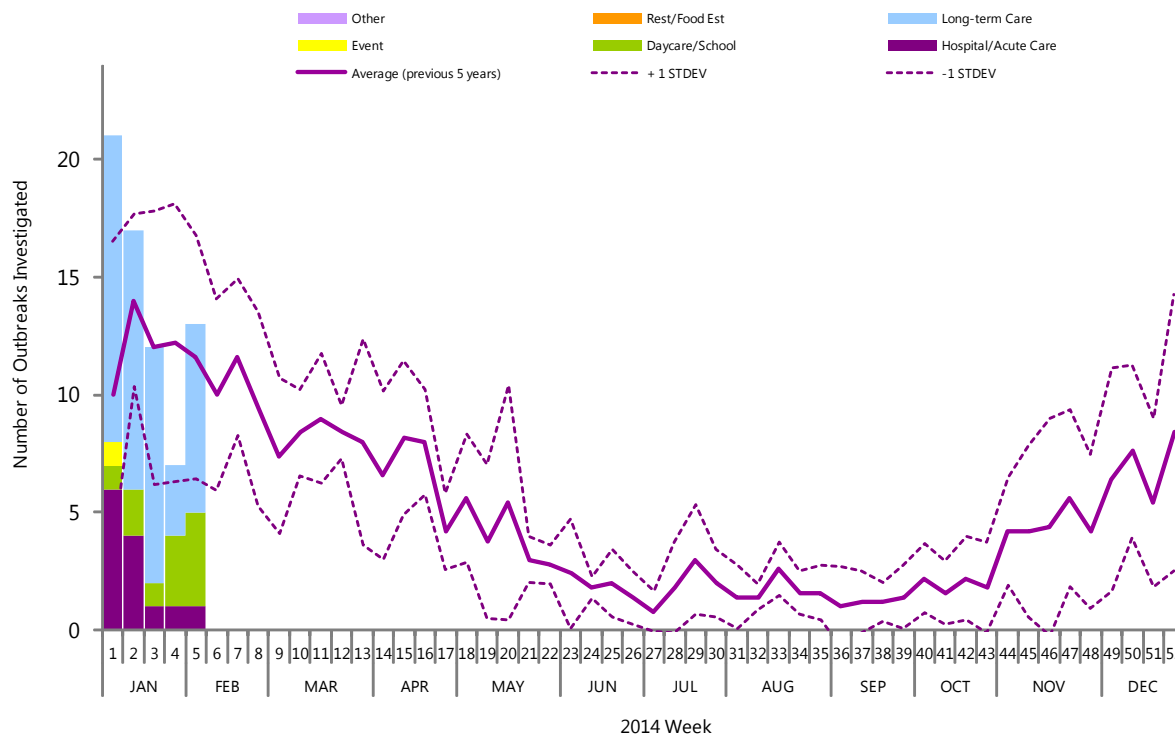
* Figure 4 reflects respiratory sample results submitted for investigation to the BCPHMRL and may not be representative of respiratory outbreaks in the entire BC community.



Gastrointestinal Outbreaks

In January, the BCPHMRL investigated 61 gastrointestinal (GI) outbreaks. Outbreaks were identified from 39 (64%) longterm care facilities, 12 (20%) hospitals and 10 (16%) daycares/schools (Figure 5). Samples for laboratory testing were submitted for 53 (87%) of these outbreaks with norovirus confirmed in 43 (85%) from 29 (64%) longterm care facilities, 11 (24%) hospitals and 5 (11%) daycares/schools. The number of outbreaks are consistent with what has been investigated in previous years.

Figure 5
Gastrointestinal outbreaks investigated* in 2014, Environmental Microbiology, Public Health Advanced 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.



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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