

LABORATORY TRENDS



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Laboratory News

Implementation of *Strongyloides* Serology testing in the Zoonotic Diseases & Emerging Pathogens Program

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Strongyloides stercoralis is a soil-transmitted helminth that is endemic in many areas of the world. The symptoms of *Strongyloides* infection ranges from subclinical (acute and chronic infections) to severe and fatal (hyperinfection syndrome and disseminated strongyloidiasis). Although rare, hyperinfection syndrome with *S. stercoralis* carries mortality rates of 87%–100%.

Strongyloides, however, has a unique characteristic, in that the infection can be life-long because of the 'auto-infective cycle'. The eggs produced by the adult female hatch when they are still in the intestinal lumen, and newborn larvae can penetrate the latter part of the bowel or the perianal skin, restarting the cycle inside the human body. For this reason, this infection can be life-long.

The gold standard for the diagnosis of *Strongyloides* is serial ova and parasite (O&P) stool examinations. However, traditional O&P can be insensitive and may require up to 7 stool exams to reach a sensitivity of 100%. A few laboratories have started in-house PCR testing, but this is also not very sensitive. More specialized stool exams such as Baermann concentration, Horadi-Mori filter paper culture, quantitative acetate concentration technique, and agar plate cultures are more sensitive but not all laboratories have these methods available. Other diagnostic tools such as serology can also be used to achieve better sensitivity.

Strongyloides serology was previously a referral test which affected the turnaround time (TAT) and in turn possible patient care. The Zoonotic Diseases & Emerging Pathogens Program recently evaluated 2 commercial kits and has implemented one of these kits. This will improve TAT and provide better patient care.

Feed a cold or starve a fever?

"Being ill is one of the greatest pleasures of life, provided one is not too ill and is not obliged to work until one is better."

Samuel Butler, Victorian Poet and Author

Historically, respiratory infections during the fall and winter months are mostly attributed to influenza viruses or "something going around" and are the major cause of visits to physician's offices at this time. Certainly, other viruses do "go around" and also have specific temporal periods when they are most prevalent in populations. This is true for coronavirus and rhinovirus, which are typically prevalent in the fall and spring and are responsible for most upper respiratory tract infections and cases of the common cold. Although these viruses are generally not associated with severe disease they do contribute to considerable economic burden in terms of absenteeism from work and school as well as visits to physician's offices and emergency departments.

A recent increase in enterovirus/rhinovirus positivity rates in BC (Figures 1-2), combined with an increased absenteeism rate by our laboratory staff due to respiratory infections, prompted our laboratory to investigate if the virus responsible was enterovirus, rhinovirus or a mixture of the two viruses.

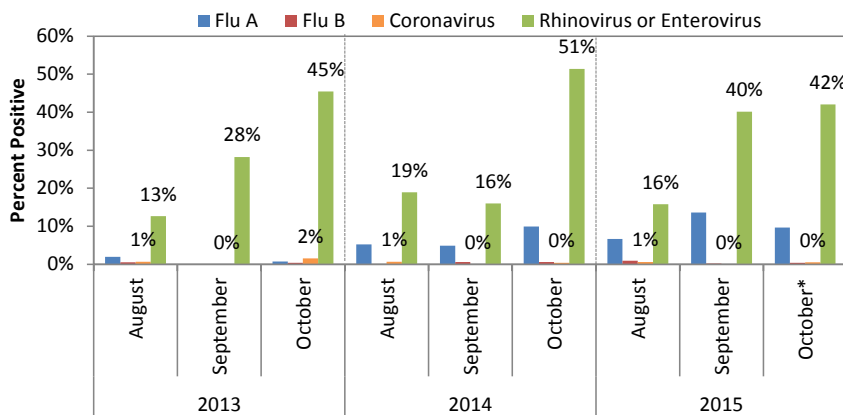


Figure 1
Influenza A/B, coronavirus and entero/rhinovirus detected August to October 2013-2015 as a percentage of total of specimens tested. Virology Program, BCPHMRL.

We randomly selected a total of 28 specimens from unique patients previously determined to be positive for enterovirus/rhinovirus by our laboratory. To further differentiate this group of viruses we amplified the 5' untranslated region (UTR) of rhinovirus/enterovirus directly from patient specimens and sequenced the amplicon to determine the genus, species and possible type of the virus. Using this method all 28 specimens were identified as a member of the rhinovirus genus (HRV), which was unexpected.

HRV were first discovered as one of the causes of the common cold in the 1950's. Taxonomy of the group has recently progressed due to molecular characterization. The rhinovirus genus is currently divided into 3 major species (A, B and C) based on nucleotide and protein sequences of their VP1 and/or VP4/VP2 protein genes. Species A and B were detected using culture techniques and types described by serological means while species C, the last group of rhinovirus to be described, was delayed due to the virus not being able to be cultured and has been described (2010) by molecular characterization. The three species are further divided into types: species A has 75 types, species B has 25 types and species C has 53 types. Previously types were defined by serology, but are now described using molecular characterization.

Typically rhinoviruses are associated with upper respiratory infections, otitis media and sinusitis in children and the common cold in adults. More recently there have been reports describing them as causing mild to severe lower respiratory tract infections in hospitalized patients, the elderly and immunocompromised patients. This is indicated in our study with a large portion of specimens coming from long term care facilities (LTCF). Other studies indicate that in most populations species A predominates followed by species C and species B. Our limited study is consistent with these findings as species A represented 64% of all rhinoviruses detected followed by species C at 32% and species B at 4%.

Although PCR of the 5'UTR region is an excellent method to detect all types of rhinoviruses sequencing of that region is not sufficiently discriminatory to identify most rhinovirus to HRV type. Differentiation of HRV to type requires sequencing of the VP 1 and/or VP4/VP2 region, which were not performed for our limited study. However, phylogenetic analysis of the 5'UTR sequence data indicated that several rhinovirus types were present in the specimens that were studied.

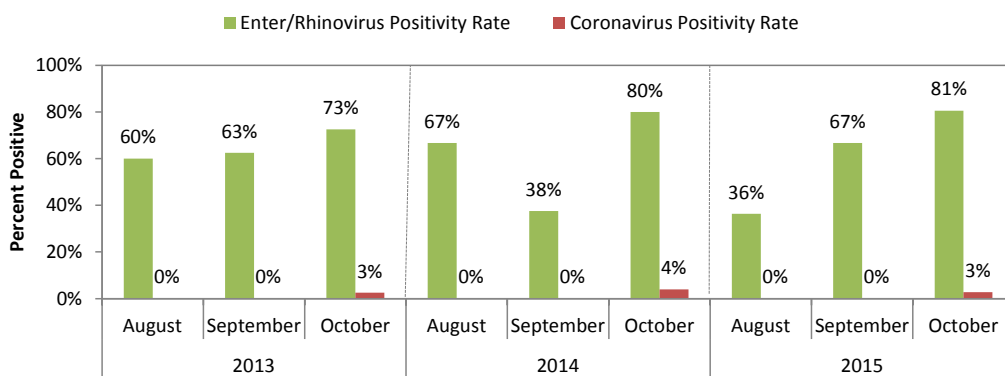


Figure 2
Prevalence of entero/rhinovirus and coronavirus in laboratory investigated influenza-like illness outbreaks during August to October, 2013-2015. Virology Program, BCPHML.

Classically respiratory or "flu" season begins in November of each year and ends in late March to April. Data compiled by our laboratory indicates that influenza becomes the prevalent virus in our population approximately the 3rd week in December and remains as such until February. So until the holiday season arrives if you get a respiratory infection think rhinovirus and not influenza, which can then guide you as you decide between having some chicken noodle soup to feed a cold or taking a dose of oseltamivir to starve a fever!

Influenza Surveillance

BC has seen an early start to the influenza season with influenza A as early as September this year. Weekly influenza A detection rates have been from 0-10% in September and reduced to 3-7% in October so far. Rates of influenza B have been 0-1% during these two months (Figure 3). Influenza A(H3) has been the dominant subtype detected so far with only one detection of influenza A(H1N1) pdm09.

Nationally, BC has reported higher influenza A detection rates compared to the other provinces who have experienced influenza A positivity rates from 0-3% in September and October (Figure 4). Rates of influenza B have been either very low to undetected across all provinces for these months.

Figure 3
Respiratory testing volumes and influenza detection rates, Virology Program, BCPHMRL.

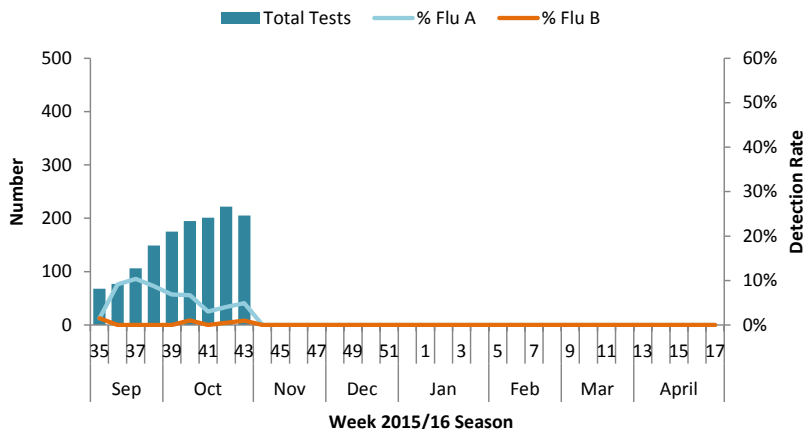
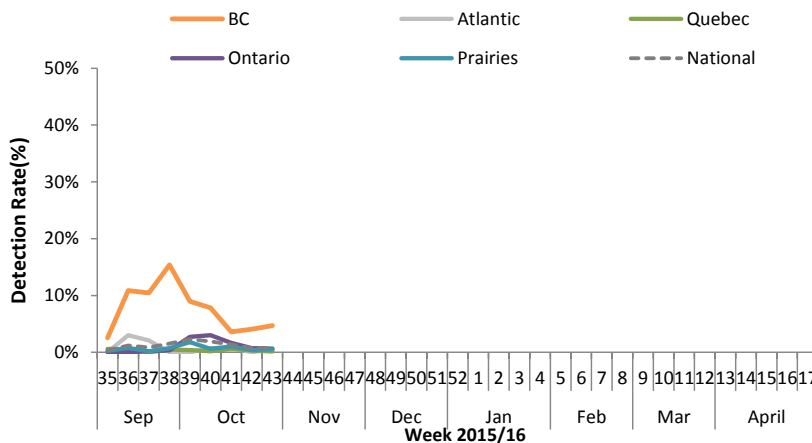


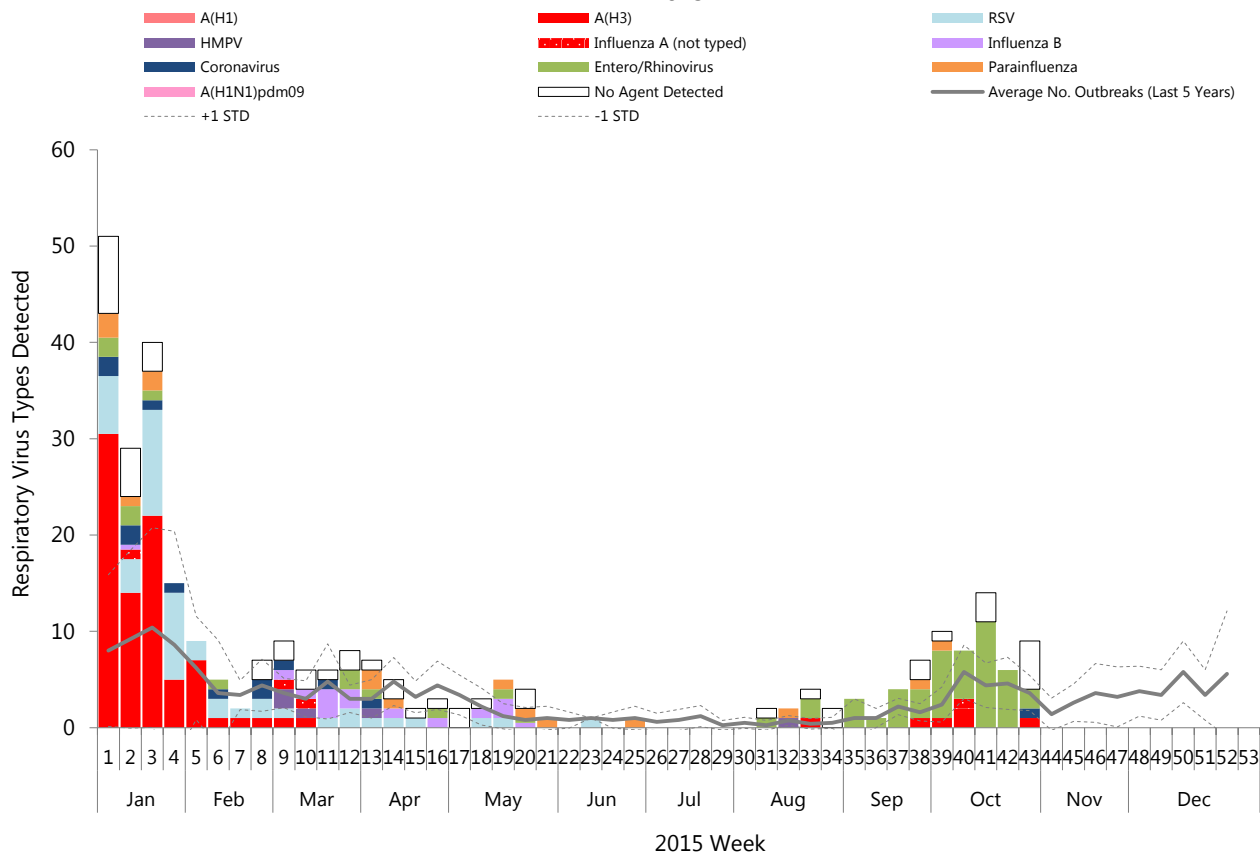
Figure 4
Influenza A detection rates across Canada, September 2014 to present. Data derived from FluWatch reports. Note: Reported detection rates may be different from actual detection rates (Figure 3) if subtyping is completed in subsequent weeks.



Influenza-Like Illness Outbreaks

In September there were 21 influenza-like illness outbreaks investigated by the Virology Program (Figure 5). There were 14 (67%) detections of entero/rhinovirus, two (10%) detections of parainfluenza and one detection of influenza A(H3) (5%). In October there were 41 influenza-like illness outbreaks investigated with 27 (66%) detections of entero/rhinovirus, five (12%) detections of influenza A(H3) (2%) and one detection of coronavirus.

Figure 5
Influenza-like illness outbreaks investigated* in 2015, Virology Program, BCPHMRL.

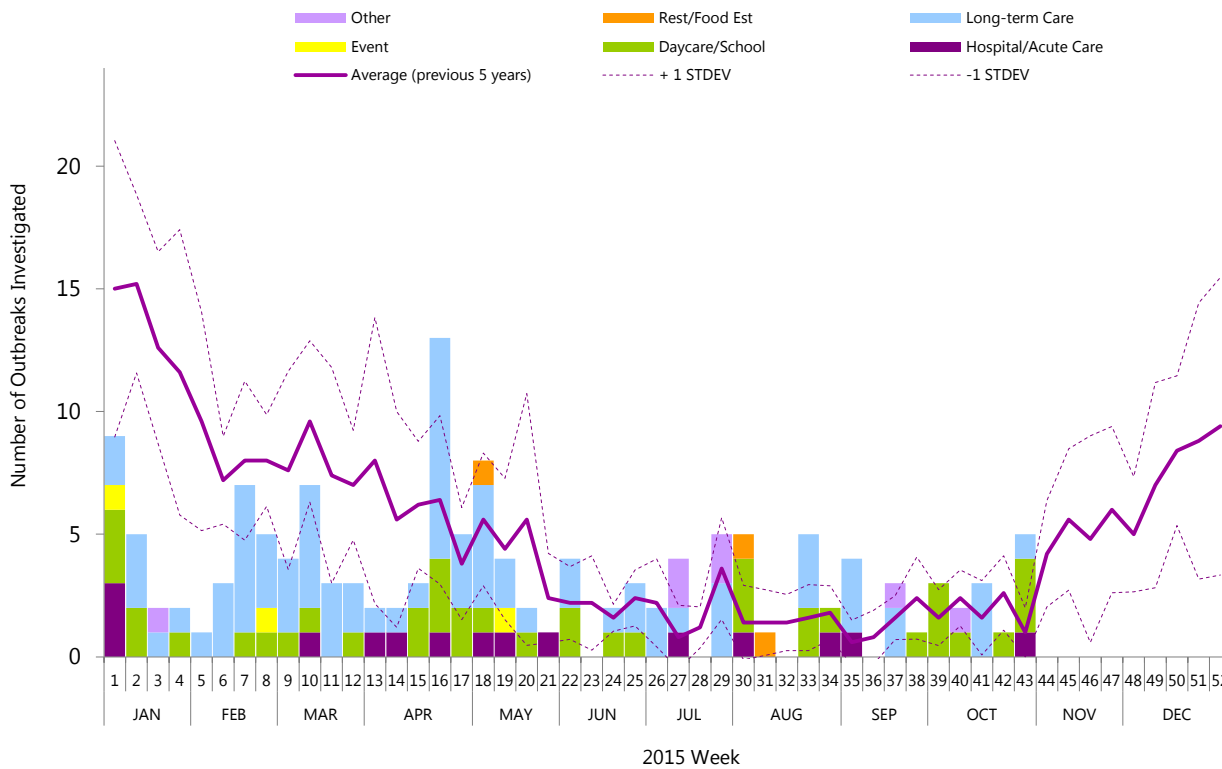


* The data available are from outbreaks in which the BCPHMRL has been notified. Some acute care microbiology laboratories are also testing for influenza in the province.

Gastrointestinal Outbreaks

In September and October, there were 21 gastrointestinal outbreaks investigated by the BCPHMRL (Figure 6). The number of outbreak investigations were at the high end compared to historical averages (Figure 6). Outbreaks were investigated from nine (43%) LTC facilities, nine (43%) daycares/schools, one (5%) hospital, and two (10%) other facility types. Samples were received from 9 (43%) of these outbreaks with norovirus detected in 4 (44%) outbreaks (two LTC facilities, one hospital and one other facility type) and sapovirus detected at a daycare/school.

Figure 6
Gastrointestinal outbreaks investigated* in 2015, 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

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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