

LABORATORY TRENDS



March 12, 2015

Laboratory News

Compliance Verification of Containment Level 3 Facilities at the BCPHMRL

Biosafety and biosecurity at any level is realized through a combination of physical containment and operational practices. In addition to the other containment level 2 (CL2) laboratories at the BC Public Health Microbiology & Reference Laboratory (BCPHMRL), there are three containment level 3 (CL3) laboratories serving the Public Health Advanced Bacteriology/Mycology, Tuberculosis/Mycobacteriology, Virology and the Zoonotic Diseases & Emerging Pathogens Programs. To be certified as a CL3 laboratory, strict engineering controls for airflow and HEPA filtration and specific biosafety equipment must be utilized to contain and prevent the release of infectious agents into the immediate work area and the environment. Operational practices and procedures are established by the biosafety program and are implemented by the respective CL3 laboratories. CL3 facilities are recertified on an annual basis and involve comprehensive verification and performance testing of control systems to ensure compliance.

As part of Compliance Verification of Containment Level 3 Facilities as described by the *Canadian Biosafety Standards and Guidelines*, five inspectors from the Public Health Agency of Canada spent the week examining the BCPHMRL CL3 laboratories. The auditors were impressed with the equipment maintenance program as well as the attention to detail with the upkeep of mechanical and control systems. A final written report will be issued soon but in general, the inspectors noted that the CL3 laboratories are functioning very well, are able to respond to mechanical and control failures and are operating within required

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parameters to maintain containment. There were also positive comments made concerning the integration of the CL2 and CL3 laboratories and overall CL3 program. This intensive audit underlined how critical it is to have the sustained dedication of laboratory staff and the assistance of Brookfield Johnson Controls/Workplace Solutions Inc. maintenance staff to provide expertise and continued mechanical and procedural support. Accreditation of the CL3 laboratories means BCPHMRL can continue to safely handle organisms that require CL3 containment as well as to respond to emerging diseases and threats of bioterrorism.



CL3 inspection team from the Public Health Agency of Canada.

Laboratory News

College of American Pathologists

A team of six College of American Pathologists trained auditors from the Arkansas State Public Health Laboratory arrived unannounced last Monday morning. It was a busy time for all but at the Summation Sign-off Conference the team was pleased to accept well-deserved accolades, a result of their hard work. We always learn from these experienced international teams.

National Syphilis Testing Recommendations

Dr. Muhammad Morshed, Program Head for the Zoonotic Diseases & Emerging Pathogens (ZEP) Program, has been the co-chair of the Canadian Public Health Laboratory Network Syphilis Task Group for the past 6 years. Recently, with additional input from public health laboratory scientists, researchers, epidemiologists and STI clinicians, the group published a series of recommendations on syphilis testing.

These guidelines discuss approaches to laboratory testing consisting of the traditional screening approach using nontreponemal tests followed by confirmation using treponemal tests, and the new "reverse algorithm" where treponemal tests are used for screening and nontreponemal tests provide the confirmation of active infection. Rapid, point-of-care tests and the application of molecular tests such as PCR are also included. Finally, recommendations surrounding the diagnosis of neurosyphilis, as well as congenital and syphilis screening in pregnant women, are also provided.

The complete guidelines can be found online at:

www.pulsus.com/journals/JnlSupToc.jsp?sCurrPg=journal&jnlKy=3&supKy=524&fromfold=Supplements&fold=Supplement

Legionella Urine Antigen Testing

Legionnaires' disease is an often severe and potentially fatal form of bacterial pneumonia caused by a long list of *Legionella* species. This disease is usually reported in the older population and found in either hospitalized patients or senior care facilities. Outbreaks are well documented.

The ZEP Program has verified and implemented the *Legionella* urine antigen test. This test is 95% sensitive (ranging from 91.0 to 97.6%) and 95% specific (ranging from 88.7 to 98.4%). However, the test can only identify *Legionella pneumophila* serogroup; this serogroup accounts for up to 80% of Legionnaire's cases. This test continues to require a urine sample.

Tuberculosis Susceptibility Testing Trends

March 24 is World TB Day, the day commemorating Dr. Robert Koch's discovery of the cause of tuberculosis (TB). Despite the availability of effective treatment, TB remains one of the world's leading causes of death from infectious disease with extensively drug-resistant cases of TB increasing in many parts of the world. Canada continues to monitor TB drug resistance patterns through the Canadian Tuberculosis Laboratory Surveillance System with representation from all provinces and territories.

The TB/Mycobacteriology Program of the BCPHMRL performs antimicrobial susceptibility testing on *Mycobacterium tuberculosis* complex (MTBC) isolates from both BC and Yukon. Testing is done using the BACTEC® 960 fluorometric proportion method where culture-positive isolates are tested against critical concentration levels of first-line anti-tuberculosis drugs including isoniazid (INH), rifampin (RMP) and ethambutol (EMB). Pyrazinamide (PZA) resistance is assessed when isolates show resistance to isoniazid and/or rifampin, or when requested. As a second-line anti-tuberculosis antibiotic, streptomycin is also tested as part of this susceptibility panel.

In 2014, 272 MTBC isolates were evaluated for antimicrobial susceptibility with 227 (83%) shown to be susceptible. Figure 1 demonstrates the resistance patterns of resistant isolates from 2005 to 2014. Mono-resistance had been on the rise from 2006 to 2011, from 5.8% in 2006 to 11.3% in 2011 before decreasing in 2012 to 9.1% of isolates. Since then, the proportion of mono-resistance has decreased to 8.5% in 2013 and risen slightly to 9.9% in 2014. Poly-resistance has been anywhere from 0% to 0.9% of isolates during this period. Multidrug resistance has varied from 0% to 2.0% from 2005 to 2013; in 2014, 2.2% of MTBC isolates were multidrug resistant.



Figure 1
Percent of *M. tuberculosis* complex patients that are mono-resistant, poly-resistant and multi-resistant to first-line TB drugs in British Columbia, 2005-2014. Resistance profiles are defined as: mono-resistance, resistance to one of the first-line drugs (INH, RMP, EMB or PZA); poly-resistance, resistance to two or more first-line drugs not including the combination of isoniazid and rifampin; and, multidrug-resistance (MDR-TB), resistance to at least the two best first-line anti-tuberculosis drugs, isoniazid and rifampin, but which does not meet the definition of extensively drug-resistant TB.

Influenza Surveillance

The Virology laboratory prepared for a heavy to moderate influenza season by cross-training additional staff in the months prior to January. Respiratory test volumes rose dramatically in the first weeks of January, peaking at 1273 tests in week 2 (Figure 2). Influenza A positivity rose concordantly to 57% with 100% of samples typed to be A(H3). To ensure typing results in a timely manner, Molecular Microbiology Program also provided support during this surge. The remaining weeks of January saw a decrease in testing and influenza activity. In February, respiratory volumes decreased to about 450 samples per week with influenza A positivity decreasing from 24% to 10% at the end of the month. A few cases of influenza A(H1N1) pdm09 were seen each week following the peak in January. Influenza B rates increased from 1% to 6% in February (Figure 2).

Nationally, detections of influenza A have decreased after peaks ranging from mid to late December in the Prairies (36%), Quebec (37%) and Ontario (34%) to later in January for the Atlantic Provinces (36%) (Figure 3A). Rates of influenza B have steadily increased since the end of January with Quebec having rates of up to 10%, followed by BC and the Atlantic Provinces (6%). The Prairies have seen positivity rates of up to 4% while Ontario continues to have low rates of 1-2% (Figure 3B).

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

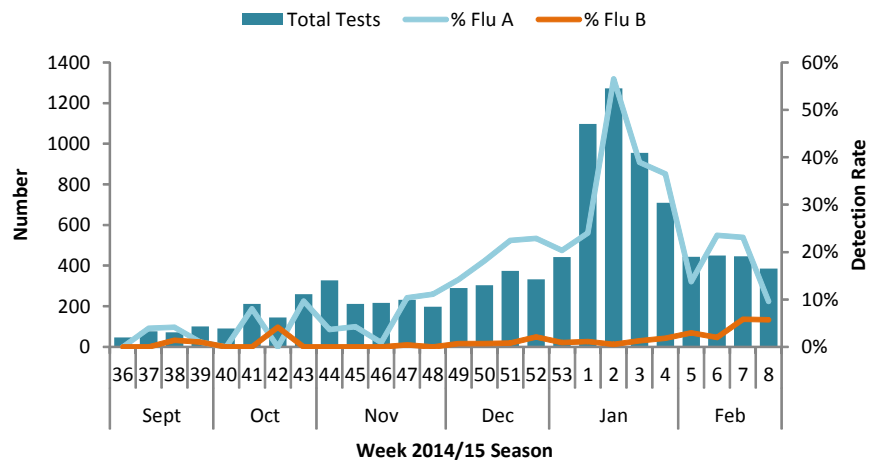
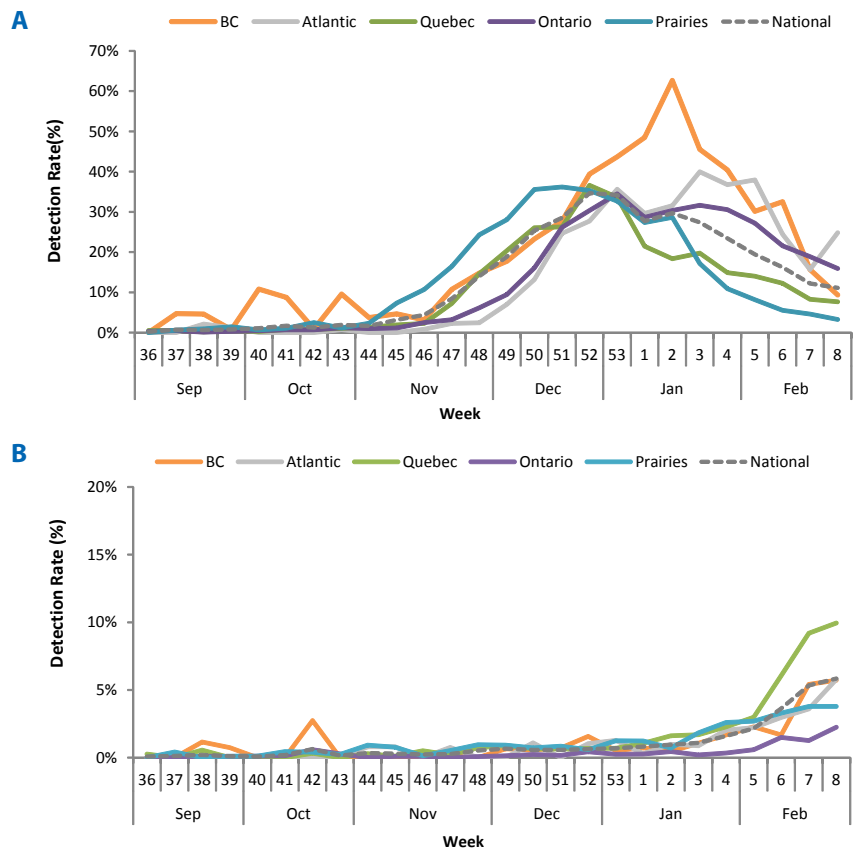


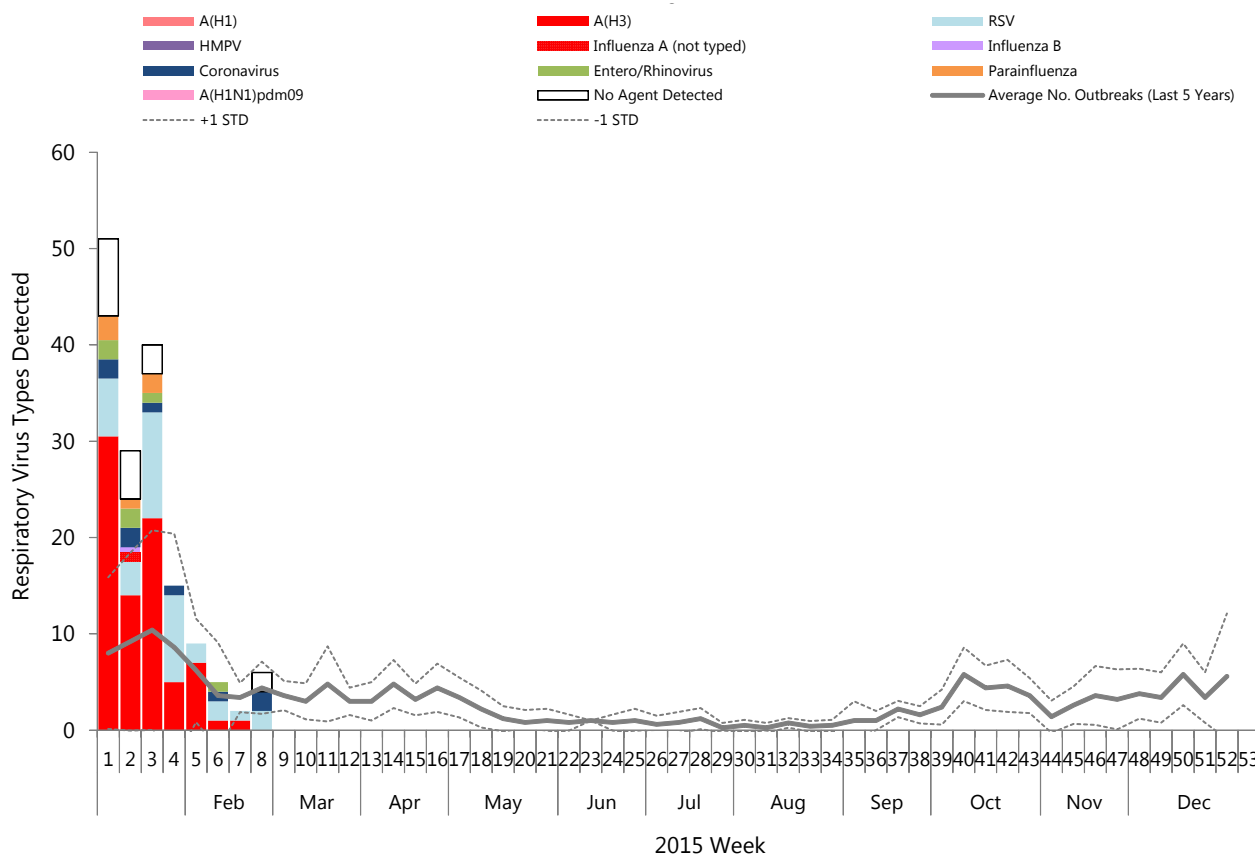
Figure 3
Influenza A (A) and influenza B (B) detection rates across Canada, September 2014 to present. Data derived from FluWatch reports. Note: While other laboratories test for influenza in the province, BC data is derived from reports by the BCPHMRL.



Influenza-Like Illness Outbreaks

In January the Virology Program investigated 146 influenza-like illness outbreaks. This has exceeded historical trends, even during the peak of the 2009 H1N1 pandemic. As the majority of outbreaks are from longterm care (LTC) facilities, this surge in activity is indicative of the impact of influenza A(H3) on elderly populations. During this time, outbreaks occurred at 135 LTC facilities with the following detected: 50% (68) influenza A(H3), 3% (4) coronavirus, and 2% (3) entero/ rhinovirus. Outbreaks with multiple infections of the following were also observed: 7% (10) influenza A(H3) and respiratory syncytial virus (RSV), 3% (4) influenza A(H3) and coronavirus, 0.02% (1) influenza A(H3) and entero/rhinovirus and 0.02% (1) influenza A(H3) and influenza B. There were also 11 (8%) hospital-related outbreaks that were positive for: influenza A(H3), 55% (6); parainfluenza, 9% (1); influenza A(H3) and RSV, 9% (1); and, parainfluenza and entero/rhinovirus, 9% (1). As influenza A activity decreased in the overall population in February, the number of outbreaks also decreased. Samples from twenty-two outbreaks were submitted from 19 (86%) LTC facilities, two (9%) hospitals and one (4%) school. Influenza A(H3) was detected in 9 (41%) outbreaks, RSV detected in 7 (32%) outbreaks, coronavirus detected in 3 (15%) and entero/ rhinovirus detected in one (5%) other outbreak.

Figure 4
Influenza-like illness outbreaks investigated* in 2015, Virology Program, BCPHML.

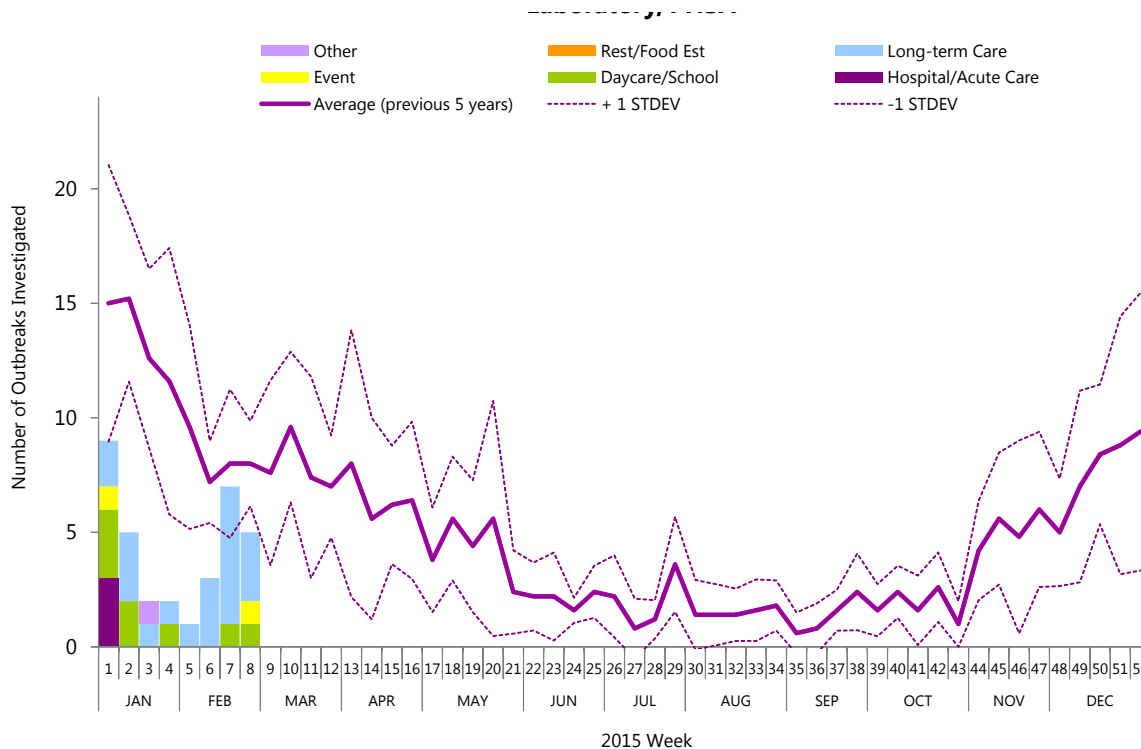


* The data available are from outbreaks in which the BCPHML has been notified. Some acute care microbiology laboratories are also testing for influenza in the province.

Gastrointestinal Outbreaks

In January, the number of gastrointestinal outbreaks investigated (18) were well below historical averages (Figure 5). Outbreaks were investigated from seven (39%) LTC facilities, six (33%) daycares/schools, three (17%) hospitals, one (6%) camp and one (6%) event. Samples were received from 14 (78%) of these outbreaks with norovirus detected in eight (57%) and sapovirus detected in two (14%). Seventeen outbreaks were investigated in February as activity started to increase by the end of the month. Outbreaks were from 14 (82%) LTC facilities, two (12%) daycares/schools and one 6%) event. Outbreaks were identified from 12 (71%) long-term care facilities, four (23%) daycares and one (6%) daycare/school. Samples were received from 13 (76%) of these outbreaks with norovirus detected in 11 (85%) and sapovirus detected in one (8%).

Figure 5
Gastrointestinal outbreaks investigated* in 2014, Environmental Microbiology, Public Health Advanced Bacteriology & Mycology, Parasitology and Virology Programs, BCPHML.



* The data available are from outbreaks in which the BCPHML 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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