June 2019

BC Centre for Disease Control
An agency of the Provincial Health Services Authority

LM LABS

LABORATORY TRENDS

A Report from the BCCDC Public Health Laboratory

Inside this Issue

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Recent awards and honours

Dr. Muhammad Morshed

Congratulations for Dr. Muhammad Morshed for receiving the Distinguished Microbiologist Service Award from the Canadian College of Microbiologists. Dr. Morshed was presented with this annual award in recognition of his outstanding professional contributions in the field of microbiology in Canada in the areas of research, teaching and involvement in the Canadian College of Microbiologists as well as for demonstrating leadership in furthering microbiology at the national level. The award was presented at the AMMI Canada-CACMID Annual Conference which was held in Ottawa in April this year. He now joins previous winners, Dr. Paul Levett in 2018 and Dr. Martin Petric in 2012 in receiving this prestigious award!

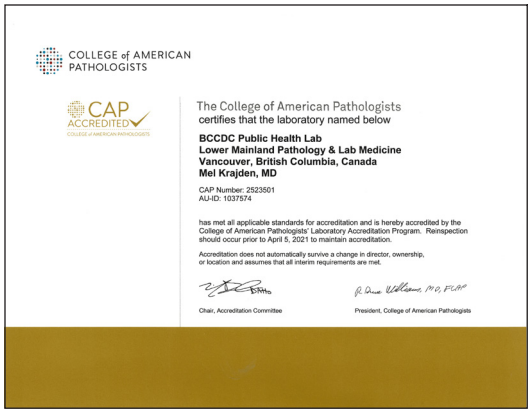
Dr. Mel Krajden & Dr. Linda Hoang

Drs. Mel Krajden and Linda Hoang were also recently honoured during Pathology Day in the Department of Pathology and Laboratory Medicine at the University of British Columbia. They were recipients of the 2019 Excellence in Research and Discovery award and the 2019 Excellence in Clinical Service award, respectively. These awards are presented each year to faculty and staff for their contributions to the department. Congratulations Drs. Krajden and Hoang on their well-deserved awards!

Temporary new team lead for Enivronmental Microbiology Program

Christine Tchao has assumed the role of temporary Team Lead for the Environmental Microbiology Program effective June 22, 2019. Christine first joined the Environmental Microbiology Program as one of the two Technical Coordinators in 2016. Since then she has demonstrated her capacity to work collaboratively with peers and leaders while contending with ongoing outbreaks, the challenges of the water courier transport system and preparing for upcoming accreditations by the College of American Pathologists and the Diagnostic Accreditation Program. Her contribution in planning for the 2018 Enhanced Water Quality Assurance accreditation must be emphasized as she worked with the team in overhauling the Environmental Microbiology Program's documentation system for the Water Bacteriology Section. All the hard work paid off as the auditors were most impressed and gave glowing reviews. We welcome Christine in her new role and look forward to her ongoing contributions to this team.

Successful audit by the College of American Pathologists


COLLEGE of AMERICAN PATHOLOGISTS

CAP ACCREDITED

The College of American Pathologists certifies that the laboratory named below

BCCDC Public Health Lab
Lower Mainland Pathology & Lab Medicine
Vancouver, British Columbia, Canada
Mel Krajden, MD

CAP Number: 2523501
AU-ID: 1037574

has met all applicable standards for accreditation and is hereby accredited by the College of American Pathologists' Laboratory Accreditation Program. Reinspection should occur prior to April 5, 2021 to maintain accreditation.

Accreditation does not automatically survive a change in director, ownership, or location and assumes that all interim requirements are met.

Chair, Accreditation Committee

President, College of American Pathologists

Laboratory accreditation by the College of American Pathologists (CAP) is an internationally-recognized benchmark that designates a clinical laboratory is adhering to rigorous accreditation standards. These requirements are based on Clinical Laboratory Improvement Amendments (CLIA) regulatory standards but are also aimed at assisting laboratories in continually providing the highest standard of services. Laboratories seeking CAP accreditation must adhere to and are assessed against about 3000 checklist requirements.

The BCCDC Public Health Laboratory (PHL) was visited by the accreditation team in April as part of the biennial accreditation cycle. The inspection model adopted by CAP is a peer-based one which employs teams of trained, practicing professionals. This year, the team consisted of colleagues led by a pathologist from East Tennessee State University. The auditors expressed how impressed they were with the overall quality and complexity of the joint public health laboratory and reference services provided by the BCCDC PHL. They commended the laboratory on the technical excellence of our site and the outstanding standards that we have come to uphold.

Now that the official CAP report and accreditation certificate has been received, the BCCDC PHL will continue to focus on maintaining an environment of excellence in quality while also striving for continuous improvement through its team of dedicated staff.

Discontinuation of CMV culture

Effective June 1, 2019 the BCCDC PHL discontinued offering cytomegalovirus (CMV) culture as a diagnostic test and transitioned to offering molecular assays available at BC Children's Hospital for pediatric/maternal requests and St. Paul's Hospital Virology Laboratory for all other requests. All other CMV testing remains unchanged. The BCCDC PHL and St. Paul's Hospital Virology Laboratory will continue to perform serology testing and CMV viral loads will continue to be offered at St. Paul's Hospital Virology Laboratory for adults and BC Children's Hospital for pediatric/maternal requests.

For more information, please consult the laboratory test menus located online in the eLab Handbook for BCCDC and BC Children's Hospital (http://www.elabhandbook.info/phsa/) or the Laboratory Online Test Catalog for St. Paul's Hospital (http://www.providencelaboratory.com/test_catalog.php).

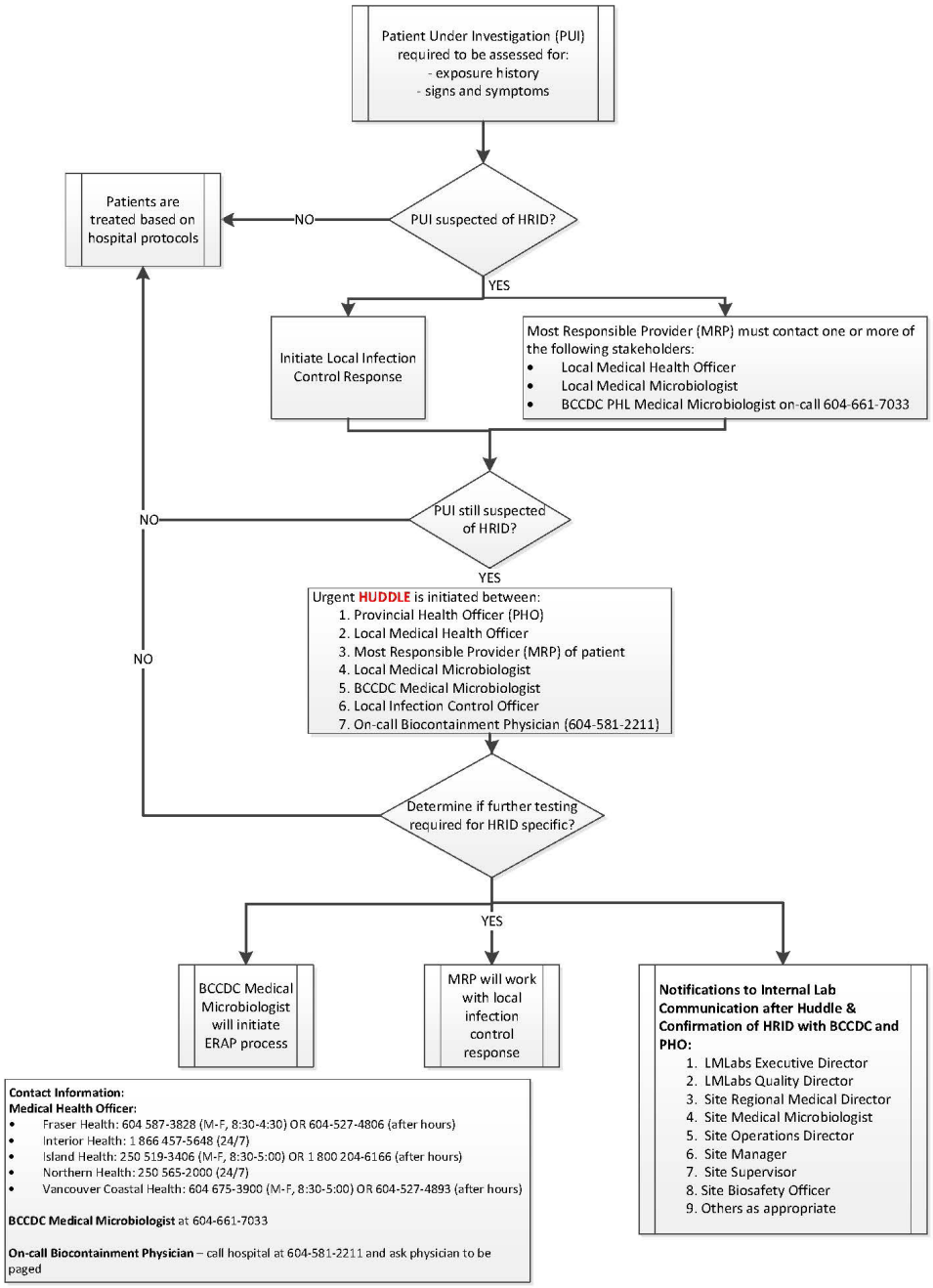
Ebola preparedness

The recent spread of Ebola virus disease (EVD) from the outbreak in the Democratic Republic of Congo to Uganda has underscored the fact that our region needs to be prepared for potential cases to be assessed at home in BC as well. A Lower Mainland High-Risk Infectious Diseases Working Group has been convening regularly to strategize on the response to a suspect case of a high risk communicable disease such as EVD. A communications response plan has been drafted, central to which is the need for an urgent huddle at the onset (Figure 1). It is clear that strong links and communication between the acute care, public health, laboratory, infection prevention and control systems must be in place and maintained.

As the province's public health laboratory, the BCCDC PHL will be a key resource during consultations and a central node supporting biosafety concerns, transport needs, activating the Emergency Response Plan (ERAP) and linking with the National Microbiology Laboratory. Our Biosafety, Biosecurity, Biohazard Containment (BBBC) Program coordinates the provincial ERAP team that specializes in the handling of Risk Group 4 pathogen spills that may occur during transportation and is networked into the current national communications on EVD. The team recently underwent their annual training to maintain proficiency in ERAP procedures and use of ERAP equipment.

While the probability of importation of EVD to BC is low, it is critical that all stakeholders are aware of the procedures related to our response. Preparedness measures will continue to be fine-tuned and clarified with this ongoing work.

Figure 1. High-Risk Infectious Diseases Communications Response Plan (working draft, May 2019).



Province-wide implementation of the next generation "TB Quantiferon Gold Plus" Interferon-Gamma Release Assay

Tuberculosis is still one of the world's most deadly infectious diseases. Interferon-Gamma Release Assays (IGRAs) are cell-mediated immunological tests that are helpful in the diagnosis of latent tuberculosis (TB) infection. There are two types of IGRA tests available. In the T-Spot TB assay, Interferon-gamma released by lymphocytes in response to stimulation by TB antigens is captured as spot deposits and these spots are quantified. The TB QuantiFERON assay quantifies Interferon-gamma released by lymphocytes using the ELISA method.

QuantiFERON-TB Gold test (QFT-G) was first approved by the Food and Drug Administration (FDA) in 2005. The QFT-G went through some modifications, turning into the QFT-Gold in Tube which obtained approval by the FDA in 2007. QIAGEN purchased this assay from Cellestis and recently made another modification called QuantiFERON®-TB Gold Plus (QFT-Plus). The QFT-Plus test, which includes 4 different collection tubes, versus the 3 different collection tubes used for QFT Gold-In-Tube assay, is designed to maximize sensitivity by including both CD4+ and CD8+ T cells-stimulating TB antigens.

The BCCDC PHL Zoonotic Diseases & Emerging Pathogens Program implemented both the T-Spot TB and the QFT Gold in Tube assays for use in select patient populations with pre-approval by Provincial TB Services physicians. The demand for these tests has been continuously increasing since their introduction in 2008. Due to increased demand, the IGRA assays were subsequently validated and implemented for defined, high risk patient groups. Patient populations initially approved for testing included:

(1) tuberculin skin test (TST)-negative immunocompromised individuals;
(2) BCG-vaccinated persons with a positive TST, and;
(3) TST-positive Indigenous and foreign-born persons.

Later this program was extended to include the chronic kidney dialysis patient population. There is a clinical need to further extend it to bone marrow transplant patients.

In January 2019, QIAGEN stopped selling the QFT Gold-In-Tube assay prompting the need to evaluate the performance of the new assay. BCCDC PHL with the help of provincial partners performed this evaluation and has validated the QFT-Plus assay for clinical use on a priority basis. **We will be switching to the new QFT-Plus assay in July 2019**. The new QFT-Plus is more permissive with respect to sample transportation times, providing the possibility for sample collections in more remote areas. BCCDC PHL, in partnership with Northern Health laboratories has recently expanded the number of sample collection and pre-processing sites in the North.

The QFT test is time and temperature sensitive and requires specialized blood collection and transportation processes. BCCDC PHL works with our regional laboratory partners for sample collection and pre-processing. All partner sites utilize standardized, quality assured processes for sample collection, onsite sample pre-processing and transport of samples to BCCDC PHL. All the established QFT collection and pre-processing sites will receive updated standard operating procedures and QFT Plus collection tubes for the new QFT-Plus assay, with a detailed description of sample collection, processing and shipment to BCCDC PHL. Information for the *Tuberculosis Interferon Gamma Release Assays* page in eLab handbook will also be updated with the changes. Our laboratory will be available to answer any questions that may arise from the transition from the QFT-Gold in Tube assay to the QFT-Plus assay.

TB genotyping surveillance

The Mycobacterial Interspersed Repetitive Units - Variable Number of Tandem Repeats (MIRU-VNTR) is a genotyping method that has been performed on select *Mycobacterium tuberculosis* (MTB) samples from the BC and Yukon and has been routinely performed on the first yearly isolate of each active TB patient since 2009. The Tuberculosis (TB)/Mycobacteriology Program at the BCCDC PHL has been offering this service since 2015 (previously this was performed by the National Reference Centre for Mycobacteriology at the National Microbiology Laboratory using a 24-digit pattern corresponding to the number of repeats at each target). The TB/Mycobacteriology Program assigns unique MIRU-VNTR-derived designation patterns and cluster codes when at least two isolates (from different patients) have matching MIRU-VNTR patterns.

Between 41-45% of isolates (since 2015) are being clustered each year using MIRU-VNTR genotyping (Figure 4). The unique isolates likely represent cases of TB acquired outside of Canada.

There are currently 299 designations assigned, representing unique strains in our database (Figure 2). Although there are several large, ongoing clusters, particularly during the beginning of implementing MIRU-VNTR at the BCCDC PHL, the majority of unique patterns belong to clusters of 2-3 individuals likely resulting from limited, local transmission events within households or other connected networks. Some of these clusters also contain multidrug resistant (MDR) isolates (Figure 3) that have been found within several clusters that span at times over numerous years. An active outbreak investigation is currently underway to monitor the BC278 cluster. The cluster contains, at this time, fifteen isolates collected from 2018-2019, primarily from a vulnerable under-housed population. They will be assessed using whole genome sequencing for further characterization and to see if additional details of transmission pathways can be determined, particularly as the same MIRU pattern has been previously observed in a cluster in another province.

Figure 2. MIRU-VNTR genotyping clustering of TB isolates in BC and Yukon from 2010 to 2019* (first quarter).

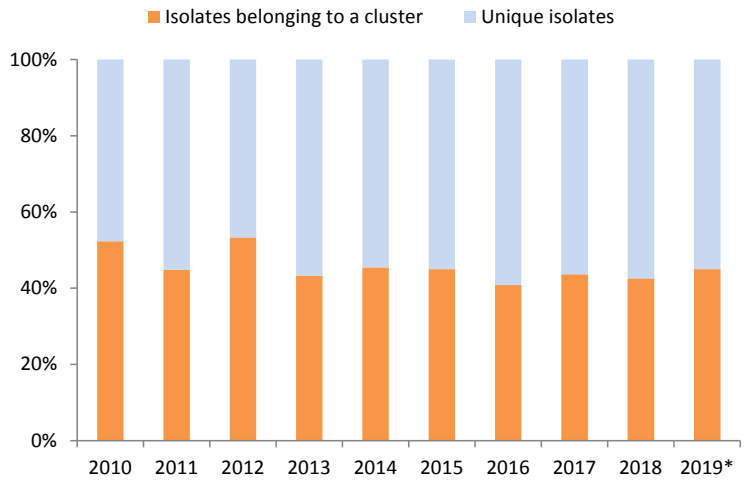
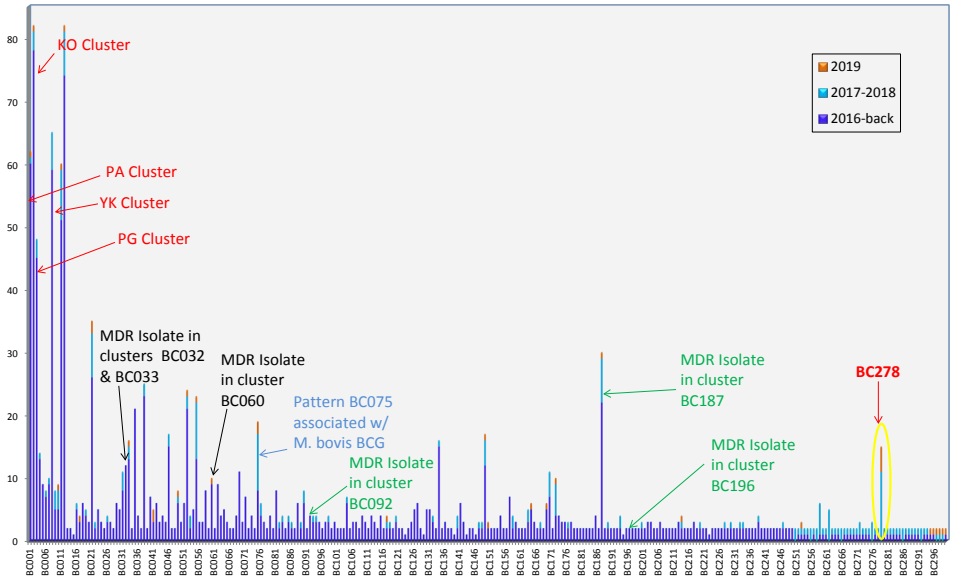


Figure 3. MIRU designations assigned up to the first quarter of 2019 including 80 Yukon isolates. Four large clusters are being monitored: KO=Kelowna, PA=Port Alberni, YK=Yukon, PG=Prince George and another large regional cluster (BC278) is also undergoing investigation, TB/Mycobacteriology Program, BCCDC PHL.



Gastrointestinal outbreaks

From January to May there were 177 gastrointestinal (GI) outbreaks investigated by the BCCDC PHL (Figure 4). After being notified of a higher than usual number of outbreaks to investigate compared to previous years in March, the number of outbreaks declined in April before increasing again in May. Outbreaks were investigated from 100 (56%) longterm care (LTC) facilities, 37 (21%) daycares/schools, 32 (18%) hospitals, three restaurants (2%), three other facility types (2%), and two events (1%). Samples were received from 69% of these outbreaks with norovirus detected in 102 (84%) (from 62 LTC facilities, 25 hospitals/acute care facilities, six daycares/schools, one restaurant, one event and one other facility type). *Aeromonas* was also detected from a LTC facility outbreak; sapovirus was detected in samples from a daycare/preschool and rotavirus was detected from a hospital outbreak.

As part of ongoing norovirus surveillance for the province, the Environmental Microbiology Program of BCCDC PHL genotypes confirmed norovirus outbreaks to monitor the molecular epidemiology of norovirus transmission across BC. Based on sequencing the capsid gene (region C), GII.4 Sydney remains the dominant strain in the province, comprising 52% of isolates genotyped in 2018 and so far 86% of isolates genotyped in 2019 (Figure 5).

Figure 4. Gastrointestinal outbreaks investigated in 2019 to May, Environmental Microbiology, Public Health Advanced Bacteriology & Mycology, Parasitology and Virology Programs, BCCDC PHL. The data available are from outbreaks in which the BCCDC PHL 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.

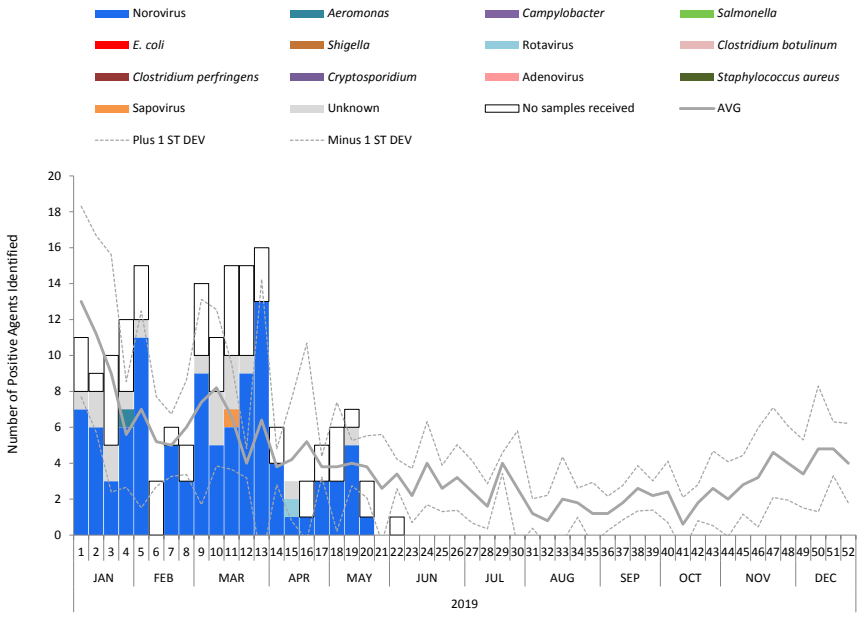
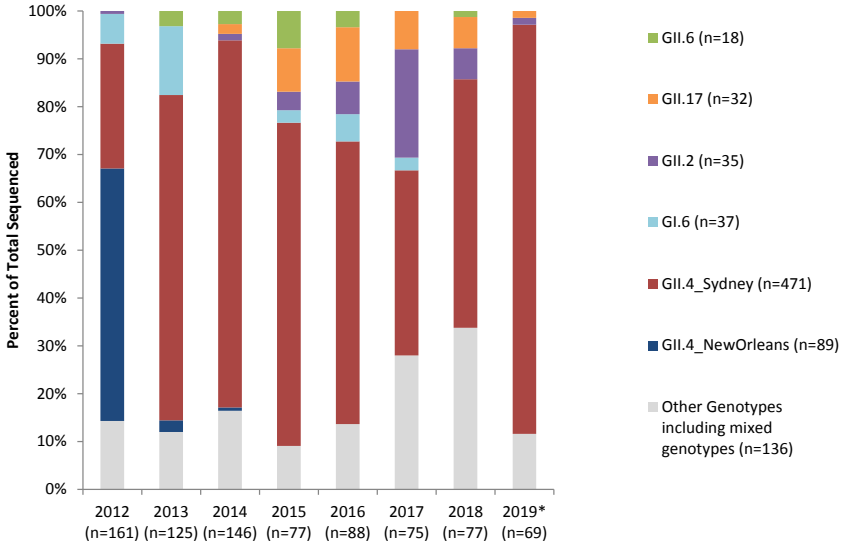


Figure 5. Region C genotyping of norovirus outbreak samples, Environmental Microbiology Program, BCCDC PHL. (Note: not all norovirus-positive outbreaks are reflected here due to sequencing limitations.)

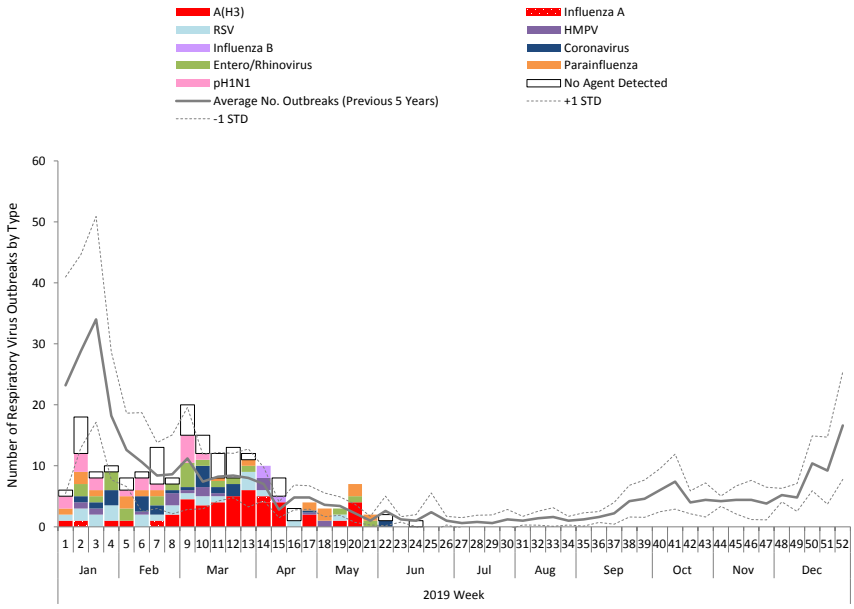


Respiratory outbreaks

From January to May there were 201 influenza-like illness (ILI) outbreaks investigated by the Virology Program of BCCDC PHL. Specimens from these outbreaks were submitted from 192 (95%) LTC facilities, six (3%) hospitals and three (1%) other facility types. Starting in March into April, the number of outbreaks was at the higher end of average weekly submissions from the past five years (Figure 6). As expected for the time of the year, from mid-April into May, the number of outbreaks then tapered off with the end of the influenza season*.

The majority of the outbreaks from January have been due to influenza (67, 33%) with A(H3) as the dominant subtype in 42 (21%) of these investigations (there were also four outbreaks where both A(H3) and another viral agent was detected (RSV, 3, 1%; coronavirus, 1, 0.5%)). These outbreaks appeared over March-April, coinciding with the domination of A(H3) later in this season. Earlier in the year, A(H1N1)pdm09 was detected in 17 (8%) of these outbreaks along with a separate outbreak where RSV was co-detected. Unsubtypeable influenza A was detected in 5 (2%) outbreaks while influenza B was detected in 3 outbreaks (2%). Other viruses detected included entero/rhinovirus (21; 10%), RSV (19; 9%), coronavirus (16; 8%), parainfluenza (15; 7%) and human metapneumovirus (9; 4%). There were also eight (4%) outbreaks where two or more agents were detected.

Figure 6. Influenza-like illness outbreaks investigated in 2019 to date, Virology Program, BCCDC PHL. Note that some outbreaks are not reflected here if they are awaiting subtyping.



*As a result of low levels of influenza and respiratory syncytial virus (RSV) during the summer months, from June 9 to September 29, 2019 all respiratory virus requests will be tested by the Luminex NxTAG Respiratory Pathogen Panel (RPP) assay only. The NxTAG RPP has a panel with 22 targets including three bacterial targets for *Chlamydophila pneumoniae*, *Legionella pneumophila*, *Mycoplasma pneumoniae*. The usual in-house developed RT-PCR assay for influenza A/B/RSV will be suspended at this time. Respiratory testing will occur every Tuesday, Wednesday, Thursday, Friday and Sunday, except Tuesdays after Monday holidays.

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The Public Health Laboratory at the BC Centre for Disease Control (BCCDC) provides consultative, interpretative testing and analyses for clinical and environmental infectious diseases in partnership with other microbiology laboratories and public health workers across the province and nationally. The BCCDC PHL is the provincial communicable disease detection, fingerprinting and molecular epidemiology centre providing advanced and specialized services along with international defined laboratory core functions. The Provincial Toxicology Centre conducts toxicology testing and analysis for clinical patients, including therapeutic drug monitoring, drug screening tests and forensic toxicology analyses for the BC Coroners Service.

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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