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

May 2016

LM LABS

LABORATORY TRENDS

Highlights

New HIV testing

Zika & Influenza surveillance

GI & Influenza-like illness outbreaks

CACMID-AMMI 2016/ new roles at the BCCDC PHL

New CPO, Zika and antibiotics research

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cap ACCREDITED™ PHSA Laboratories BCCDC Public Health Laboratory

http://www.bccdc.ca/health-professionals/professional-resources/laboratory-services

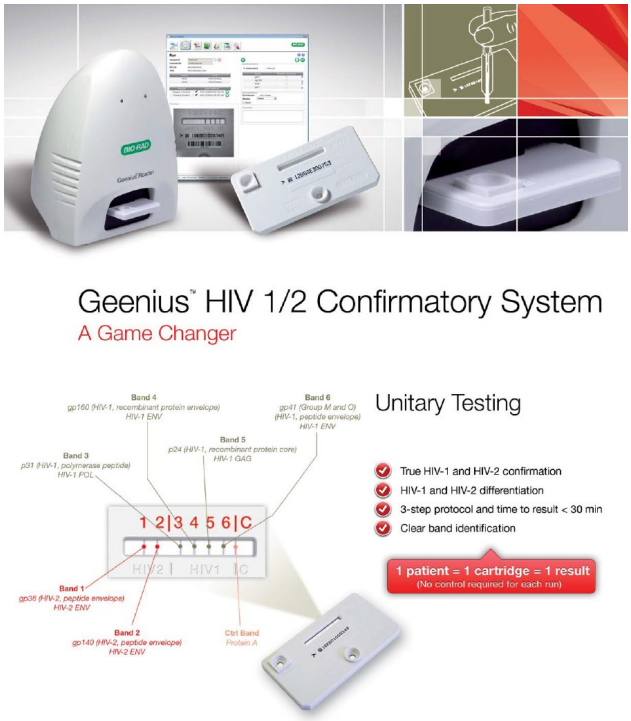
LAB NEWS

Implementation of a new HIV confirmatory test:

Beginning in June 2016, the HIV Western Blot assay will be replaced by the Bio-Rad Geenius immunochromatographic system. This assay detects and differentiates antibodies specific to HIV-1 & HIV-2. Currently, reactive fourth generation EIA HIV Ag/Ab screen tests are confirmed by Western Blot. The adoption of the Bio-Rad Geenius system will allow for same-day confirmation of established HIV infections (compared with the older Western Blot that where samples were batched for testing).

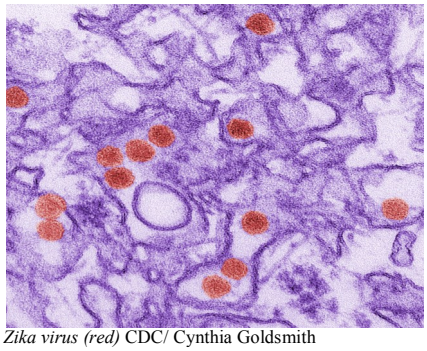
Please note that the laboratory will continue to identify acute HIV infections (which typically present with weak EIA signals) to decrease onward transmission. Acute HIV infections are accompanied by very high viral loads, individuals do not know that they are infected, and when informed, they will often reduce their transmission risk related activities. Acute infections are generally immunoblot negative or indeterminate (weak banding patterns observed) and they are HIV RNA positive. For follow up questions about the new testing please contact Dr. Agatha Jassem or Dr. Mel Krajden at the BCCDC PHL.

> The adoption of the Bio-Rad Geenius system will allow for same-day confirmation of established HIV infections



Bio-Rad Laboratories INFECTIOUS DISEASE TESTING .
© Bio-Rad 25 16067 Rev A 11/2012

SURVEILLANCE



Zika virus (red) CDC/ Cynthia Goldsmith

Zika virus

Written with Diana George.

Since the last report on Zika virus (ZIKV) surveillance in the March, 2016, Laboratory Trends, the number of confirmed cases of ZIKV infection in British Columbia (BC) and Yukon Territory as of 14 May, 2016, has increased from two to seven (1% positivity rate), all associated with travel to the Caribbean, Central or South America. During epidemiology weeks 1-19, 2016 (3 Jan – 14 May), there have been 859 individuals tested. Test order volumes initially peaked during epidemiology week 6 (7 – 13 February, 2016) at 157 per week and then began to decline. Volumes then increased in week 16 (17 – 23 May, 2016) and reached 157 per week again in week 18 (1 – 7 May, 2016) (Figure 1). Of note, the increasing trend in test orders in week 16 coincided with a Vancouver Sun news article on 18 April, 2016, reporting on BC ZIKV test results.[1]

With congenital abnormalities having a causal association with vertical transmission of ZIKV, the majority of tests ordered (73%) continue to be for females and 90% of these females are of child-bearing age (Figure 2). Of interest, the amount of tests ordered on males has increased from 19% reported in the March, 2016, Laboratory Trends to 27%, with this likely due to the mounting evidence for insertive sexual transmission of ZIKV.

While the risk of vector-borne transmission in Canada is low as the mosquitos known to transmit ZIKV are not established, the British Columbia Centre for Disease Control (BCCDC) and the BCCDC Public Health Laboratory continue to work together with BC Health Authorities on testing, surveillance, case investigation and follow up, and contact tracing.

This will become increasingly important as we approach the Brazil Summer Olympic Games in August. Moving forward, the BCCDC will coordinate follow up for any children born to mothers that were ZIKV confirmed during pregnancy and monitor them for developmental abnormalities. Further information for healthcare providers can be found on the Zika virus BCCDC website.

> "the amount of tests ordered on males has increased from 19% to 27%"

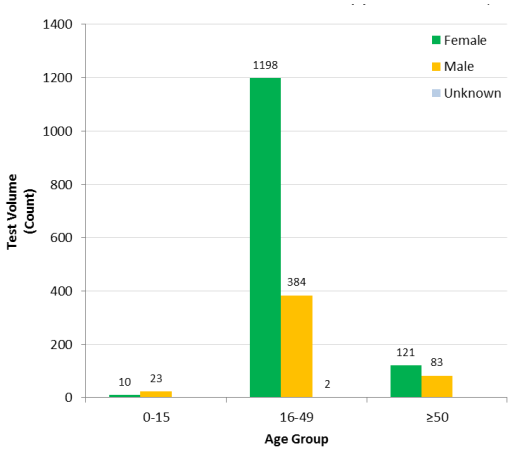


Figure 2. Cumulative Test Volumes of Samples for Zika Virus by Age Group and Gender (Epi Week 1-19, 2016, n=1821

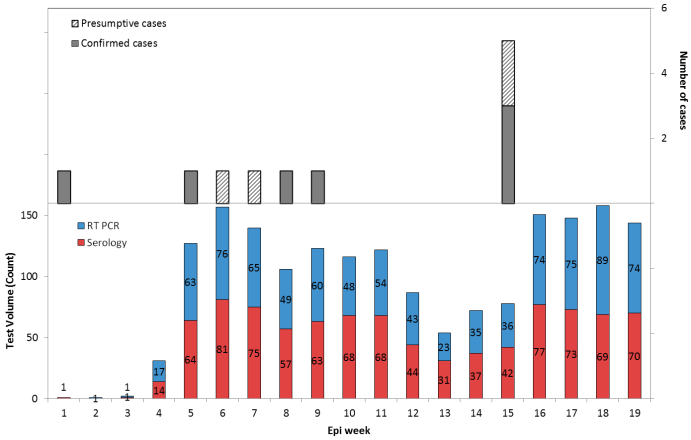


Figure 1. Cumulative Volumes of Ordered Tests for Zika Virus RT PCR and Serology* (Epi Week 1-19** 2016, n=1821)

*Note: test volumes indicate number of tests ordered, not individuals tested, as individuals may be tested by both methods tests may be pending
**Epi week based on received date for test volume and based on resulted date for cases

Reference

1. Fayerman P. Zika virus detected in seven B.C. residents, including two pregnant women. Vancouver Sun [internet]. 2016 Apr 18 [cited 2016 May 12]. Available from Vancouver Sun: http://vancouversun.com/health/sexual-health/zika-virus-detected-in-seven-b-c-residents-including-two-pregnant-women

SURVEILLANCE

CDC/ Brian Judd

Influenza

Written with Catharine Chambers

Compared to the uncharacteristically early and intense 2014/15 influenza season in BC, the 2015/16 season began later and continued longer (Figure 1). Influenza A positivity (33% at peak in week 10) was not as high as the previous season (57% at peak in week 2), but was above the national rate during week 13-17 (27 March – 30 April) and has returned to expected values for this time of the year (Figure 2-a). Influenza B detection rates increased earlier and peaked higher than the previous season (23% in week 4 beginning 24 January, 2016, compared to 18% in week 11, 2015) but have decreased to between 5-8% since week 13 (beginning 27 Mar, 2016) (Figure 2-b). The dominant influenza A subtype was A (H3N2) (percent of influenza A detections range: 47.8% - 100.0%) until week 3 (17 – 23 January, 2016), albeit at low levels with influenza positivity remaining below 18%, at which point the dominant subtype became A(H1N1)pdm09 (percent of influenza A detections range: 52.7% – 98.5%) until week 17 (24 - 30 April, 2016).

Using findings from the BCCDC-led Canadian Sentinel Practitioner Surveillance Network, an interim assessment of the 2015/16 influenza vaccine against A (H1N1)pmd09 in four Canadian provinces (including BC) was estimated.

Adjusted vaccine effectiveness was found to be 64% (95% confidence interval: 44-77%) against A(H1N1)pdm09.[1] The dominant influenza subtype in BC was (H1N1)pdm09 since week 3.

With influenza incidence having returned to expected levels and the flu season having been declared over, it will be interesting to see the final estimate of vaccine effectiveness using data from the rest of the season and interpret it against this interim estimate.

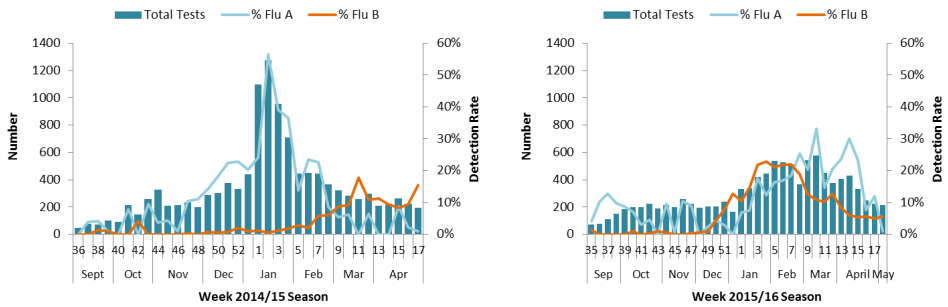


Figure 1. Respiratory testing volumes and influenza detection rates, Virology Program, BCCDC PHL.

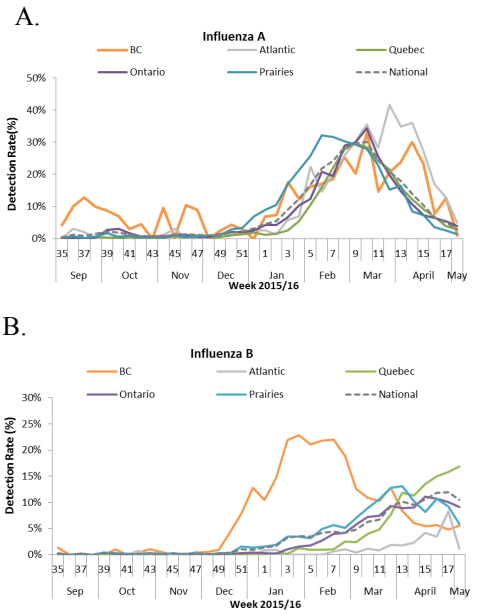


Figure 2. Influenza A and B detection rates across Canada, September 2015 to present. Data derived from FluWatch reports. Note: Reported detection rates may be different from actual detection rates (above) if subtyping is completed in subsequent weeks.

> "Adjusted vaccine effectiveness was found to be 64% against A(H1N1)pdm09.[1] The dominant influenza subtype in BC was A(H1N1)pdm09 since week 3."

1. Chambers C, Skowronski D, Sabaiduc S, Winter A, Dickinson J, De Serres G, Gubbay J, Drews S, Martineau C, Eshaghi A, Krajden M, Bastien N, Li Y. Interim estimates of 2015/16 vaccine effectiveness against influenza A(H1N1)pdm09, Canada, February 2016. Euro Surveill. 2016;21(11)

OUTBREAK

Influenza-like illnesses

Written with Catharine Chambers

During epidemiology weeks 11 – 18 (13 Mar – 7 May, 2016) since the last Laboratory Trends issue, there were 61 facility influenza-like illness outbreaks investigated by the BCCDC Public Health Laboratory (PHL) Virology Program. This was higher than expected when compared to the average number of investigations over the preceding five years, relating to the later start to the influenza season identified with FluWatch surveillance (above).

No infectious agent was detected in 22 (36%) outbreaks. Of influenza viruses identified, type B was the largest contributor (n=7, 18%), while entero/rhinoviruses were the largest non-influenza contributor (n=8, 21%) (Figure 1).

Interestingly, influenza A(H1N1)pdm09 was not the dominant agent identified Week 11 - 18 (n=6, 15%) despite its prominent circulation during the same time in the community (representing 92% of all detections at the BCCDC PHL). One likely explanation for this is the serial vaccine coverage rate within this population. During the 2014/15 influenza season, 89% of residents of residential care facilities received the influenza vaccine, many being vaccinated each year, while 77% of residential care staff were vaccinated.[1,2,3] The most recent data from the 2013/14 Canadian Community Health Survey gives an age standardized rate of 31% vaccine coverage in community-based BC residents, suggesting greater immunity among residents of residential care facilities.[4] Another possible reason for this may be an aging cohort effect of residual seroprotection in very-aged individuals that had been exposed to the 1918 A(H1N1) virus and subsequent lifelong serial exposures, providing greater protection compared to younger individuals.[3]

"Interestingly, influenza A(H1N1)pdm09 was not the dominant agent identified [in facility ILI outbreaks]."

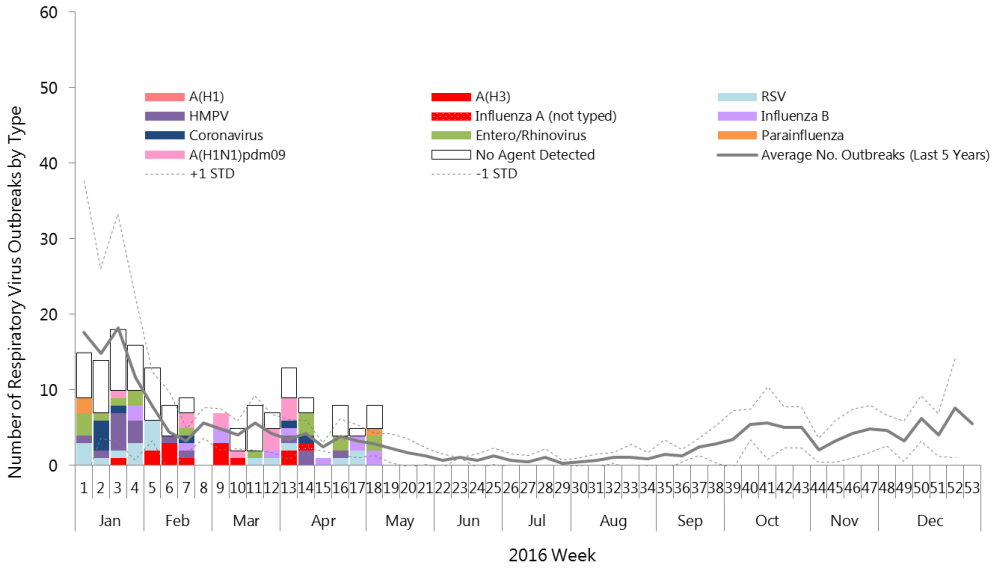


Figure 1. Respiratory outbreak investigations at the BCCDC PHL

1. BC Centre for Disease Control [Internet]. Influenza vaccination coverage for residents of residential care facilities British Columbia, 2014/15. 2015 [cited 2016 May 18]. Available from: http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/Immunization/Coverage/LTC_residents_2014_15%20_influenza_vaccination_coverage.pdf

2. BC Centre for Disease Control [Internet]. Influenza vaccination coverage for staff of residential care facilities British Columbia, 2014/15. 2015 [cited 2016 May 18]. Available from: http://www.bccdc.ca/resource-gallery/Documents/Statistics%20and%20Research/Statistics%20and%20Reports/Immunization/Coverage/LTC_HCWs_2014_15_influenza_vaccination_coverage.pdf

3. Skowronski DM, Chambers C, Sabaiduc S, Janjua N, Li G, Petric M, Krajden M, Purych D, Li Y, De Serres G. Pre- and Postpandemic Estimates of 2009 Pandemic Influenza A(H1N1) Seroprotection to Inform Surveillance-Based Incidence, by Age, During the 2013–2014 Epidemic in Canada. J Infect Dis. 2015; 221(1). DOI: 10.1093/infdis/jiu366

4. Gionet L. Statistics Canada [Internet]. Flu Vaccination rates in Canada. Minister of Industry; 27 October 2015 [cited 2016 May 18]. Available from: http://www.statcan.gc.ca/pub/82-624-x/2015001/article/14218-eng.pdf

OUTBREAK

Gastrointestinal

CDC/ Amanda Mills

During epidemiologic weeks 1-18, there were 96 gastrointestinal outbreaks investigated by the BCCDC PHL, an increase from 84 gastrointestinal outbreaks during the same time period in the previous year, but within the expected 2011-2015 historical trend.

Outbreaks were investigated from 63 (66%) long term care (LTC) facilities, 20 (21%) daycares/ schools, eight (8%) hospitals, two (2%) restaurants, one (1%) private function, and two (2%) unclassified outbreak facility type (Figure 1).

Samples were received from 70 (73%) of these outbreaks with norovirus detected in 51 (73%) outbreaks (41 LTC facilities, seven hospitals, one daycare/school, one restaurant, and one unclassified outbreak facility type), two (3%) sapovirus outbreaks detected (one daycare/school and one LTC), rotavirus detected at one (1%) daycare/ school, and outbreaks of unknown etiology among 16 (23%) investigations (nine LTCs, four daycares/schools, one hospital, and one private function) (Figure 2).

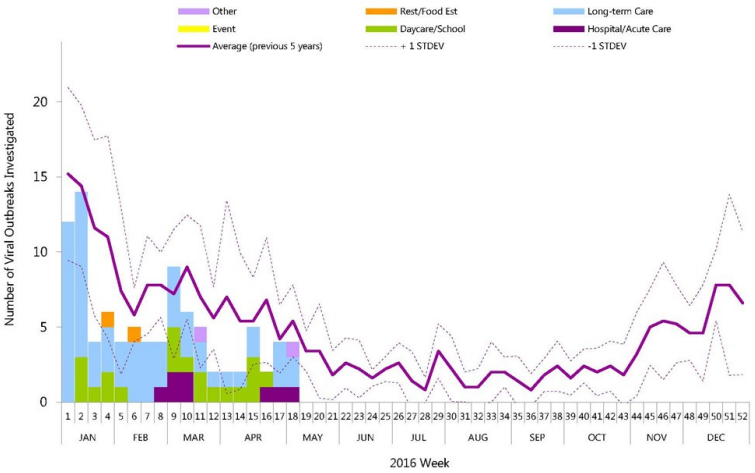


Figure 1. Viral gastrointestinal outbreaks investigated* in 2016 by facility type, Environmental Microbiology, Public Health Advanced Bacteriology & Mycology, Parasitology and Virology Programs, BCCDC PHL.

* 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. Given the nature of GI outbreaks, samples are not always available for testing.

"norovirus was detected in 51 (73%) outbreaks, two (3%) sapovirus outbreaks were detected, rotavirus was detected at one (1%) daycare/ school, and outbreaks of unknown etiology among 16 (23%) investigations"

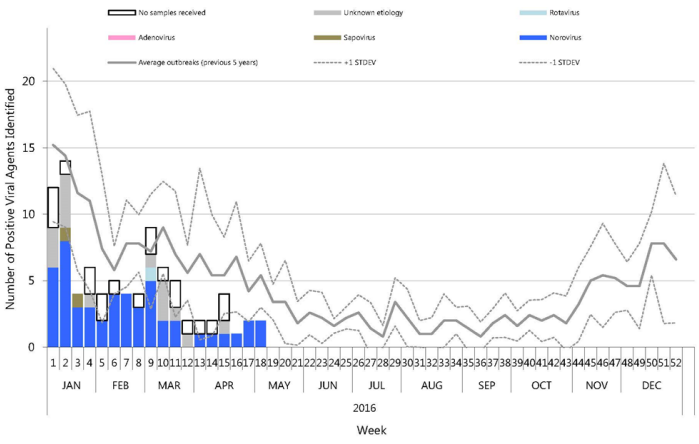


Figure 2. Viral gastrointestinal outbreaks investigated in 2016 by etiology, Environmental Microbiology, Public Health Advanced Bacteriology & Mycology, Parasitology and Virology Programs, BCCDC PHL.

SPOTLIGHT

People and papers of the BCCDC PHL

BCCDC PHL at CACMID-AMMI Vancouver 2016

From March 30th to April 2nd, Vancouver hosted the 11th annual conjoint meeting for the Canadian Association for Clinical Microbiology and Infectious Diseases (CACMID) and the Association of Medical Microbiology and Infectious Disease Canada (AMMI). Many BCCDC PHL members attended and presented their incredible work (listed below) that can be explored further in the meeting abstracts .

The annual CACMID-AMMI meeting features a variety of topics in microbiology and infectious disease and draws a range of experts in infectious diseases, diagnostic microbiology, antimicrobial stewardship, disease prevention and control and public health.

This year's meeting addressed many critical topics including the applications and advances in next generation sequencing and genomics- discussed by the plenary speaker Dr. Charles Chiu – retrospective and real time Zika and Ebola virus outbreak reports, surveillance and impacts of carbapenemase producing organisms (CPOs) and many more. Featured sessions included Global Health, Non HIV Immunodeficiency, What's Hot in Adult and Paediatric Infectious Diseases and Diagnostic Microbiology, Tuberculosis Update and a Debate on Whether Healthcare Workers Should be Going Bare Below.

BCCDC PHL presentations at CACMID

Presenter	Poster	Oral
Min-Kuang Lee	April 1 (1215-1330) Exploring the Next Generation Sequence Analysis Pipeline for Lyme Disease Causing Agent	
Keerthi Fernando		April 1 (1600-1615) Passive Surveillance of Borrelia burgdorferi in British Columbia (2002 to 2013)
Yvonne Simpson	April 1 (1215-1330) Implementation of Centralized IGRA testing in British Columbia Partnering with Laboratories across British Columbia	
Yvonne Simpson (Presented by Ida Wang)	April 1 (1215-1330) Evaluation of a New Zeus VlsE-1/pepC10 IgG/IgM Lyme ELISA on the Dynex DS2 Automated Platform	
Teresa Lo	April 1 (1215-1330) PCR is Useful as a Supplemental Test in the Reference Laboratory to Assist with Diagnosis of Amoebiasis in Liver	
Matthew Croxen	April 1 (1215-1330) Use of Genome Sequencing to Inform Diagnostic Assay Development for Streptococcus pneumoniae and S. Pseudopneumoniae	
Matthew Croxen		April 2 (1145-1300) Analysing Your Sequence Data
Matthew Croxen		April 1 (1645-1700) A Genomic Picture of NDM-Producing Organisms Isolated in British Columbia
Kim Macdonald		April 1 (16:00-17:00) Genome sequencing of Salmonella Javiana in British Colubia: gaining perspective on rare serotypes in a clinical genomics workflow
Mel Krajden		Apr 2 (1115-1130) Hepatitis C Virus (HCV) Mortality Patterns in the British Columbia Hepatitis Testers Cohort (BC-HTC)
Kingsley Gunadasa	April 1 (1215-1330) Evaluation of the Luminex® MAGPIX® NxTAG® Respiratory Pathogen Panel	
Tracy Lee	April 1 (1215-1330) Challenges in Developing a Real-Time PCR Assay for Hepatitis C Virus Genotyping	
Diane Eisler	April 1 (1215-1330) Development of a Fast Triplex Real-time RT-PCR for the Detection of Norovirus Genotypes I and II in RNA Extracts from Stool and Vomitus Specimens	
Diane Eisler	April 1 (1215-1330) Development of a Fast Multiplex Real-time PCR for the Detection of Chlamydophila pneumoniae, Legionella pneumophila and Mycoplasma pneumoniae in DNA Extracts from Atypical Pneumonia Specimens	
Guanghong Han		April 1 (16:00-17:15) Provincial surveillance for carbapenemase producing organisms in British Columbia: 2014-15.

SPOTLIGHT

People and papers of the BCCDC PHL

Long service awards & new roles at the BCCDC PHL

Spring has sprung at the BCCDC PHL with many exciting changes and commemorations to celebrate! On April 28th 2016, the BCCDC PHL hosted the long service awards reception and honoured the following staff for their service of 5 to 35 years:

5 years	Chris Kwan, Ida (Hsiao Yun) Wang, Angela Kong, Suzanne Baumeister
10 years	Levi Bacabac, Nida del Ponso, Brian Fowler
15 years	Gemma Bacabac, Marly Fernando, Dennis Friesen, Bruce Gamage
20 years	Kenneth Chu, Christine Froelich, Karen Lam, Mo-Wah Ng, Maria Kilicarslan
25 years	Tony Wong, Ray Wada, Man Lee Lam
30 years	Annette Castell
35 years	Teresa Ho

The new fiscal year has also brought new roles for BCCDC PHL staff with the appointment of **Dr. Mel Krajden** as the BCCDC PHL Medical Director, **Dr. Karen Mooder**- Multi-Site Director, Operations, **Quantine Wong**- BCCDC PHL Site Supervisor, **Brian Auk**– BCCDC PHL Team Lead, Virology/ Molecular Microbiology & Genomics , **Frankie Tsang**- BCCDC PHL Team Lead, Environmental Microbiology, and **Dr. Pat Doyle**– Medical Microbiologist.

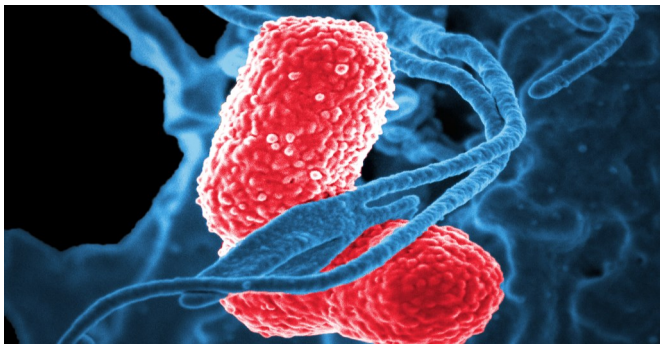
Long Service Awards Photo credit: Teresa Lo, BCCDC PHL

Molecular tools, genome sequencing characterize CPO in BC

Written with Dr. Matthew Croxen.

In a paper published in the Journal of Clinical Microbiology, Drs. Inna Sekirov, Matthew Croxen and Linda Hoang (head of Bacteriology & Mycology Program), along with Corrinne Ng, Yin Chang and Rob Azana, reviewed and commented on the increasing number of carbapenemase-producing organisms (CPO) in BC.

In collaboration with the National Microbiology Laboratory in Winnipeg, traditional molecular tools such as Pulsed-Field Gel Electrophoresis (PFGE) and Restriction Fragment Length Polymorphism (RFLP) plasmid analysis, along with genome sequencing was used to look at isolate clonality and plasmid diversity in these organisms. *Enterobacter cloacae* isolates were related by PFGE and Multilocus Sequence Typing (MLST) analysis, suggesting clonal spread. *Klebsiella pneumoniae* and *Escherichia coli* however, were more diverse by PFGE and MLST with common plasmid RFLP patterns. This suggests that there is sharing of plasmids between unrelated organisms.


Klebsiella pneumonia, National Institute of Allergy and Infectious Diseases

> The predominant organisms were *Klebsiella pneumoniae*, *Enterobacter cloacae* and *Escherichia coli*, with the New Delhi-metallo-β-lactamase (NDM) carbapenemase being the most prevalent.

Epidemiologic and genotypic review of carbapenemase-producing organisms in British Columbia, Canada, between 2008 and 2014
Inna Sekirov, Matthew A. Croxen, Corrinne Ng, Robert Azana, Yin Chang,Laura Mataseje, David Boyd, Chand Mangat, Benjamin Mack, Manal Tadros,Elizabeth Brodkin, Pamela Kibsey, Aleksandra Stefanovic, Sylvie Champagne,Michael R. Mulvey, and Linda M. N. Hoang. J. Clin. Microbiol. February 2016 54:2 317-327

SPOTLIGHT

People and papers of the BCCDC PHL

PCR assay, sequencing identifies first Zika case in BC

The March issue of the Canadian Communicable Diseases Report featured a case report by Dr. Muhammad Morshed (Head of Zoonotic Diseases and Emerging Pathogens at the BCCDC PHL) and colleagues that describes **the first reported case of Zika virus in Canada related to the recent outbreak from the South and Central Americas**.

A woman, who had returned to Canada from a family visit in El Salvador, presented with a fever and rash and was initially queried for measles, dengue and chikungunya viral infections.

Serology work was done by the Centre for Disease Control (CDC) in Fort Collins and molecular testing was re-confirmed by the National Microbiology Laboratory in Winnipeg. With the help of the BCCDC PHL's pan-flavivirus and Zika PCR assay and subsequent amplicon sequencing, Zika virus was diagnosed 7 days from the patient's initial assessment.

CDC/ Prof. Frank Hadley Collins

Molecular (PCR) tests validated and implemented at the BCCDC PHL, helped to identify flavivirus RNA from nasopharyngeal and urine samples and subsequent sequencing successfully identified the presence of Zika virus.

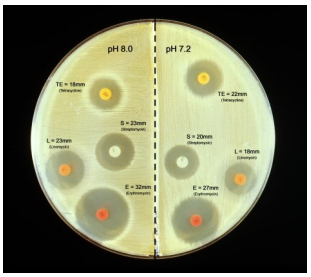
Teale A, Payne M, England J, Morshed M, Hull M. Zika virus, an emerging flavivirus, as a cause of fever and rash in a traveller returning from Central America. Can Comm Dis Rep 2016;42:68-71.

Dentists, antimicrobial stewardship & antibiotics in BC

Written with Diana George

Overuse of antibiotics across populations can lead to microbial resistance. Surveillance of antibiotic utilization helps track antibiotic misuse and abuse and supports antimicrobial stewardship in the medical and healthcare communities.

In a study published in the May issue of the Journal of the American Dental Association, a group of researchers and staff from the BCCDC, the University of British Columbia, and the University of Toronto, led by Dr. David Patrick, reported on the significant contribution of dental antibiotic prescriptions in British Columbia. The authors analyzed antibiotic use across prescribing professions (physicians, dentists, nurse practitioners and naturopathic physicians), using anonymized, line-listed data from the Ministry of Health on outpatient prescriptions from 1996 to 2013.



Staphylococcus sp and antibiotic-impregnated disks. CDC.

In British Columbia, antimicrobial stewardship efforts have lead to an overall decline in the rate of antibiotic prescribing though the prescribing contribution from dentists has been largely overlooked.

Out of 2.6 million antibiotic prescriptions written by BC practitioners in 2013, the authors noted that dentists contributed 11.3 % (much less than physicians at 87.5%), with the number of prescriptions from dentists rising significantly from 1996 to 2013, contrary to a decline observed in physician prescriptions. Penicillin V, a narrow spectrum antibiotic, was less prescribed by dentists compared to amoxicillin and combinations of amoxicillin and enzyme inhibitors

In an antimicrobial stewardship effort, the authors broadcasted a webinar from the Canadian Dental Association and observed 11 explanatory themes well supported by the literature.

Fawziah Marra, PharmD, Diana George, MSc, Mei Chong, MSc, Susan Sutherland, DDS, MSc, David M. Patrick, MD, MHSc.Antibiotic prescribing by dentists has increased: Why? J Am Dent Assoc. 2016 May;147(5):320-7.

A Report of the BCCDC Public Health Laboratory

http://www.bccdc.ca/health-professionals/professional-resources/laboratory-services

The BCCDC Public Health Laboratory 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 BCCDC Public Health Laboratory 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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Program Head and Medical Microbiologist: Dr. Linda Hoang & Dr. Mel Krajden
Team Lead: Brian Auk

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Team Lead: Dr. Mabel Rodrigues

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Clinical Virologist: Dr. Agatha Jassem
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