BC PUBLIC HEALTH MICROBIOLOGY & REFERENCE LABORATORY

LABORATORY TRENDS

Vancouver, BC

June 17, 2014

In this Issue:

Success With Genomic R&D Initiatives

The Genomics R&D Initiative (GRDI) is a federal program that coordinates genomics-based research and development solutions in the fields of health care, food safety, natural resources, agriculture, fisheries and environmental protection. The following projects reflect some of the new interprovincial and national partnerships that will soon be underway.

Single Nucleotide Variant subtyping of *Salmonella* Enteritidis and *Salmonella* Heidelberg

Led by Dr. Roger Johnson from the Laboratory for Foodborne Zoonoses at the Public Health Agency of Canada (PHAC), this project is a collaboration between PHAC, the National Microbiology Laboratory (NML) and public health laboratories in Ontario, Quebec and British Columbia (BC). The project aims to develop Single Nucleotide Variant (SNV) technology to discriminate between strains of *Salmonella* Enteritidis and Heidelberg. As current available methods are unable to quickly and economically characterize strains of *S*. Enteritidis and *S*. Heidelberg the outcomes of this work will be hugely beneficial for outbreak detection and management and public health surveillance.

Previous SNV developmental work by the BC Public Health Microbiology & Reference Laboratory (BCPHMRL) will be evaluated for addition to the SNV assay panel and in particular, validation work by Kim Macdonald, BCPHMRL/ PHAC Laboratory Liaison Technical Officer, will be major contributions to this four-year project.

Establishment of a National MALDI Database (NMD) to Support Diagnostic Laboratories across Canada

The BCPHMRL is also contributing to a database when Matrix Assisted Laser Desorption Ionization Time-of-Flight (MALDI TOF) is used for microbial identification. Species diagnosis by MALDI is dependent on profile libraries of microorganisms which may or may not be well established. Kathy Bernard, Head, Special Bacteriology Unit, Antimicrobial Resistance and Nosocomial Infections at the NML is the Principal Investigator for this project. With the help of the project consortium, a national MALDI TOF database will be created for rare, unusual or other bacteria which are missing or not well identified by current databases.

Bioinformatics of Carpanemase Producing Organisms

Dr. Linda Hoang is also Co-Investigator in a GRDI project to establish bioinformatics capacity to do whole genome sequencing of carbepenemase producing organisms (CPO). These recently emerged multi-drug resistant bacteria are highly transmissible within a healthcare setting, and have contributed to a number of hospital outbreaks in Canada. Working with other provincial public health laboratories and hospitals experiencing outbreaks of CPO, this project aims to develop standardized whole-genome sequencing (WGS) protocols to help determine mechanisms of spread within the hospitals. Combining WGS data with the patient hospital data will hopefully inform and improve infection control practices. Ultimately, the goal of this project is to limit the spread of these untreatable CPO in hospitals by using the state-of-the-art WGS methods which will one day be available at our frontline hospital laboratories.

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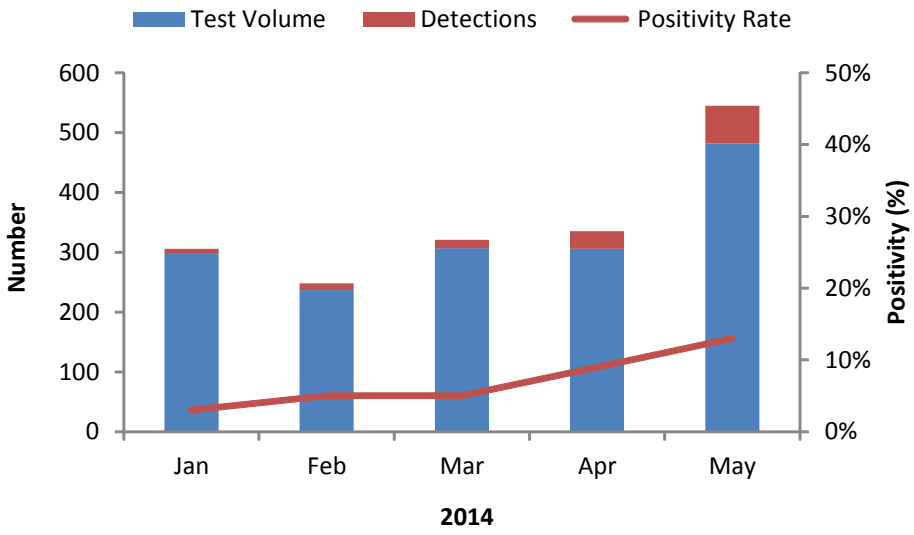
Pertussis Surveillance

Rates of *Bordetella pertussis* have steadily been on the rise from this year from 3% positivity in January to 13% positivity in May (Figure 1). Cases have been detected from all health authorities across the province with Northern, Fraser and Vancouver Coastal health authorities having the most cases.

In the north, a pertussis outbreak beginning in March continues in the Northwest region. Two-thirds of the laboratory confirmed cases are under 20 years of age and nearly all are from Haida Gwaii with spread also to Prince Rupert.

Figure 1
Pertussis PCR test volumes and detection rates, Public Health Advanced Bacteriology & Mycology Program, BCPHMRL.



Influenza Surveillance

The current influenza season in BC is nearly at its end with some low level circulation of influenza B continuing. This season was characterized by high rates of influenza A(H1N1)pdm09 starting from week 48 (end of November) and peaking on week 2 in January at 40% positivity before falling and disappearing on week 15 in April (Figure 2). This pattern was similar to the 2012-2013 influenza season where influenza A(H3N2) was dominant but over a slightly longer timeframe and with prolonged high laboratory detection. The 2011-2012 season demonstrated lower positivity for influenza A(H3N2) but over a much longer period from December to the end of June. Detections of the secondary influenza subtype appeared later on and were typically observed at low levels (under 5% positivity for the 2013-2014 and 2012-2013 seasons and under 10% positivity for the 2011-2012 season).

The pattern of influenza B activity appeared consistent over the past 3 seasons with detection rates increasing at around weeks 6-7 in February and peaking in week 16 in April for the 2013-2014 and 2012-2013 seasons or week 22 at the end of May for the 2011-2012 season (Figure 3). This season, influenza B positivity peaked briefly at 22% positivity. with continued circulation of influenza B virus which is to be expected at this time of the year.

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Figure 2
Influenza A detection rates over the last 3 seasons, Virology Program, BCPHMRL.

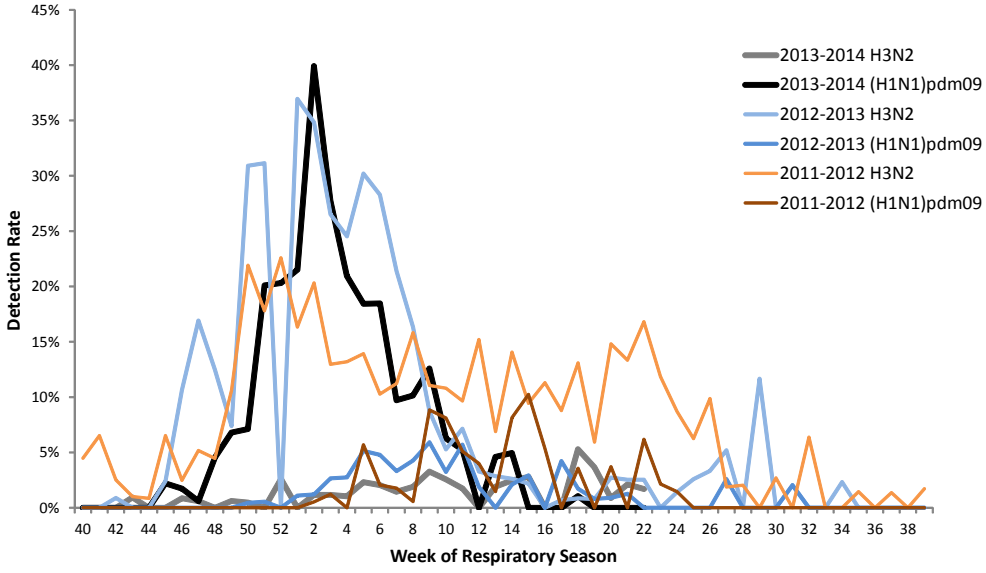
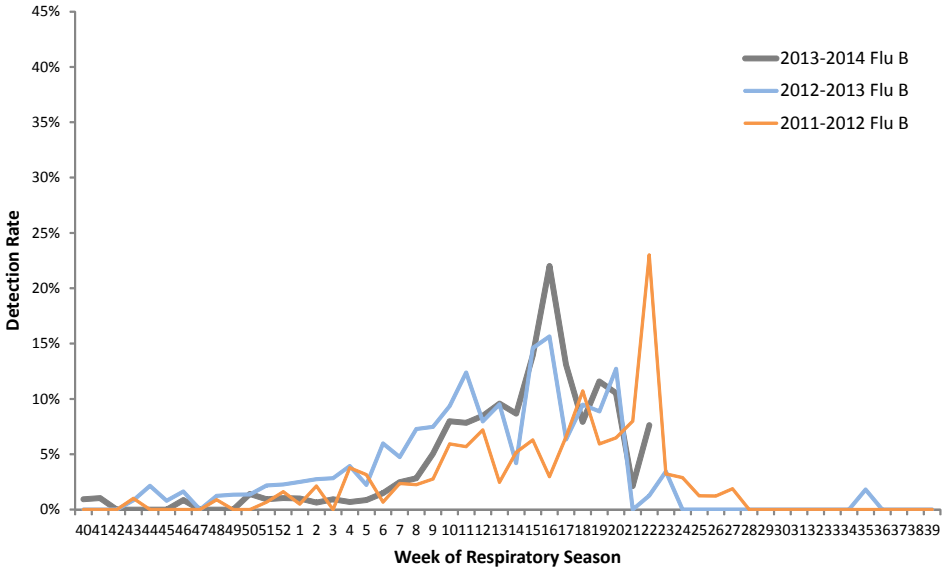


Figure 3
Influenza B detection rates over the last 3 seasons, Virology Program, BCPHMRL.



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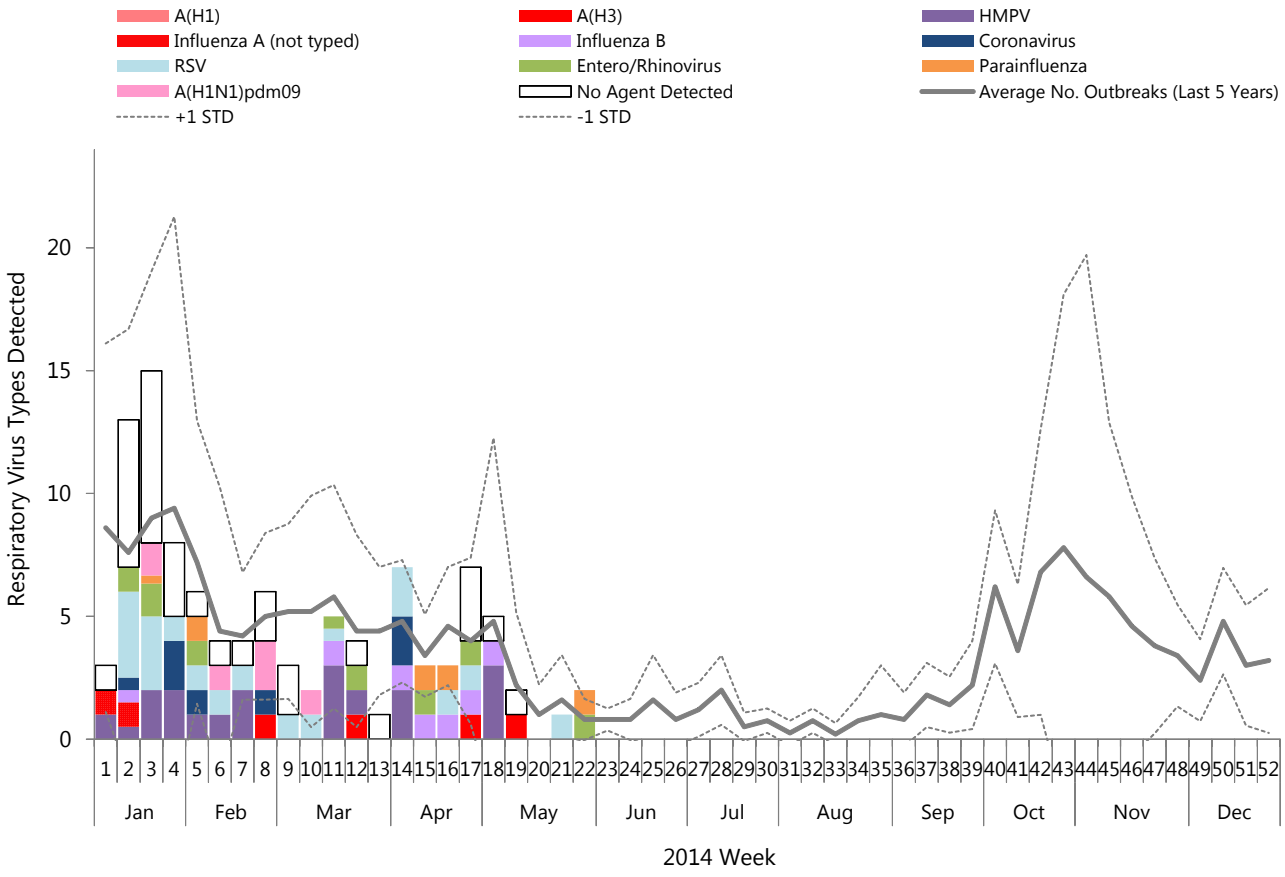
Respiratory Outbreaks

There were 7 respiratory outbreaks investigated for the month of May which is consistent with the historical trend at this time of the year (Figure 4). Samples were submitted from 6 (86%) longterm care (LTC) facilities and 1 (14%) hospital. From the LTC facilities, human metapneumovirus was detected at two facilities, respiratory syncytial virus detected at another, influenza A(H3) detected at a separate facility and parainfluenza detected in the final facility. Entero/rhinovirus was detected from samples from the hospital outbreak.

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.

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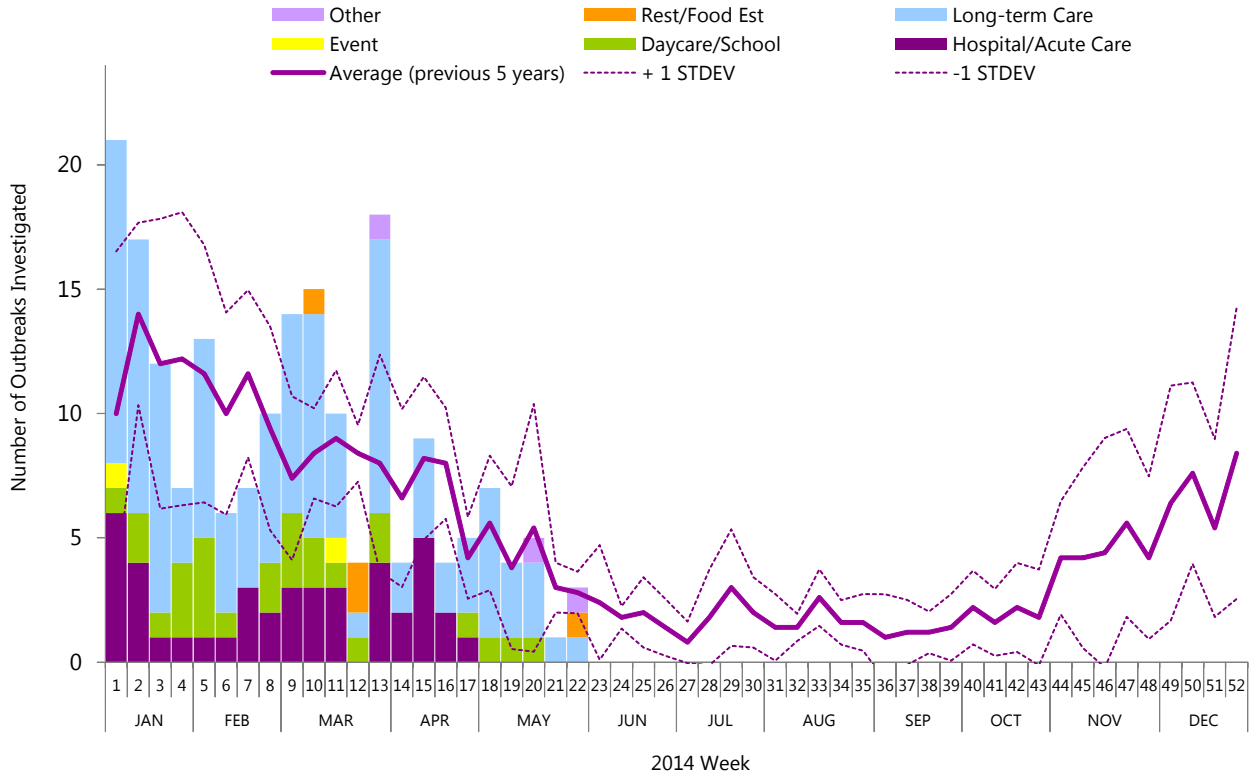
Gastrointestinal Outbreaks

In May, the BCPHMRL investigated 16 gastrointestinal (GI) outbreaks, a decrease from the previous month and consistent with this time in previous years (Figure 5). Outbreaks were identified from 10 (62%) longterm care facilities, 3 (19%) daycares/schools, 2 (12%) other event types (including a foodborne event) and 1 (6%) restaurant/food service establishment. Samples for laboratory testing were submitted for 13 (81%) of these outbreaks with norovirus confirmed in 9 (69%) from 7 (78%) longterm care facilities, 1 (11%) daycares/school and 1 (11%) other event. Sapovirus was also identified in 1 (8%) separate outbreak in a longterm care facility.

The foodborne event is a multijurisdictional outbreak of multiple serotypes of *Salmonella enterica* (Newport, Hartford, Saintpaul, Sandiego and Oranienburg) linked to consumption of chia seeds and products. A total of 44 cases in BC, Alberta, Ontario and Quebec as well as 21 cases in 12 US states have been reported to date with more expected as additional serotypes have been included in the investigation. Illness onset dates have ranged from December 2013 to May 2014. These products have been distributed in Canada and the US and have been recalled. The Public Health Agency of Canada is collaborating with provincial health authorities, the Canadian Food Inspection Agency, Health Canada and the US Centers for Disease Control and Prevention for this investigation.

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.

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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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