



BC Centre for Disease Control

An agency of the Provincial Health Services Authority

BC Centre for Disease Control Report - 2013

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Introduction

Welcome to our latest report on the BC Centre for Disease Control. This report provides an overview of the Centre and the work that we do.

In 2013, and into 2014, we experienced some key changes in leadership that meant we had to say good-bye to some valued colleagues and welcome some new people to the team.

In May 2013, Dr. Nick Foster took on a temporary role at the BC Cancer Agency, which led the way for Lydia Drasic to assume some of his senior leadership responsibilities while also continuing in her role as Executive Director of Population and Public Health. She later became a permanent member of the team in a newly created role as Executive Director, BCCDC Operations and Chronic Disease Prevention. This new role replaced the Chief Operating Officer role following Nick Foster's departure and aligned PHSA Population and Public Health more closely with the BCCDC.

In December 2013, Dr. Bob Brunham stepped down as Provincial Executive Director and work began to recruit a new leader for the Centre. We're pleased that Dr. Mark Tyndall has been appointed to the role of Executive Medical Director BCCDC and Deputy Provincial Health Officer effective September 2, 2014. Dr. Bonnie Henry, was appointed as Interim Executive Medical Director in December to cover until Dr. Tyndall takes up the role.

Throughout these changes, BCCDC staff continued their exemplary work in public health promotion, health protection and disease prevention through surveillance, detection, treatment, outbreak management, prevention and consultation services.

Some of the highlights of 2013 included:

- BCCDC played a key role by participating in the development of the Population and Public Health Surveillance Plan for BC. The agency had already begun a process to consolidate and enhance its ability to use surveillance data effectively, thus positioning BCCDC well to coordinate, lead and support public health surveillance in BC.
- The BCCDC Panorama Central Support Team (Pan-CST) provided support for the 2013 provincial launch of this key public health information system. BCCDC and PHSA Information Management Information Technology Services (IMITS) were involved in actively supporting critical clinical, business process, data quality and technical issues that arose in the early days post-launch and on an ongoing basis.
- In fall 2013, BCCDC supported changes to the publicly funded immunization program: the introduction of the live attenuated intranasal influenza vaccine and the timing of the third dose of the HPV (human papillomavirus vaccine) changed. BCCDC's role included development of promotional and educational materials for the public and health care providers, vaccine purchasing and distribution, and monitoring and evaluation of these programs in addition to the routine immunization programs in BC.
- BCCDC provided regular advisories to the medical community in BC on behalf of the Provincial Health Officer about reports of H7N9 avian influenza in China and cases of MERS-CoV (Middle Eastern Respiratory Syndrome) to ensure a high level of vigilance, in particular for travellers returning from affected areas who had developed respiratory illnesses. BCCDC also provided regular updates on elevated levels of H1N1 influenza activity this influenza season, a strain known to cause increased morbidity and mortality in younger people, that led to increased need for hospitalization and ICU care.
- BCCDC co-led the implementation committee for the BC Strategic Plan for Tuberculosis

Prevention, Treatment and Control which worked toward collaboratively developing detailed work plans and shared roles between health authorities and BCCDC for the nine prioritized actions from the plan.

- BCCDC led analyses that informed a Lower Mainland regional initiative to develop an emergency action plan for episodes of extremely hot weather. In May 2013, BCCDC formalized inclusion of alerts from a “nowcasting” system into the heat health emergency response algorithm.
- BCCDC participated in the Ministry of Health’s process to develop a Sexually Transmitted Infections Strategic Plan and provided advice to the Ministry on principles of STI/HIV prevention and control, established global and provincial sexual health strategies, expertise in STI and sexual health at PHSA agencies, methods to monitor the impact of an STI control strategy and examples of innovative approaches to address goals in the Guiding Framework for Public Health.
- Infectious syphilis rates increased to historically high levels, mainly among gay, bisexual and other men who have sex with men. BCCDC was involved in public health syphilis response strategies including review and follow-up of all positive syphilis laboratory test, case management and development of a communication strategy that emphasized the need for safe sexual behaviours.
- BCCDC led the provincial response to a national outbreak of illness caused by E. coli O157:H7 unpasteurized cheese products and was involved in both the epidemiological investigation and food safety-related onsite inspections.
- BCCDC continues to use its strengths in surveillance, evaluation, innovation and best practices to guide its role. We look forward to continuing the important work of the Centre in the months and years ahead.

Sincerely,

Dr. Bonnie Henry

Interim Executive Medical Director

Lydia Drasic

Executive Director, BCCDC Operations and Chronic Disease Prevention

Overview

ABOUT BCCDC

The BC Centre for Disease Control (BCCDC) provides provincial and national leadership in public health through surveillance, detection, treatment, prevention and consultation services. We provide both direct diagnostic and treatment services for people with diseases of public health importance and analytical and policy support to all levels of government and health authorities.

BCCDC investigates and evaluates the occurrence of communicable diseases in BC and is the provincial reporting centre for reportable cases and categories of communicable diseases. We create opportunities for scientists, health professionals, university and other partners to contribute their knowledge and experience in resolving the outstanding health challenges facing British Columbians.

MANDATE

By virtue of delegation and designation, the BCCDC carries out regulatory functions on behalf of the Provincial Health Officer under the Public Health Act. BCCDC's unique integrated structure, one that combines service delivery, policy advice and research, contributes greatly to our ability to identify and respond to emerging public health threats.

BCCDC is dedicated to preventing and controlling communicable disease and promoting environmental health for the province.

Our mandate: Working together to protect health, prevent harm, prepare for threats.

We believe that there are no boundaries to what we can do to better the health of British Columbians. Each team member dedicates energy, expertise and passion to the prevention, detection and cure of disease. We lead through research, innovation and action.

As an agency of the Provincial Health Services Authority (PHSA), BCCDC supports PHSA's three primary strategic directions: Improving quality outcomes and providing better value for patients; Promoting healthier populations; Contributing to a sustainable health care system.

We are dedicated to embedding a culture of quality and safety into all aspects of its programs. We work closely with partner health authorities, health professions and other stakeholders to continually improve patient safety and quality of services.

HISTORY

BCCDC has a long history of excellence in the prevention, detection and control of communicable diseases. Originally known as "Special Health and Treatment Services", in 1955 the service divisions operating in Vancouver were brought together under one roof but continued to operate independently. In 1977, the name was changed to the "Vancouver Bureau" and the divisions operated under one administration. In 1986, the organization became the "British Columbia Centre for Disease Control" to reflect its primary focus. In 1997, the BCCDC was established as a society and its governance devolved from the Ministry of Health to the Vancouver/Richmond Health Board. In December 2001, BCCDC became an agency of the new Provincial Health Services Authority (PHSA) and has remained part of PHSA ever since, while continuing to maintain strong ties to other health partners.

PARTNERS

Partnerships are integral to BCCDC's programs and services. BCCDC has close ties with clinical, education, research, and other communicable disease-related institutions in British Columbia, Canada and internationally.

Key partners include:

- Regional health authorities
- Government of British Columbia
- University of British Columbia
- Simon Fraser University
- Public Health Agency of Canada
- Health Canada
- BC Communicable Disease Policy Advisory Committee
- BC Environmental Health Policy Committee

The day-to-day public health work of the BC Centre for Disease Control is done in support of regional health authorities, the BC Ministry of Health and the Provincial Health Officer.

ORGANIZATION

Scientific and technical support is provided by the following five service lines:

- 1. Clinical Prevention Services (CPS)** is an integrated clinical prevention service, encompassing Sexually Transmitted Infections (STI) and HIV prevention, Tuberculosis (TB) Control and Hepatitis, to provide coordinated, quality and cost-effective care to clients with a focus on vulnerable communities. Programs include STI and TB outpatient clinics, provincial outreach programs and services for Aboriginal peoples.
- 2. Communicable Disease Prevention and Control Services (CDPACS)** is the provincial reporting centre for cases of communicable disease. This service line monitors and evaluates cases and outbreaks, develops prevention and control policies and programs, with strong informatics capacity by creating core methodological expertise in surveillance, epidemiology and links to public health laboratories.

- 3. Environmental Health Services (EHS)** acts as a resource on matters related to environmental health policy, practice, and research. This is accomplished through a mix of activities that can be broadly organized into the following four areas: policy coordination and support, provision of consultative resources, environmental health capacity expansion through research and education, and direct service provision.

- 4. Immunization Programs and Vaccine Preventable Disease Services (IPVPDS)** is responsible for planning, monitoring, implementation support, and evaluation of new and existing immunization programs, including surveillance of vaccine preventable diseases. The service synthesizes evidence to inform policy recommendations made by the Communicable Disease Policy Advisory Committee and supports the work of the BC Immunization Committee. The service is home to a pharmacy, which is responsible for the purchase and distribution of vaccines, TB and STI drugs in BC and the dispensing of medications for the STI and TB clinics.

- 5. Public Health Emergency Management (PHEM)** was developed in response to a need identified by the Ministry of Health for BCCDC capacity to anticipate and coordinate the provincial response to public health aspects of a major emergency (communicable disease or environmental hazard) that might affect several health authorities.

EDUCATION

BCCDC is involved in a wide range of education activities, including training health professionals and emergency preparedness personnel, and providing reliable and current public health information to the general public.

RESEARCH

BCCDC collaborates with the University of British Columbia and more recently Simon Fraser University to advance public health policy, applied research and clinical teaching. Through a formal process of assessment of capacity and need, the BCCDC has identified the following research themes:

- Efficacy and cost effectiveness
- Communication and health policy
- Emerging infectious diseases
- Food and water borne disease
- Vaccine and immunology
- Knowledge translation and diffusion of innovation
- Mathematical modeling
- Genomics
- Electronic public health

PHSA Corporate Services manages corporate services departments which offer centralized services to all PHSA agencies, including BCCDC. These departments include Human Resources, Information Technology, Communications, Finance, and Quality, Safety and Risk Management. Each of these departments is represented within the BCCDC building.

PHSA Public Health Microbiology Reference Laboratory, located at BCCDC, provides specialized services and integrated core functions province-wide for communicable diseases detection, surveillance, outbreak investigation and emergency response. The laboratory also assists in problem solving for other microbiology labs across the province. Working within the Lower Mainland Pathology and Laboratory Medicine Services, as well as with public health workers in health authorities and BCCDC, it uses advanced molecular and genomic tools for microbial fingerprinting and other specialized tests for complicated or rare infections. More information is available at www.lmlabs.phsa.ca.

Clinical Prevention Services (CPS) Overview

Clinical Prevention Services (CPS) is an integrated clinical prevention service, encompassing Sexually Transmitted Infections (STI) and HIV diagnosis and prevention, Tuberculosis Control, and Hepatitis, to provide coordinated, quality and cost effective care to our clients with a focus on vulnerable communities.

STI/HIV PREVENTION AND CONTROL

STI/HIV Prevention and Control is the provincial centre of excellence for sexually transmitted infection and HIV, and coordinates BC-wide efforts to control STI/HIV through prevention, testing and care. CPS operates the Provincial STI/HIV clinic, an outreach prevention program, the PHSA STOP HIV Program, on-reserve education for Aboriginal communities and consultation services for practitioners on STI/HIV management.

TUBERCULOSIS SERVICES

Tuberculosis Services is the provincial centre of excellence for TB prevention, control and treatment. Programs include the Provincial TB clinics in New Westminster and Vancouver, a street outreach program in Vancouver's downtown eastside, a direct observed therapy (DOT) Program, case management, provincial consulting services, and services for Aboriginal Communities.

HEPATITIS SERVICES

The interdisciplinary team at BC Hepatitis Services works collaboratively with clinicians, scientists, educators, consumers, health and social service agencies and provincial Health Authorities in the delivery of prevention and care services but is not involved in direct services to clients.

WHAT CPS DOES

- Lead the development, implementation and dissemination of provincial clinical guidelines, prevention and treatment recommendations.
- Conduct ongoing surveillance to describe and analyze trends in HIV, AIDS, sexually transmitted infections, tuberculosis and hepatitis C.
- Provide support and consultation for nurses and other health care providers for TB management and contact investigation, and clinical STI practice.
- Provide front line clinical prevention services focusing on the development, application, evaluation and dissemination of innovations and best clinical practices for diagnostics, treatment, prevention and control of STI, HIV, TB and hepatitis.
- Clinical services provide expert direct client consultation, including case finding, treating and contact tracing, adverse event monitoring and medication reconciliation for STIs, HIV and TB.
- Conduct public health research that informs evidenced-based public health practice, programming and policy.
- Collaborate with each of the health authorities to develop and test comprehensive prevention and care demonstration projects.
- Participate in the development of Hepatology Nursing Standards.
- Offer education for health professionals and work with others to create health education materials.
- Connect people to resources.

Clinical Prevention Services (CPS) Highlights

STOP HIV PROGRAM

The STOP HIV Team at the BCCDC provides clinical and policy leadership to regional health authorities and agencies of PHSA to meet the provincial Hope to Health goals of an AIDS free generation. The team includes physicians, nurses, epidemiologists and analysts working together to provide leadership around key HIV prevention and linkage to care initiatives both within BCCDC and in partner agencies. These include the development of a rapid referral pathway for newly diagnosed clients, the expansion of acute and point of care HIV testing, the scale up of routine HIV testing in TB services and other PHSA agencies and targeted funding to improve access to HIV testing for gay men and men who have sex with men. The STOP HIV program has also funded capacity building activities for HIV testing in First Nations communities through the Chee Mamuk program. The team also creates guidelines and provides HIV education and policy consultation across the province. Through additional STOP HIV resources the team supports the overall monitoring and evaluation of Hope to Health testing initiatives and provides enhanced surveillance and testing data to regional health authorities and partners. The team contributed to the development of the new Provincial Health Officer's guidelines on HIV testing in BC and will contribute ongoing leadership in the implementation and evaluation of the guidelines.

mHEALTH PILOT PROJECTS

Following the successful completion of pilot projects using text messaging to communicate with patients in the areas of tuberculosis (TB) and HIV care, the BCCDC is expanding its mobile health (mHealth) services through ongoing research projects at the Vancouver and New Westminster TB Clinics and the HIV Oak Tree Clinic. Building on evidence-based interventions conducted by BCCDC clinician researchers, these mHealth projects are using

weekly interactive text messages to check in on how patients are doing throughout their care. The interactive check-ins are intended to increase healthcare access and support for vulnerable and hard-to-reach populations; improve patient health outcomes through increased medication adherence and care engagement; reduce health system costs by remotely promoting health in the community and reducing reliance on emergency and hospital services. A randomized controlled trial assessing the effect of this mHealth intervention on latent tuberculosis infection treatment is currently ongoing at the BCCDC TB Clinics, with 149 participants enrolled. At the HIV Oak Tree Clinic, 100 high-risk HIV-positive individuals are being enrolled to assess the intervention's cost-effectiveness and its ability to improve clinical outcomes and patient quality of life. In addition, a systematic review of short message service interventions for the prevention and treatment of sexually transmitted infections is underway.

ONLINE SEXUAL HEALTH SERVICES PROGRAM

Online Sexual Health Services (OSHS) Program focuses on using online technologies to deliver innovative sexual health services and reduce barriers to accessing sexual health care. The program includes a provincial sexual health website (www.SmartSexResource.com), which offers a searchable clinic finder, "ask a question" and "chat with a nurse" features, and a blog for health care providers. The website, which launched in August 2012, saw its first full year of implementation in 2013 and received over 65,000 visitors, 76% of which were unique. More than 300 questions were submitted by the public, and almost 70 chat sessions were held. The OSHS Program also includes an internet-based STI and HIV testing service, called Get Checked Online. Through Get Checked Online, people can print a lab

requisition for STI and HIV testing, visit a private lab to give samples, and retrieve results online or over the phone. 2013 saw the final stages of development for this service, which will launch in 2014.

ANONYMOUS TESTING

In March 2013, BCCDC launched the anonymous HIV testing pilot. The pilot allows a person to test using a numbered code known only to them and without the collection of identifiable or contact information. The purpose of the pilot is to increase the uptake of HIV testing in clients such as MSM, youth and healthcare workers who may not test, or delay testing, due to confidentiality concerns. Regardless of the test result, it is hoped that the pilot will open doors to access other prevention or clinical services for potentially marginalized individuals. Anonymous testing is an addition to, not replacement of, existing HIV testing options (nominal testing, non-nominal testing, testing using pseudonyms) and has been implemented at eight sites in BC across the Lower Mainland with plans to expand to other areas of the province as well.

IMMEDIATE STAGING

Clinical Prevention Services offers direct clinical service at a variety of sites such as the Provincial STI Clinic, some provincial correctional facilities, and in partnership with community organizations that support vulnerable populations in low-threshold settings. Numerous infections of syphilis, gonorrhea and chlamydia were diagnosed, treated and followed up by the clinic and outreach nurses and physicians. Also, approximately 20% of the new HIV infections in BC are tested through BCCDC clinics – in 2013 this was 53 new diagnoses of HIV, including seven diagnoses of acute HIV infection.

Building on the success of clinician engagement with these clients, an enhanced follow-up and engagement with care strategy was developed with the goal to improve formalized referral processes and to confirm client's engagement in HIV-specific care. Key measures included acceptance of immediate

viral load and CD4 serology to stage the HIV infection and acceptance of referral to HIV-specific care. Of the new HIV diagnoses made at the clinic and outreach sites in 2013, 75% of clients accepted immediate viral load and CD4 serology, and 98% accepted referrals to HIV-specific care.

CHEE MAMUK

Chee Mamuk is a provincial Aboriginal program that provides innovative and culturally appropriate HIV, hepatitis sexually transmitted infection (STI) education, resources and wise practice models. Chee Mamuk's services are grounded in community, tradition and science in order to build capacity in Aboriginal communities to prevent the spread of HIV and STIs.

During the 2013/2014 fiscal year, Chee Mamuk provided two Around the Kitchen Table (ATKT) trainings. ATKT is a workshop where teams of Aboriginal women leaders learn how to run HIV, hepatitis and sexual health sessions in their own communities. ATKT follows a traditional approach recognizing that traditional knowledge and skills are passed through informal day-to-day activities. By building on traditions and bringing women together to learn about HIV, ATKT helps increase healthy self-esteem and identity. Last year Chee Mamuk trained 11 teams of women to run ATKT in their communities.

As well, Chee Mamuk delivered the 'Mobilizing on HIV and STIs in Aboriginal Communities' trainings. Mobilizing helps teams of two frontline healthcare workers in Aboriginal communities assess the level of readiness to implement HIV education in their home communities. Mobilizing then helps the teams create a community plan, based on their level of readiness, to increase awareness of HIV and STIs in their community. Last year, Chee Mamuk trained 13 teams in the Mobilizing training.

PROVINCIAL TUBERCULOSIS STRATEGY

The BC Strategic Plan for Tuberculosis Prevention, Treatment and Control was released in 2012. Tuberculosis Services at the BC Centre for Disease Control, together with the Ministry of Health, BC Health Authorities, and physicians are working to achieve the key objectives outlined in the provincial strategy. During the first year, implementation efforts centred on setting the groundwork for further work. A formal committee was developed and meets regularly. Priority actions were identified with working groups focused on surveillance, contact investigation, outbreak planning and continuity of care between facilities and authorities. Preliminary work began on the development of a template for a Public Health Service Level Agreement. Nursing educational needs were clarified, materials identified and tools developed to support healthcare workers with TB services. Periodic progress reports are a part of the TB Strategy and the first has been posted on the BCCDC website at http://www.bccdc.ca/NR/rdonlyres/8E10D561-D0C9-4496-851D-C2637DFEA8B0/0/TB_Report_StratPlanProgress_20140311.pdf

IGRA TESTING AND TB SERVICES FOR ABORIGINAL COMMUNITIES (TBSAC) PROGRAM

TBSAC provides TB services to Health Centers located on-reserve and to Aboriginal people both on and off reserve, funded and delivered in partnership with First Nations Health Authority. As part of the routine support given to communities with a higher burden of TB, nurses from TB Services for Aboriginal Communities (TBSAC) are invited into communities to assist local Community Health Nurses in their annual community-wide TB Screenings. One of the goals of these screenings is to identify and offer preventative treatment to individuals who have recently become infected with latent TB infection.

Traditionally, the Tuberculin Skin Test (TST) has been the standard tool used to screen for tuberculosis

infection. While it remains a widely used test, the TST is associated with false positive results, specifically in people who were vaccinated with BCG (Bacille Calmette-Guérin) outside of infancy. In recent years, the use of Interferon Gamma Release Assays (IGRA), a blood test that measures the body's immune response to prior exposure to mycobacterium tuberculosis (MTB), has been offered by TBSAC to assist in the diagnosis of TB infection in some people who have had a positive TST result. Unaffected by a client's previous BCG status, the IGRAs enhanced specificity can prevent unnecessary treatment of Latent TB Infection (LTBI) in patients with falsely positive TSTs, a burden both to the patient and to the health system. Unfortunately, due to processing time sensitivities and the sophisticated equipment required to run this blood test, IGRAs are currently only available for BC residents in one of four testing sites located in Vancouver, Victoria, Kelowna, and Prince George. Travel to and from testing sites can be logistically and financially challenging for rural communities members and has proven to be a barrier for many clients who would benefit from and are interested in pursuing testing to clarify their TB infection status.

In an attempt to make IGRA testing more accessible, TBSAC has launched a mobile IGRA testing program to bring this novel test to remote First Nations communities. Geared with a portable incubator, TBSAC nurses have visited six communities. To date, a total of fifty-seven Quantiferon Gold (the most commonly used IGRA in Canada) tests were collected, incubated, centrifuged and transported by the TBSAC nurses to the Public Health Microbiology Reference Laboratory (PHMRL) at the BCCDC for processing. Of the IGRA samples collected in community, forty-two were non-reactive allowing for the avoidance of unnecessary LTBI treatment. The personal and system cost savings for those clients who will avoid unnecessary LTBI treatment supports the use of this innovative approach.

EPIDEMIOLOGY AND SURVEILLANCE

The Epidemiology and Surveillance program played a key role in the monitoring and evaluation of provincial strategies and initiatives in 2013. In addition to contributing program indicators related to testing and diagnosis for monitoring of the provincial STOP HIV/AIDS program, the E&S program in partnership with health authority tuberculosis leads developed a monitoring framework for the provincial tuberculosis strategy which is now being implemented. 2013 also saw the release of the first multi-year annual surveillance report for tuberculosis for BC as well as the implementation of a health authority quarterly monitoring report for TB, STI, HIV, and Hepatitis C. These accomplishments fulfill objectives of the TB strategic plan as well as facilitating timely reporting and identification of changes in trends provincially and regionally.

EDUCATION

The CPS Education Program is responsible for the coordination, planning, development, implementation, and evaluation of educational activities and initiatives. The Program coordinates the development of clinical practice guidelines including decision support tools for nurses and other health care providers working in the areas of sexually transmitted infection management and tuberculosis management. Each year, the Education Program provides or partners in the development of HIV, STI, hepatitis, and TB workshops, training sessions, online education for health care providers across the province, and review of policy and guidelines. In 2013-14 the education team, designed and developed HIV 101 and TB 101 online courses (with consultation/input from provincial partners), and developed a Hepatitis C online course. In 2013, a STI Decision Support Tools Provincial working group was established with representation from all BC health authorities and Options for Sexual Health. This group in collaboration with BCCDC, successfully completed

a review of nurse Decision Support Tools for CRNBC. An evaluation was completed and submitted for the BCCDC STI Certified Online Course and was approved for another three years.

Communicable Disease Prevention and Control Services (CDPACS) Overview

CDPACS provides centre-wide advanced epidemiological and statistical modelling, consulting and training, as well as geographic mapping, data linkage and information privacy strategies to support disease surveillance, public health practice and research activities at BCCDC.

The Do Bugs Need Drugs? (DBND) program is a multifaceted public and health care professional education program geared towards decreasing antibiotic overuse and misuse, and reducing the spread of resistant organisms (www.dobugsneeddrugs.org.)

Trends in antimicrobial utilization in BC are monitored to evaluate population-level antimicrobial utilization trends and to assess changes in prescribing patterns. Trends in antimicrobial resistance in BC are monitored to provide a comprehensive overview of antimicrobial resistance trends and to correlate these trends with trends in antimicrobial utilization

The Harm Reduction Program is a collaboration with various partners including the Ministry of Health, regional health authorities, service providers and people who use drugs, to help keep people who use illegal drugs safe from disease and injury. The program provides equipment for safer drug use, such as needles and syringes, to help reduce the transmission of HIV and hepatitis C and safer sex products. Harm reduction also develops policies, training materials, and conducts research to reduce the harms associated with drug use. 2013 marked the highest level of distribution and uptake to date.

The Influenza & Emerging Respiratory Pathogens team conducts research, performs surveillance, synthesizes evidence and provides policy advice related to influenza and emerging or re-emerging respiratory pathogens as well as pertussis. From January 1, 2012 to December 31, 2013 the team contributed more than 20 scientific papers in

peer-reviewed journals, informing public policy in Canada and abroad. In support of further knowledge translation and public education, the team conducted more than 60 media interviews.

Mathematical modeling is an effective means for predicting the behavior of large, complex systems such as infectious disease spread. Models are analytical and computational tools that allow us to simulate the spread of diseases through a variety of populations and settings to test different intervention strategies.

Communicable Disease Prevention and Control Services (CDPACS) Highlights

PUBLIC HEALTH ANALYTICS

CDPACS continued quarterly access audits of all sensitive datasets held within the secure data repository. Several key privacy impact assessments and security, threat and risk assessments were completed or updated in support of the provincial public health information system (Panorama) and the Public Health Reporting Data Warehouse that supports surveillance and analysis of integrated public health data.

CDPACS has also developed an advanced data processing infrastructure that significantly reduces the processing time required for staff to perform complex analyses. Advances have also been made towards making provincial infectious disease surveillance data available in an interactive way - as a public access dataset - on the BCCDC website.

Automated data integration of reportable communicable disease reports and laboratory diagnoses into a public health reporting data warehouse facilitates more comprehensive surveillance of infectious diseases, decreases data processing time, and improves data access controls. Use of this system has grown in 2013 to incorporate additional datasets and user groups across the BCCDC.

PANORAMA

Various processes were established including incident, service request, reporting and clinical informatics along with supporting infrastructure and governance for BC health authorities, Yukon Territorial Government and First Nations.

Provincial standard clinical business processes were established for Immunization, Family Health and Inventory programs along with associated data standards and policies.

The provincial audiology project is on schedule for deployment in June 2014 allowing for consolidation of numerous disparate documentation systems into one.

ADVANCED ANALYTICS

CDPACS Advanced Analytics provided analytical/statistical support, working collaboratively with researchers within both BCCDC and the Public Health Microbiology & Reference Laboratory (PHMRL).

The team provided ongoing support in statistical and epidemiological methods to staff and students in public health through, for example, newly established weekly training and knowledge exchange sessions.

Research projects in Advanced Analytics included investigating relationships between extreme weather and water-borne illness, methods for HIV incidence estimation, forecasting future rates of cancer, and evaluation of BC's healthcare worker influenza immunization policy. Projects regularly involved partners in academia and other public health agencies such as the Public Health Agency of Canada (PHAC) and the BC Cancer Agency (BCCA).

ENTERIC AND ZOOBOTIC DISEASE PROGRAM

The program was involved in 23 enteric outbreak investigations. More than half were solved and many led to journal publications.

New criteria were implemented to determine when to initiate provincial enteric outbreak investigations. The criteria led to a more transparent and standardised process and efficient use of resources by identifying outbreaks with a greater chance of being solved and controlled.

BCCDC and the PHAC collaborated to determine the burden of domestically-acquired foodborne illness in BC. During 2000 to 2010, there were an estimated 550,000 cases annually of domestically acquired foodborne illness in BC. This is equivalent to 1 in 8 residents getting ill from contaminated food in BC every year.

An evaluation was undertaken of the “Eat Safely, Eat Well” food safety in pregnancy program launched in 2011 (www.bccdc.ca/foodsafetyinpregnancy.ca). The team provides information to help prevent foodborne infection in pregnant women. The evaluation found that the team’s resources were distributed throughout the province and are a preferred resource by health care providers for food safety information. A study of pregnant women in BC identified that they improved their knowledge and behaviours related to food safety.

The team is finalizing guidelines for zoonotic diseases in animals reportable to public health. CDPACS is supporting clinical and research activities of the PHSA Complex Chronic Disease Clinic. As it does every year, CDPACS co-hosted the successful BC Zoonoses Symposium in November 2013 which brings together BC practitioners and researchers in public health and animal health.

The team participated in several studies: comparison of shiga toxin-producing *Escherichia coli* O157 and non-O157 infections; association between campylobacteriosis, agriculture and drinking water; and, clinical progression and predictors of outcome of *C. gattii* infected individuals.

INFLUENZA AND EMERGING RESPIRATORY PATHOGENS

ANNUAL INFLUENZA VACCINE EFFECTIVENESS (VE) MONITORING: The team leads the Canadian sentinel physician surveillance network involving the collaboration of the five largest provinces of Canada to monitor annual influenza virus evolution and vaccine effectiveness (VE).

The team pioneered use of the innovative test-negative design (TND) and in 2013 proved the validity of TND methods for VE estimation in direct comparison with estimates derived by gold-standard randomized controlled trial analysis. For the past 8 years, the team has published end-of-season VE estimates based on the TND methodology in peer-reviewed journals and, for the past two seasons, has provided mid-season interim VE estimates to inform real-time public health messaging and response during the influenza peak. During both the 2012-13 and 2013-14 influenza seasons, the team was the first globally to publish fully-adjusted mid-season VE estimates, reporting suboptimal vaccine protection against the dominant circulating H3N2 virus for 2012-13 but substantial protection against resurgent A(H1N1)pdm09 epidemic activity in 2013-14. As such, the team was the only VE monitoring team from Canada invited to contribute to the WHO vaccine strain selection for the northern and southern hemispheres.

IMMUNO-EPIDEMIOLOGY and EPIDEMIC RISK ASSESSMENT: In multi-centre collaborations the team contributed scientific papers to inform understanding and public health messaging related to emerging and re-emerging influenza viruses, including H3N2v, A(H1N1)pdm09 and H7N9. During the current reporting period, the team published findings related to population sero-susceptibility and epidemic risk assessment, relative disease burden by age, cross-reactive vaccine responses and immunologic interactions for seasonal and novel viruses. In 2013, the team directly contributed to WHO meta-analysis of A(H1N1)pdm09 infection rates based on serology during the 2009 pandemic and also newly contributed primary analysis of A(H1N1)pdm09 sero-protection by age to explain 2013 epidemic resurgence, with findings disseminated real time to assist public health communication and response activities.

ROUTINE AND SPECIAL RESPIRATORY PATHOGEN SURVEILLANCE BULLETINS: Surveillance bulletins summarizing community based influenza and other respiratory virus activity are routinely distributed to

more than 700 health care practitioners across the province to guide real-time public health messaging and clinical decision making. These bulletins are distributed weekly during the winter season and periodically during inter-seasonal months and are available at <http://www.bccdc.ca/dis-cond/DiseaseStatsReports/influSurveillanceReports.htm>.

Our team is also responsible for assembling and disseminating special pathogen reports to inform clinicians and public health practitioners throughout the province about emerging respiratory virus threats globally, notably this year avian influenza H7N9 and MERS-CoV. The team monitors the epidemiologic profile of reported cases, synthesizes the available evidence, and conducts risk assessment and analysis. These summaries are distributed in support of timely awareness and response provincially and nationally directly to >1400 clinicians, public health and infection control practitioners, with further fan-out distribution through health care settings. The team has also ensured timely knowledge translation by presenting emerging information during invited speaking events and abstract submissions to provincial and national conferences, meetings and rounds.

Dissemination of special pathogen reports to inform clinicians and public health practitioners throughout the province about emerging respiratory virus threats globally, notably avian influenza H7N9 and MERS-CoV. The team monitors the epidemiologic profile of reported cases, synthesizes the available evidence, and conducts risk assessment and analysis. These summaries are distributed in support of timely awareness and response provincially and nationally directly to >1400 clinicians, public health and infection control practitioners, with further fan-out distribution through health care settings.

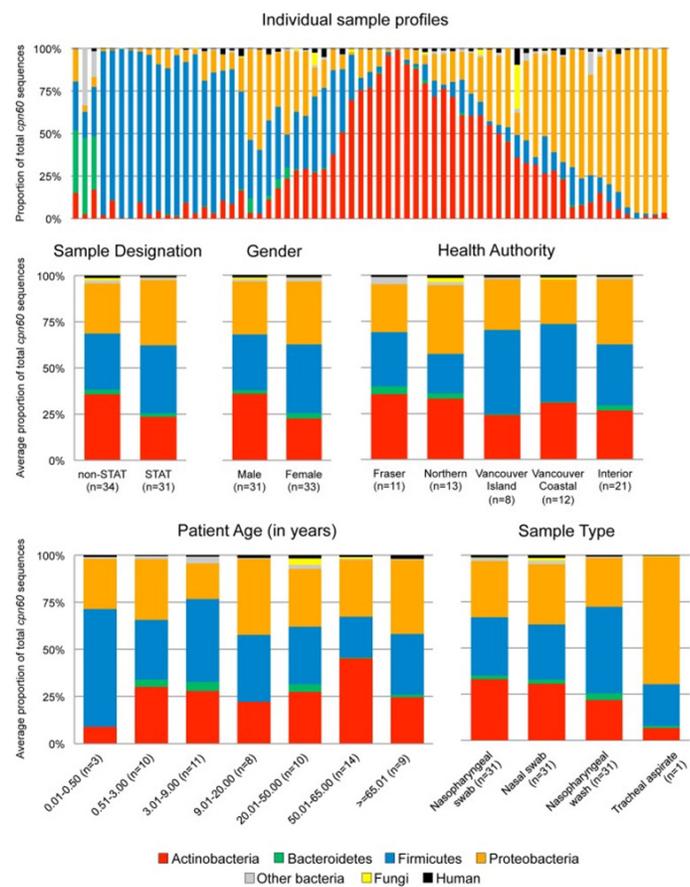
GENOMICS

In 2013, the genomics team launched a new project to sequence the genomes of all *Mycobacterium tuberculosis* isolates collected in BC since 1995.

These data will allow the team to identify transmission pathways within the province and will support the Provincial TB Strategy in developing new intervention and health promotion strategies.

The TB genomics team also collaborated on two Nature Genetics publications exploring the genetics of antimicrobial resistance in TB.

The genomics team also published several metagenomics studies, including an analysis of co-infections in severe versus mild H1N1 patients, and multiple reviews of the utility of metagenomics as a tool in public health.



Metagenomic sequencing of throat swabs from pandemic H1N1 influenza cases revealed the diverse microbial flora present in the respiratory tract of an individual with influenza virus

DO BUGS NEED DRUGS? AND ANTI-MICROBIAL RESISTANT PATHOGENS

The team conducted educational sessions for more than 2,500 physicians and 4,000 health care professionals and healthcare students.

With assistance from more than 1,000 medical students, nursing students and early childhood education undergrads, DBND provided school educational sessions for pre-school and elementary students across the province.

More than 12,000 hardcopies of the Bugs and Drugs book for healthcare professionals and students were distributed. The publication focuses on providing guidance for appropriate antibiotic prescribing. In addition the program made available more than 2,100 apps compatible for the iPhone.

New transit ads were created in collaboration with the Vancouver Film School, which emphasized that antibiotics don't work on cold and flu viruses. The ad campaign ran in the fall throughout the transit system (buses, Skytrain stations, and on Skytrain and Canada Line cars). Advertisements were placed throughout the Lower Mainland, as well as in Kelowna and Victoria.



Two new 15 second television ads were produced in collaboration with Vancouver Film School graduates. The ad campaign ran for six weeks beginning in January on most television networks within BC, including Knowledge Network (<http://www.dobugsneeddrugs.org/educational-resources/public-service-announcements/> - See Public Service Announcement #6 and #7).

Six new peer reviewed publications were published. The Antimicrobial Resistant Trends in the Province of British Columbia 2012 report was completed and posted on the BCCDC website: <http://www.bccdc.ca/prevention/AntibioticResistance/ReportsandPublications/default.htm>

The DBND Evaluation team implemented a “drug resistance index” which will simplify communications about the gravity of trends for antibiotic resistance.

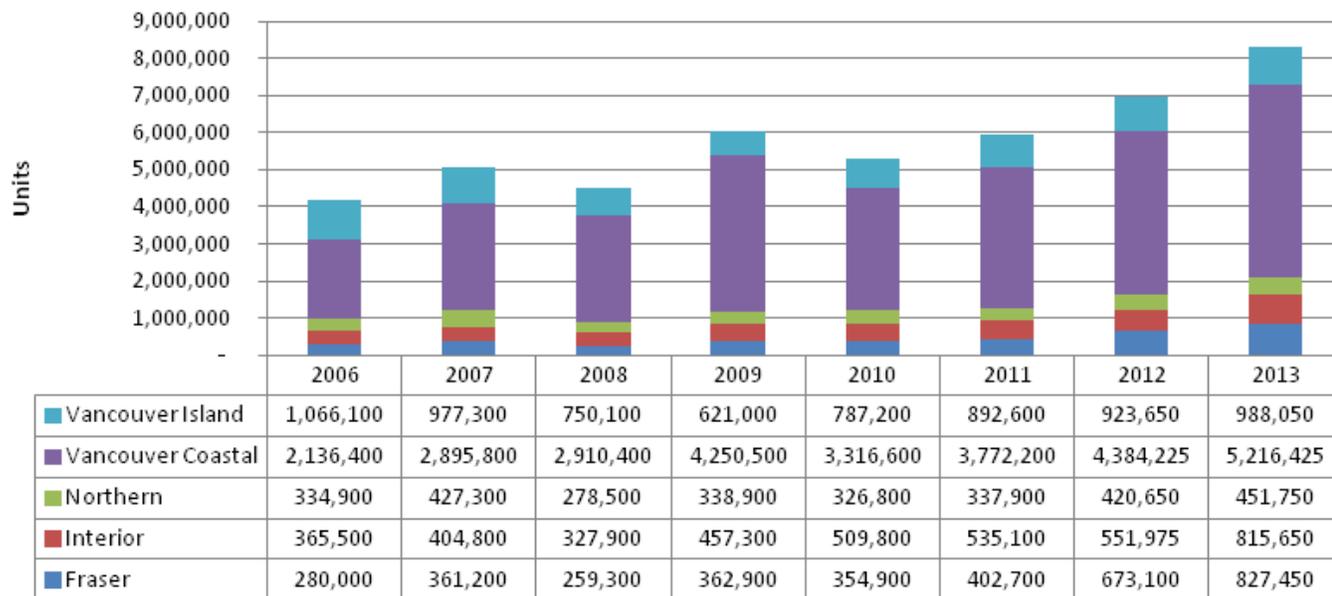
The team collaborated with various societies and NGOs with regard to a national movement toward eliminating the use of antibiotics as growth promoters in agriculture.

The team and colleagues completed a national review of surveillance for antibiotic resistance and antibiotic drug use which is helping to shape further steps the country takes to provide information for action in this field.

HARM REDUCTION AND BLOODBORNE PATHOGENS

In 2013, the program marked the highest level of distribution and uptake to date.

**Needle/Syringe Distribution by HA
(Jan - Dec by Calendar Years)**



In August 2012, the team launched the BC Take Home Naloxone program to reduce harms related to opioid overdose. The program trains people to prevent, recognize and respond to an opioid overdose, and provides naloxone kits for overdose response.

An overdose survival guide brochure and other training materials were developed, and can be accessed online at towardtheheart.com/naloxone.

At the end of 2013, 31 sites across BC were participating in the program, nearly 600 naloxone kits had been dispensed to clients, and over 50 overdoses had been reversed by naloxone kits.



BC Take Home Naloxone Program Sites

The team continues to maintain an online platform for the latest information on Harm Reduction for healthcare professionals (www.towardtheheart.com) allowing for centralized and timely information sharing. A supply catalogue is also available using this platform, making this a one stop resource.

To gain comprehensive data about the high-risk substance use and access to harm reduction services in BC, the harm reduction team conducted a pilot survey of harm reduction clients in BC in 2012. A number of regional differences were identified, and the survey tool was modified and expanded to other sites across BC in 2013.

Results from the survey have been shared with service providers and community agencies, and will be used to inform planning of harm reduction services to improve health outcomes in this marginalized population.

The Youth Injection Prevention (YIP) project was a collaborative multi-phase study led by the BC Harm Reduction team during 2012-2013. Partnering with street-involved youth co-researchers, the study team sought to identify resiliency factors associated with preventing street-involved youth from injecting drugs.

Phase 1 involved interviews with service providers who work with at-risk street-involved youth. In phase 2, one-on-one interviews and focus group interviews were conducted with at-risk street-involved youth aged 15-24 years of age. In phase 3, results from the previous phases were disseminated across BC through "Next Step Workshops" led by youth co-researchers supported by McCreary Centre Society.

Funding assistance for this project was provided by the Vancouver Foundation, UBC, BCCDC, CIHR and MSFHR. <http://www.bccdc.ca/prevention/HarmReduction/YIPProject/default.htm>

The BCCDC harm reduction team, in partnership with the Eastside Illicit Drinkers Group for Education (EIDGE), led focus groups about consumption of non-beverage alcohol and illicitly manufactured alcohol in

BC communities. A total of 114 people participated in 10 focus groups held in Fraser, Interior, Vancouver Island and Northern Health Authorities.

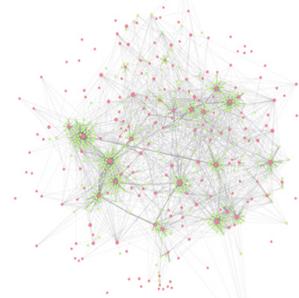
This research is an important step in learning about illicit alcohol use, harms and harm reduction methods. Our findings show immediate steps that can be taken to improve the health and well-being of people who consume illicit alcohol in BC by increasing low-barrier shelter beds and affordable housing units, and creating indoor spaces for people using illicit alcohol so they are able to look after one another. The results will also be used to advocate for harm reduction services such as managed alcohol programs.

MATHEMATICAL MODELING

The Division of Mathematical Modeling (DMM) uses analytical and computational tools to simulate the spread of diseases on a network. The DMM has made remarkable impacts on the international global health agenda in health systems.

In early 2013, the group was given the distinct honor of being designated as the WHO's first Collaborating Centre in Complexity Sciences for Health Systems. Through this platform the group has expanded its knowledge network to regularly collaborate with international experts and demonstrate the added value of incorporating complexity sciences for health decision-making support.

This figure is a typical outcome of a DMM-led multi-institutional study that focuses on understanding infectious disease spread in hospital settings. The network represents healthcare workers' (green nodes) visits to different locations within a hospital (red nodes).



Environmental Health Services (EHS) Overview

Environmental Health Services (EHS) is mandated to act as a resource to the Provincial Health Officer, the Ministry of Health, and BC's regional health authorities on matters related to environmental health policy, practice, and research. This is accomplished through a mix of activities that can be broadly organized into the following four areas: Policy Coordination and Support, Provision of Consultative Resources, Environmental Health Capacity Expansion through Research and Education, and Direct Service Provision.

POLICY SUPPORT & COORDINATION

EHS helps support and coordinate environmental health policy development primarily through the BC Environmental Health Policy Advisory Committee (BCEHPAC). Other Roles include:

- As the secretariat for the BCEHPAC, EHS helps to ensure an efficient, inclusive, and collaborative approach to the development of environmental health policy in British Columbia.
- EHS provides technical advice and expertise to the BCEHPAC, the Provincial Health Officer, the Ministry of Health, and other public sector partners in order to ensure that environmental health policy development is well supported by scientific evidence.
- EHS also works to develop practical surveillance instruments to better monitor the incidence and prevalence of health impacts related to environmental hazards in BC, as well as tools to assess the distribution and impact of environmental hazards needing remediation.

PROVISION OF CONSULTATIVE RESOURCES

EHS provides a number of unique consultative services to the PHO, Ministry of Health, regional health authorities, and other public sector partners including, but not limited to the following activities:

- Knowledge translation related to the management of unusual or complex situations involving risks to human health from environmental hazards;
- Hazard identification and risk-analysis and risk-assessment of key environmental hazards; and,
- Development of guidelines and advice related to diverse issues of environmental health significance.

ENVIRONMENTAL HEALTH CAPACITY EXPANSION THROUGH EDUCATION AND RESEARCH

There is limited scientific evidence to support Environmental Health policy, EHS leverages its strong relationships with academic partners to coordinate and conduct focused research to fill these knowledge gaps. EHS also focuses on developing educational tools to assist environmental health practitioners in the regional health authorities.

DIRECT SERVICE PROVISION

- Provision of drug and poison information services to health professionals and the public by the BC Drug and Poison Information Centre.
- Co-management of foodborne illness outbreaks with Communicable Disease Prevention and Control Services.
- Development and diffusion of BC-wide food recall strategies and dissemination of food recall notices.

- Revision of food safety plans for chain restaurants with headquarters outside of BC.
- Audit of BC Trans-Fat Regulation documentation for chain restaurants with headquarters outside of BC.
- Inspection and licensure of provincial dairy processing plants.
- Licensure of provincial dairy plant workers.

NATIONAL COLLABORATING CENTRE FOR ENVIRONMENTAL HEALTH

EHS also hosts the National Collaborating Centre for Environmental Health (NCCEH).

- The NCCEH is one of six centres created to foster linkages within the public health community.
- The centres are funded by the Public Health Agency of Canada through the National Collaborating Centres for Public Health program.
- The NCCEH's focus is environmental health, defined initially as services and programs currently delivered by regional and local health agencies in Canada.
- The NCCEH's function is to synthesize, translate, and exchange knowledge; and build capacity through networks of environmental practitioners, policy-makers, and researchers.

Environmental Health Services (EHS) Highlights

SURVEILLANCE ACTIVITIES

Extreme hot weather and excess mortality

During the summer of 2009 the Lower Mainland experienced a period of unprecedentedly hot weather that resulted in a 40% increase in mortality over one week. In the summer of 2011 Environmental Health Services established its ongoing integrated surveillance system that tracks temperatures, observed mortality, and predicted mortality in real-time to provide advanced warning of dangerously hot weather. If certain trigger conditions are met the BCCDC consults with Vancouver Coastal Health, Fraser Health, Environment Canada, and emergency responders to plan public health interventions, such as community outreach and establishment of cooling centres.

Forest fire smoke and its population health impacts

Forest fires cause some of the worst air quality that British Columbians will ever experience, and many studies show that smoke exacerbates asthma and other respiratory conditions. In the summer of 2012 Environmental Health Services established the ongoing BC Asthma Monitoring System (BCAMS) to help public health authorities understand daily smoke exposure and its effects across the province. Information about smoke is derived from the air quality monitoring network, satellites, and the BlueSky pollution forecasting model. Information about the health effects is derived from asthma-related pharmaceutical dispensations and physician visits. By combining these data in near-real-time we provide a timely tool to help medical health officers make effective public health decisions during forest fire season.

Lung cancer mortality in high radon areas

Radon gas is produced by the radioactive disintegration of naturally occurring uranium, and it can accumulate in buildings that are not designed to limit its entry from the soil below. Residential exposure to radon gas is the second leading cause of lung cancer in Canada, and it interacts with cigarettes to put smokers at even higher risk. In 2013 Environmental Health Services developed and applied new methods for ongoing annual surveillance of radon impacts in BC. The first analyses show that lung cancer mortality has been an increasing fraction of all natural mortality in high radon areas of the province from 1986-2012, especially for women. We expect this trend to plateau and reverse over the coming decade, as smoke rates decline and radon awareness improves.

POISON CENTRE CALLS RELATED TO PRESCRIBED, LEGAL, AND ILLICIT DRUGS

In 2011 the BC Drug and Poison Information Centre (DPIC) joined Environmental Health Services at the BCCDC, and transitioned from paper records to a digital database at the same time. These digital records provide a rich foundation for surveillance of poisonings in the province, and we have started to address specific questions now that two years of data are available. In 2013 DPIC partnered with the BCCDC Harm Reduction team to enhance their surveillance activities by producing weekly reports on poisonings due to alcohol, benzodiazepines, opiates, sedatives, stimulants, and hallucinogens in each regional health authority. This information is used to complement surveillance data from other sources, including reports from emergency departments and harm reduction centres.

RESEARCH ACTIVITIES

Errors in nighttime insulin dosing

Diabetics who inject insulin use different dosages during daytime and nighttime. A small dose of short-acting “bolus” insulin is used with meals and a large dose of long-acting “basal” insulin is used at bedtime. It is common, however, for the short-acting dose to be erroneously administered at bedtime, leaving the user with too much insulin for evening needs. The new digital Drug and Poison Information Centre (DPIC) database was used to study all calls related to insulin dosing from 2012-2013. Analyses showed that call volume was elevated during nighttime hours, with a peak at 03:00. This research provides evidence for improved communication with diabetic patients around nighttime insulin dosing, and highlights the value of the 24-hour services provided by DPIC and the BCCDC.

Evaluation of inflammatory bowel disease in Trail

A report from the small town of Northport in Washington State suggested that the population has a high prevalence of inflammatory bowel disease (IBD) and noted that the town is downriver from the metal smelter in Trail, BC. Based on this report Environmental Health Services requested information on hospital admissions, physician visits, and pharmaceutical dispensations related to IBD in Trail and in the comparable communities of Nelson and Williams Lake. Analyses showed that baseline rates of IBD were higher in Trail than in Nelson and Williams Lake from 2007-2011, but not nearly as high as those reported for Newport. Results have been presented to the community via town hall meetings, and more detailed research is ongoing.

Mapping forest fire smoke exposure for surveillance and epidemiology

Forest fire smoke often affects populations living in rural and remote communities that are not included in the BC regulatory air quality monitoring network. This makes it challenging to assess their exposure in real-time and to retrospectively study the public health effects of smoky air. To address this issue Environmental Health Services has developed a smoke mapping tool that statistically integrates air quality measurements, meteorological forecasts, and satellite observations of fires and smoke. Research done with these maps suggests that rural and remote populations are at higher risk than more urban populations during smoke episodes, possibly due to greater exposures and reduced access to care.

FOODSAFE project follow-up

FOODSAFE is a BC made, nationally recognized food safety training certification program for food handlers. Over time, however, food handlers forget what they’ve been taught. To determine if retraining would improve food safety knowledge we compared three groups of food handlers – workers who had been retrained in FOODSAFE, workers who had previously taken FOODSAFE training, and workers who had never taken FOODSAFE training. Food safety knowledge in the retrained intervention group (83%) improved significantly in comparison to the control group (74%), and both groups scored higher than food handlers with no training (52%). As a result of this study, provincial policy was changed, FOODSAFE recertification was introduced, and the nearly one million FOODSAFE certificates issued since the program began in 1986 will expire in five years on July 29, 2018. This paper was published in Food Control in Jan 2014. More information about these studies can be found on the BCCDEC website: <http://www.bccdc.ca/foodhealth/foodguidelines/FOODSAFE+Knowledge+Retention+Study.htm>.

Paralytic Shellfish Poisoning (PSP) and Mapping

Paralytic Shellfish Poisoning (PSP) occurs after eating toxin-containing bivalve shellfish. The toxins are produced by toxic marine dinoflagellates (a small algae) that are sometimes but not always associated with red tides. With the assistance of a UBC student, an analysis of Canadian Food Inspection Agency data was conducted to examine the occurrence of PSP-toxins (saxitoxins) in coastal BC waters from 2002 – 2012. This analysis showed that no area in BC is safe from “red tides”. As expected, dangerous levels of saxitoxin (over 80 µg/100g of shellfish meat) are more frequent during warmer summer months (May to October), but the levels of saxitoxin vary annually in the 26 geographically distinct harvest areas. We also reviewed all the available data on PSP and found more illnesses are occurring from commercially purchased shellfish and the number of incidents appears to be increasing. Between 2006 and 2012, 79% of all recalls in Canada occurred from shellfish harvested in BC.

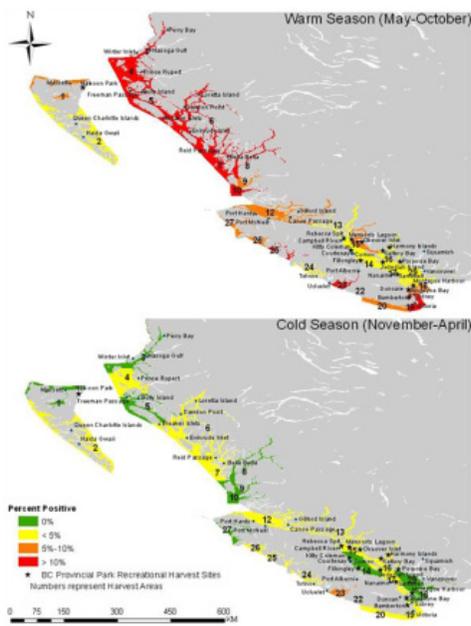


Figure: Seasonal Trends.

As expected, more harvest sites exceeded the regulatory limit of 80 µg/100g during warm months (May-Oct) than during cold months (Nov-Apr) 8.1% vs 2.4% of PSP-toxin from 2002 to 2012.

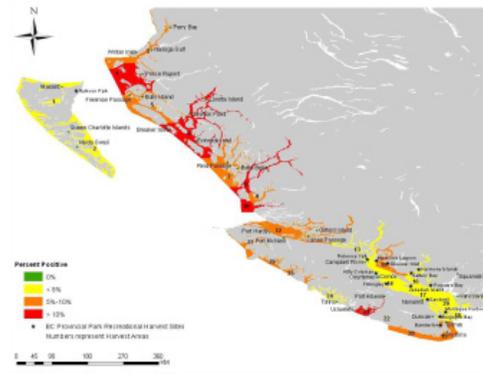


Figure: Geographic Hot-spots of PSP-toxin from 2002 to 2012 along BC’s coast.

From 2002 to 2012, 6.1% of shellfish samples (n=33,376) exceeded the regulatory guideline for saxitoxin >80µg/100g.

Raw Milk

Raw milk (unpasteurized milk) continues to be a controversial topic in Canada. While some advocates want access to raw milk products, they are currently not permitted for sale in Canada. EHS completed a review of illnesses attributed to raw milk in BC and found that between 1981 and 2009 there were 11 incidents of raw milk or unpasteurized products causing illnesses. The summary of these incidents can be found on the BCCDC website: http://www.bccdc.ca/NR/rdonlyres/823408EA-82DF-4310-8503-D782DAFB7E9D/0/TableofBCrawmilkevents_2013web.pdf. The organisms identified in the raw milk products causing illness included Campylobacter spp., Brucella, Salmonella Heidelberg and S. Berta, Toxoplasmosis, and E. coli O157:H7

POLICY AND CONSULTATION ACTIVITIES

Report to the Provincial Health Officer on radon reduction in BC

Following findings of increased lung cancer mortality in high radon areas of BC, the Provincial Health Officer (PHO) asked Environmental Health Services to make recommendations for a coordinated radon reduction program for the province. The report

recommends an approach combining updated building codes, more residential radon testing, and improved risk communication. It also highlights the potential for radon reduction programs to partner with smoking cessation programs in working to reduce the burden of lung cancer morbidity and mortality in the BC population. The full report will be available on the PHO website in 2014.

Diarrhetic Shellfish Symposium

Following BC's first documented diarrhetic shellfish poisoning (DSP) outbreak, EHS organized and hosted a symposium on November 27, 2012 to facilitate deeper understanding of DSP as an emergent issue. Invited speakers addressed a broad spectrum of topics: harmful algal blooms (HABs) and human health, government agency programs for risk assessment and regulation, phytoplankton monitoring and research of HABs, outbreak summaries from BC and Washington, in addition to ways in which we can improve and foster communication between stakeholders. Over 110 participants attended the symposium, and the proceedings and copies of all presentations can be found on the BCCDC website: http://www.bccdc.ca/foodhealth/fish/DSP_Symposium.htm Following the symposium, Environmental Health's Lorraine McIntyre and Catherine Elliott were guest editors for a special issue of the journal *Marine Drugs* based on papers resulting from the outbreak and presentations and research initiatives presented at the symposium: http://www.mdpi.com/journal/marinedrugs/special_issues/poisoning_symposium

Preparation of radiation protection training material for dental professionals

On request from the BC Dental Association (BCDA), EHS radiation specialists assisted BCDA with the development of radiation protection training materials intended for dental professionals who use dental cone beam computed tomography (CBCT), including technologists, dentists, and dental surgeons. The training materials include power point presentations and a video explaining the principles,

EHS

methods and strategies pertaining to the protection of X-ray operators and dental patients in dental cone beam CT (CBCT). The training materials complement the guidelines and radiation information on dental CBCT previously developed for BCDA for radiation protection and quality assurance purposes.

Radiofrequency Toolkit

At the request of BC medical and environmental health officers, experts in radiation, epidemiology, exposure assessments and cancer studies assessed health risks from radiofrequency (RF) devices. The RF Toolkit was a two year project involving numerous EHS and NCEEH staff for its development and completion. The purpose of the RF Toolkit is to inform health officers on issues of risks to health of the many devices and applications which emit radiofrequency (RF) waves. The Toolkit summarizes and assesses scientific research and health effects of RF and incorporates sections on medical and occupational uses of RF and how they inform risk to the general public and on measures to limit exposure.

EDUCATION AND STUDENT ACTIVITIES

NCCEH/BCCDC Risk-Based Inspection of Food Premises Online Course

In 2012, the NCCEH consulted with the Canadian Institute of Public Health Inspectors (CIPHI) and received their support to develop an online course that caters to the needs of public health inspectors. This was an opportunity to develop expertise and provide accessible continuing education to new and experienced public health inspectors across Canada. The first offering of the course was in April 2013.

The NCCEH/BCCDC Risk-Based Inspection of Food Premises Online Course offers a comprehensive approach to the inspection of food premises that is applicable across all provinces and territories. It focuses on the systematic identification, assessment, and control of risk factors that contribute to food-borne illness. The content of the course is based, in

part, on an in-person course that was developed by the BCCDC and the BC regional health authorities and includes components on prerequisite programs, risk analysis of premises and foods, food safety plans, inspection planning, communication with food premises operators, and assessment of food safety risks based on the principles of Hazard Analysis and Critical Control Points (HACCP).

As of March 2014, three terms have been delivered with over 100 participants from nine provinces/territories across Canada. A waitlist of interested participants, including public health inspectors, food safety specialists, supervisors, program managers, and practice consultants continues to grow. NCCEH/BCCDC continues to evaluate the delivery of the course and is currently in discussion with external partners to take on the delivery of this course.

Farmers' Market Student Projects

In collaboration with the BC Farmers' Market Association and Regional Health Authorities, EHS teamed up with two students from BCIT and UBC to conduct two projects in 2012-13. The first project was an observational study of farmers' markets that assessed whether vendors were in compliance with the Temporary Food Market Guidelines (<http://www.bccdc.ca/NR/rdonlyres/8084EEC3-3010-4908-876E-37BF359A939D/0/GuidelinesSaleofFoodsatTemporaryFoodMarketsApril2014.pdf>) to determine the need for market support systems for vendors and managers, and to assess their food safety knowledge. The second project was a follow-up study that assessed farmers' market managers and Environmental Health Officers' ability to recognize potentially hazardous foods and to identify food safety risk information in food applications received at farmers' markets. Both papers have been submitted to Food Protection Trends (in March 2014). The projects showed that improvements are required with temperature control and hand-washing compliance in farmers' markets, and that both managers and EHO's would benefit by receiving further training in identifying food safety risks in food applications.

Radiation Student Projects

In collaboration with BCIT, EHS partnered with two environmental health students to complete research projects on radiation related issues in 2013:

Assessment of exposure to Light Emissions from LCD computer monitors at BCIT

The first project investigated the exposure of computer users to light emissions from LCD viewing monitors and the suitability of ambient lighting in working spaces. Exposure levels from 30 computer LCD monitors installed in 3 laboratories at BCIT were measured and documented. The results of the study were used to suggest lighting adjustments for a healthier working environment.

Testing fish for radioactivity

The second project is related to the Fukushima Dai-ichi nuclear incident and its potential impact on the BC environment. The nuclear incident in Japan raised many concerns among the population in BC, particularly its impact on fish in the Pacific Ocean. The aim of this project was to perform a series of radioactivity tests on a variety of commonly consumed fish to determine if any radionuclides originating from Fukushima, essentially Cesium-134 and Cesium-137, were present in the fish. Ten different species of fish and three different species of shellfish purchased from local food stores were tested and analyzed by means of a portable gamma spectrometer. The results of this study revealed no presence of Fukushima radioactivity in the tested fish. While this study could ease the fears of the population to a certain extent, more surveys on fish but also on sea water and flora are recommended in the years to come to defuse any further concerns.

Immunization Programs and Vaccine Preventable Diseases Service (IPVPDS) Overview

BCCDC's Immunization Programs and Vaccine Preventable Diseases Service is responsible for end-to-end management of BC's immunization program and associated disease and program evaluation activities.

IMMUNIZATION PROGRAMS

The BCCDC Immunization Service works in partnership with the Ministry of Health, regional health authorities and health care providers across the province to ensure the health of people and communities are protected through immunization. The current BC immunization schedule is comprised of vaccines that protect against 16 infectious diseases: diphtheria, whooping cough, tetanus, polio, Haemophilus influenzae b, rotavirus, hepatitis A and B, human papillomavirus (HPV), meningococcal disease, pneumococcal disease, measles, mumps, rubella, chickenpox and influenza.

As new vaccines become available, the Immunization Service will review the factors important for decisions related to their introduction such as the burden of illness in BC that could be prevented by the vaccine, its safety profile, its cost effectiveness, and programmatic issues related to its introduction.

The four broad goals for the Immunize BC strategic framework are to:

- Increase vaccine uptake
- Ensure decisions about new vaccines are based on best available evidence
- Build sustainability into the program
- Improve system performance

New vaccines are added to the publicly funded immunization program or changes to the vaccine schedule are made based on recommendations by the BC Communicable Disease Policy Advisory Committee to the Ministry of Health. These in turn are based on scientific and operational

considerations developed by the BC Centre for Disease Control Immunization Program staff in conjunction with their key partners, including the BC Immunization Committee.

Surveillance Epidemiologists track the occurrence of vaccine preventable diseases, vaccine uptake, and vaccine safety throughout the province so that IPVPDS can assess how well our immunization programs are working.

VACCINE WAREHOUSE AND OPERATIONS

The warehouse secures supplies of needed vaccines and ensures timely distribution to health authorities. This service houses the pharmacy and vaccine warehouse and in 2013 distributed a total of 2.7 million doses of vaccines to every part of British Columbia. The BCCDC distributed a total of 1.4 million doses of influenza vaccine in 2013/4 and met unprecedented demands for additional influenza vaccine related to a heavy A/H1N1 influenza season. This was the largest number of influenza vaccine doses distributed in BC apart from the 2009/10 pandemic year!

The BCCDC pharmacy also provided medications for treatment of tuberculosis along with clinical review to avoid adverse drug interactions, and antibiotics for treatment of sexually transmitted infections.

Immunization Programs and Vaccine Preventable Diseases Service (IPVPDS) Highlights

PROGRAM CHANGES

There were three changes to the immunization program in British Columbia in 2013. A new nasal spray influenza vaccine (Flumist) was made available free for eligible children aged 2-17. A policy change to the school age HPV program saw the reintroduction of a third dose of the vaccine for grade nine girls. Lastly, the HPV vaccine program was expanded to young women aged 26 and younger, extending the protection against cancer of the cervix beyond girls and young women of school age. This one time program for young women is being delivered through a variety of health care providers in BC including health units, college/university student health services, youth and sexual health clinics, pharmacists certified to immunize, and physicians.

PANORAMA IMPLEMENTATION

In July, a new information system was introduced to replace an older system for both immunization record keeping and reporting of adverse events following immunization. The new system called Panorama includes an immunization forecaster to assist public health nurses in determining which vaccines a child needs, and supports reminder/recall to ensure on time immunization based on the individual's unique immunization history, their date of birth, and taking into account any reason why they should not be immunized.

NEW ONLINE COURSES

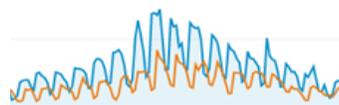
Two online education courses initially piloted for specific groups of immunizers were expanded for use by other health care providers in 2013. The InFLUenza course was first created for nursing students at Langara College to develop their knowledge and skills to safely and competently administer the influenza vaccine. Similarly, an

immunization communication module was initially developed for midwifery students to build capacity about communicating effectively with patients about immunization issues.

After a thorough evaluation, both courses were modified and are now available for other immunizers in BC such as nurses, physicians and pharmacists. Both courses are available off the BCCDC's learning education site at www.bccdclearning.ca.

IMMUNIZATION PROMOTION

Web Traffic



Web traffic on www.immunizebc.ca, which is maintained by the BCCDC, increased significantly in 2013. Throughout the year, 197,249 people visited the site, up 83% from the 2012. Similarly, page views were also up 64% to over 637,000 in 2013 with mobile and tablet access more than doubling to about one quarter of all traffic.

BC Flu Locator and new Online Ads for Influenza

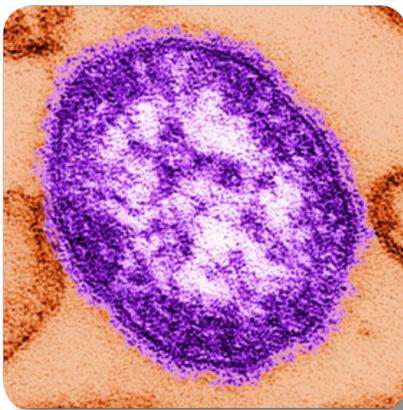


The team supported an easy to use Google map based clinic finder. Housed on ImmunizeBC.ca, the BC Flu Clinic Locator provided the public with a quick and easy way to find 1,500 public and private flu clinics throughout the province just using their postal code. The Flu Locator page was accessed over 130,000 times during the flu season making it the most accessed page on the ImmunizeBC website for the year.

A series of three new public 15 second advertisements were developed in time to highlight new aspects of the 2013-14 influenza season. The ads included information about flu vaccine for pregnant women and the new nasal spray immunization option for children.

OUTBREAK HIGHLIGHTS: MEASLES AND MUMPS

Measles



2013 saw an increase in imported measles cases from overseas, with a total of 17 confirmed cases related to importation from countries such as Thailand, the Philippines, and the Netherlands. This compares with only two measles cases in 2012. Of the 17 cases in 2013, the majority were unimmunized and five were hospitalized including three children and two adults.

The increased importations of measles in 2013 reflected the growing levels of measles activity in much of the world including Europe. Measles is the most infectious of all vaccine preventable diseases and can survive in small droplets in the air for several hours. For everyone to be safe from measles, 95% of people need to be protected – ideally by vaccination and not the disease!

Mumps

Mumps remains endemic in BC with a resurgence in the province since 2008 and ongoing activity including periodic outbreaks since that time. In 2013

IPVPDS

there were 60 confirmed cases in British Columbia with one person requiring hospitalization. In the ten years preceding, the number of cases ranged from 1-132 per year in BC. Incidents of mumps were spread out geographically throughout the province in 2013 with cases reported in every regional health authority. Of the six cases reported from children under 10 years of age, none had received any documented doses of MMR vaccine.

BC PHARMACISTS

The BCCDC supports the delivery of immunization services through pharmacists in this province as a new and accessible option for the public to be immunized. By the end of 2013 there were a total 2,788 pharmacists certified to administer vaccines at over 1,000 pharmacies throughout British Columbia. Influenza was the most utilized vaccine with BC pharmacists immunizing a total of 363,000 people during the 2013/4 flu vaccine campaign, but other vaccines are also available from these providers including pneumococcal 23-valent vaccine, since April 2012 the bivalent HPV vaccine for young women, and starting February 2013, tetanus-diphtheria boosters and measles mumps and rubella (MMR) vaccine, and under specific circumstances, several other vaccines as well.

KEY INDICATORS

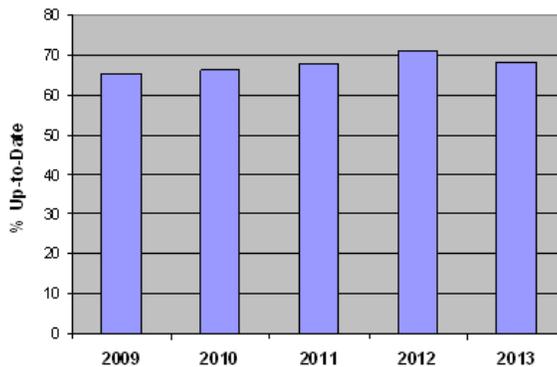
The proportion of children fully up to date for all routine immunizations by their 2nd birthday was 68% in 2013. When vaccines were considered individually, 76-86% of children turning 2 in 2013 were up to date for a particular vaccine.

In grade 6 age children, of the assessed vaccines, hepatitis B vaccine has the highest uptake at 90.2% in 2013, followed by meningococcal C (88.7%) and chickenpox vaccines (84.3%).

HPV vaccine uptake is increasing each year since the start of the program in the 2008/9 school year, but still has the lowest uptake of these vaccines, at 69.1% for 2 dose completion in grade 6 girls. Achieving

higher uptake of this vaccine with a goal to immunize at least 90% remains a high priority.

IMMUNIZATION COVERAGE RATES: UP-TO-DATE BY 2ND BIRTHDAY



The results shown in the above chart are based on analysis of data from the provincial immunization registries used in BC by four of the five health authorities. In Vancouver Coastal Health, records on infants and young children are not routinely collected. The analysis is based on completion of recommended vaccine doses scheduled at 2, 4, 6, 12 and 18 months of age to prevent 12 diseases by the 2nd birthday.

KEY EDUCATION AND PROMOTIONAL MATERIALS AND STRATEGIES

The BCCDC led a project that saw the creation of a new educational tool for immunizers. The Immunization Communications Tool (ICT) was developed in 2013 for an eventual launch in early 2014. The new tool was based on a very popular ICT that was first developed in 2008. The updated ICT is available on www.immunizebc.ca and hardcopies were distributed to immunizing physicians, public health nurses, pharmacists, nurse practitioners and midwives throughout BC.

The Immunization section of the Communicable Disease Control Manual is the provincial guidelines for all immunizers in the province. Key sections include the recommended immunization schedules

and recommendations for use of each vaccine available through the publicly funded programs. Seventeen updates to these guidelines were released during the year. The Immunization manual continues to be one of the most popular downloaded sections on the BCCDC site with the Immunizations Schedules section downloaded nearly 10,000 times during the year.

Supporting educational documents for health care professionals were developed and posted on www.immunizebc.ca and www.bccdc.ca.

In partnership with the BC Pediatric Society, a pilot initiative was undertaken to promote non-publicly funded vaccines for children. This included the development of a series of posters in various languages including Mandarin, Cantonese and Punjabi to be posted in health units and schools in Burnaby and New Westminster.

A text messaging immunization reminder application that was first introduced in 2012 was updated with new features for 2013. Designed for the public, anyone can use this handy tool to get immunization reminders delivered right to their mobile phone. The service has sent thousands of reminders to parents and others about their child's next immunization appointment.

New posters were printed and distributed to support the expansion of the HPV vaccine campaign for women under 26.

New brochures targeting parents of children under the age of two as well as kindergarten vaccinations were released.

The team was active in social media building an audience with daily postings to its two ImmunizeBC Facebook pages, Twitter feed and YouTube channel.

Public Health Emergency Management (PHEM) Overview

The Public Health Emergency Management (PHEM) service line works within BCCDC and with partner agencies to provide expertise, coordination and support in response to public health emergencies and the public health aspects of natural disasters and other emergencies in British Columbia. PHEM was established in 2007 in response to a memorandum of understanding (MOU) between BC's Provincial Health Officer (PHO), PHSA and the BCCDC. The MOU outlines specific expectations for the BCCDC in identifying, planning and responding to public health emergencies in BC in support of the PHO and regional health authorities.

MANDATE

PHEM contributes a public health perspective and provides expertise for joint emergency planning and delivery activities. To do this PHEM works closely with non-health partners, local and provincial governments, interdisciplinary councils and committees. PHEM:

- Participates in regional and provincial emergency management initiatives.
- Participates in multi-agency exercises to test plans and capabilities.
- Provides leadership and advice on initiatives relating to public health and emergency management.
- Undertakes necessary work to ensure the BCCDC is prepared to respond to public health emergencies and can sustain its operations to the highest possible level at all times.

Partners include:

- The Office of the Provincial Health Officer
- Ministry of Health
- Health Emergency Management BC
- Regional Health Authorities
- First Nations Health Authority

- Public Health Agency of Canada
- Health Canada
- Other provincial and federal partners

RECENT HIGHLIGHTS

- Provided leadership in the response to the nuclear incident in Fukushima Japan
- Provided leadership and expertise in the revision of the provincial pandemic influenza plan
- Completed and distributed a BCCDC emergency response plan
- Completed a BCCDC fire safety review and update with PHSA Labs and building management
- Oversaw BCCDC participation in ShakeOut BC, a province-wide earthquake drill
- Participated in provincial and multi-agency projects related to improving public health emergency management
- Completed revised evidence paper for core program in Public Health Emergency Management
- Developed PHEM priorities for research with Provincial Health Officer
- Lead in risk assessment and revision for BC radiological and nuclear response plan
- Revise chapters of BC Pandemic Plan
- Participated in Health Emergency Management Council, FNHA emergency preparedness committee, Medical Advisory Committee for the Mobile Medical Unit, World Health Organisation Virtual International Advisor Group on Mass Gatherings
- Provided support to PHO in response to H7N9/ MERS CoV; National Committees: Respiratory Infectious Disease Outbreak Coordinating Committee, Public Health Measures Task Group and Infection Prevent and Control Task Group
- Support to PHO on response to ICU surge in influenza during the 2013-14 influenza season

UBC Centre for Disease Control

As the academic arm of BCCDC, the UBC Centre for Disease Control (UBC CDC) conducts and coordinates research, education, knowledge translation, and policy development in support of provincial, national, and international programs for public health control and prevention. Programs span many areas of infectious and chronic disease, as well as environmental hazards. UBC CDC’s mandate is to advance health research, teaching, and public health policy by linking the academic and research expertise of UBC with the expertise and experience of public health professionals at BCCDC. As the provincial centre of excellence in research on the surveillance, control, and prevention of infectious diseases and other public health threats, the UBC CDC effectively links academia, governments, health organizations and the public in understanding and combating communicable, chronic and environment-related diseases.

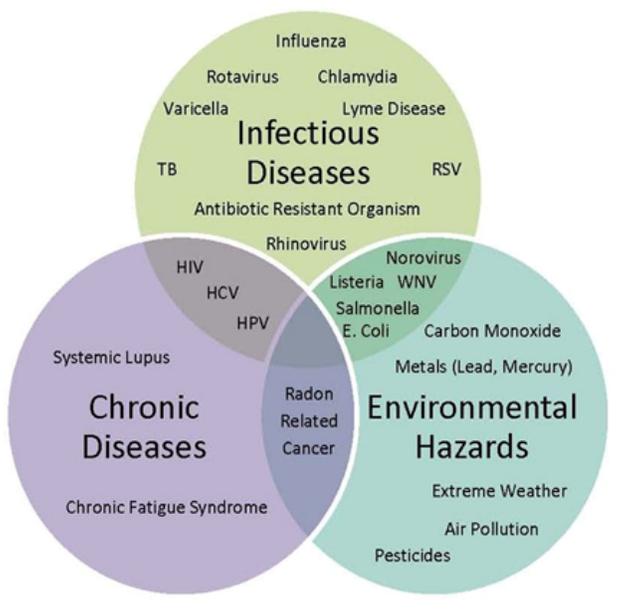
response to problems discovered through service roles, and continually leads to innovative changes in public health policies and practice. The Centre’s collaborative trans-disciplinary research programs span all service lines, linking together infectious diseases, chronic diseases and environmental hazards using a range of innovative technologies and methodologies such as genomics, mathematical modeling, and novel epidemiological and statistical tools.

GRAND ROUNDS

Grand Rounds is a high-profile bi-weekly forum highlighting leading-edge research given by faculty or invited lecturers, and is accredited by the College of Physicians and Surgeons of Canada as a Continuing Medical Education activity. Grand Rounds is webcast live and archived into on-demand audio-video packages made available for anyone to view on the BCCDC website. Grand Rounds presentations for 2013 can be viewed at <http://www.bccdc.ca/util/about/UBCCDC/GrandRounds/default.htm>

RESEARCH WEEK

Research Week highlights the Centre’s excellence in research, knowledge translation, and collaboration and remains one of the most important tools for creating a lively culture of research at BCCDC. The event features lunchtime professional development workshops, two two-hour symposium sessions, and a two-day poster display. This year’s theme was “Community is our Foundation”, and featured an opening internal keynote by Dr Babak Pourbohloul, an external closing keynote by Dr James Blanchard (Professor of Community Health Science at the University of Manitoba), and lunchtime workshop topics including Clarity in Writing, Work Hacks, and Stats 101. Archives of the event can be viewed at <http://phsa.mediasite.com/mediasite/Catalog/Full/294edd1b92844f6ea66ccb7275b1568021>.



The unique integrated structure of the BCCDC and the UBC CDC – one that combines service delivery, policy advice and research – contributes greatly to identifying and responding to emerging public health threats. Embedding research within service allows the formulation of key research questions in

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