

Immunization

in British Columbia, 2008



Table of Contents

- List of Acronyms2
- Executive Summary3
- A Word from the Ministry of Healthy Living and Sport.....4
- Introduction5
- Highlights from 2008.....6
- Rates of Vaccine-Preventable Diseases10
- Immunization Coverage.....11
- Priority Action #1: Immunization Promotion.....18**
 - Launch of ImmunizeBC18
 - “Two-Year-Old” Campaign.....18
 - Immunization Posters.....19
 - HPV Vaccination Campaign20
 - Influenza Campaign20
 - Health Region Promotion Initiatives21
- Priority Action #2: Improving Access23**
- Priority Action #3: Training and Quality.....25**
 - Forum on Immunizing in Schools25
 - Benefit Risk Communication25
 - HealthLink BC 8-1-126
 - Highlights from the Health Regions.....26
- Priority Action #4: Immunization Registry29**
- Priority #5: Vaccine Management30**
 - Expenditures30
 - Warehouse and Pharmacy Operations31
 - Realignment of School Immunization Schedules.....31
 - Vaccine Wastage.....32
 - Refrigerated Transport32
- Priority Action #6: Program Evaluation and Research33**
 - Three Dose Pneumococcal Conjugate Vaccine Program Evaluation33
 - Program Evaluation in the Northern Health Region34
 - Michael Smith Foundation for Health Research Funding.....35
 - Vaccine Evaluation Centre Update.....35
 - 8th Canadian Immunization Conference36
- Conclusion38**
- Appendices39**
 - Appendix A: 2008 BCISC Members39
 - Appendix B: BC Contributions to Research (2008).....40
 - Appendix C: Influenza Coverage Rates41
 - Appendix D: 8th Canadian Immunization Conference – BC Contributions44

List of Acronyms

ACF	Acute Care Facility
aNICS	Adult National Immunization Coverage Survey
BCCDC	British Columbia Centre for Disease Control
BCCH	BC Children’s Hospital
BCISC	British Columbia Immunization Sub-Committee, a subcommittee of the Communicable Disease Policy Advisory Committee, which advises the Ministry of Healthy Living and Sport on program/policy decisions
CD	Communicable Disease
CCHS	Canadian Community Health Survey
CHC	Child Health Clinic
CHN	Community Health Nurse
COPD	Chronic Obstructive Pulmonary Disease
DTaP-IPV-Hib	Diphtheria, Tetanus, Pertussis, Polio, <i>Haemophilus influenzae</i> type b
DTES	Downtown Eastside
FH	Fraser Health
FNIH	First Nations and Inuit Health
HCP	Healthcare Professional
HCW	Healthcare Worker
HPV	Human Papillomavirus
HSDA	Health Service Delivery Area
IH	Interior Health
IMPACT	Immunization Monitoring Program ACTive
IPD	Invasive Pneumococcal Disease
iPHIS	Integrated Public Health Information System
LTCF	Long-Term Care Facility
MHLS	Ministry of Healthy Living and Sport
MMR	Measles, Mumps, Rubella
MSP	Medical Services Plan
NACI	National Advisory Committee on Immunization, an expert committee reporting to the Public Health Agency of Canada, which publishes statements on use of vaccines
NH	Northern Health
PARIS	Primary Access Regional Information System
PHAC	Public Health Agency of Canada
PHSA	Provincial Health Services Authority
PHN	Public Health Nurse
RN	Registered Nurse
UBC	University of British Columbia
VCH	Vancouver Coastal Health
VEC	Vaccine Evaluation Centre
VIH	Vancouver Island Health
WHITE	Workplace Health Indicator Tracking and Evaluation

Executive Summary

British Columbia's immunization program strives to protect the public from illness, disability, and death associated with vaccine-preventable, communicable diseases. This report, a follow-up to the 2006-2007 report, is intended to update healthcare professionals (HCP) and consumers of BC's immunization program about coverage levels and progress in implementing the ImmunizeBC strategic plan.

Coverage rates in 2008 showed a general plateau in vaccine uptake. Only 66.5% of two-year-old children were completely up-to-date for all recommended vaccines and kindergarten-age vaccine coverage was 76.9% or above for all routine vaccines. In grade 6 and 9 students the coverage rates for all routine vaccines were at or above 85.9%. Uptake of the first dose of the new human papillomavirus (HPV) vaccine was 64.7% for grade 6 and 66.4% for grade 9 girls. Influenza immunization rates were 64.5% for people 65 years and older, and ranged from 33.2 – 52.1% for adults with chronic medical conditions, depending on the condition. Influenza immunization rates for staff of acute care facilities (ACF) as well as staff and residents of long-term care facilities (LTCF) were 41.6%, 63.5%, and 91.2% respectively.

Healthcare professionals across the province continued to work towards improving immunization access in BC and progress has been reported from each of the five health regions and from First Nations and Inuit Health (FNIH). Some notable quality improvement highlights included a travelling immunization communications workshop and an immunization orientation program for influenza. These and many more efforts help to ensure that BC remains a national leader in immunization.

In 2008, the immunization landscape in BC evolved with the launch of the school-based HPV vaccine program that was offered to grade 6 and 9 girls. As well, the ImmunizeBC website (www.immunizebc.ca) was launched and promotional efforts focused on parents of two-year-old children. The BC Immunization Subcommittee (BCISC) held a forum on the topic of immunization in schools, which drew over 160 attendees from across the province. The use of refrigerated transport for 80% of vaccine deliveries was one factor that led to a significant decrease in the wastage of vaccines from 6% in 2007 to 4.6% by the end of 2008. Immunization research is ongoing at the Vaccine Evaluation Centre (VEC) and a special competition held by the Michael Smith Foundation for Health Research supported three important immunization research projects. Immunization guidelines were continuously updated in 2008 based on current evidence. Two doses of mumps vaccine became recommended for all individuals born on or after January 1, 1970. The three-dose infant pneumococcal conjugate vaccine program was shown to be effective in reducing disease rates in BC.

The BC immunization program strives to be a model of continuous improvement and advancement and it is this ambition which has guided the creation of the 2008 annual report. This resource can help inform future strategies to ensure that all British Columbians benefit from the many vaccines that are now available.

A Word from the Ministry of Healthy Living and Sport

British Columbia has one of the most comprehensive immunization programs in Canada and strives to achieve and potentially exceed national targets in immunization coverage and service. In 2008, \$42 million was allocated within the BC Centre for Disease Control (BCCDC), an agency of the Provincial Health Services Authority (PHSA), for the purchase and distribution of vaccines, while health regions were allocated appropriate funds for increased staffing to deliver these immunization services across the province. Additionally, in 2008, the Communicable Disease and Addiction Prevention Branch of the Ministry of Healthy Living and Sport (MHLS) worked collaboratively with its immunization partners to introduce a new cancer-preventing HPV vaccine program for girls in grade 6 (ongoing) and to catch up girls in grade 9 for three years.

Building on and strengthening our successes is a priority for British Columbians. This is why the MHLS has invested in immunization research, evaluation, and promotion. Recognizing the key role that research plays in public health and immunization, the MHLS provided \$200,000 for research and evaluation through the Michael Smith Foundation for Health Research. One key to the effectiveness of immunization programs is achieving high rates of immunization coverage. In 2008, \$500,000 was provided for immunization promotion with a further \$100,000 invested specifically in influenza immunization promotion.

To increase the number of healthcare providers certified for immunization and to increase access to the competency process, \$90,000 was invested in 2008 in the development of an on-line immunization education course building upon the National Immunization Competencies for Health Professionals.

The MHLS will continue to work collaboratively with its partners to ensure all British Columbians benefit from immunization. Improvements will be made based on the best available evidence to ensure that the BC immunization program remains one of the finest in Canada.

Introduction

British Columbia's immunization partners work together to increase vaccine coverage levels, decrease program inefficiencies, and deliver a quality immunization program. Ongoing declines in the morbidity and mortality associated with vaccine-preventable, infectious diseases were observed in 2008.

The mission of the immunization program in British Columbia is to improve health by reducing illness, disability, and death associated with vaccine-preventable diseases.

Immunization remains one of the most successful and cost-effective public health interventions available and is a cornerstone of British Columbia's healthcare system. In the 2008/09 fiscal year, the cost of vaccines for fully immunizing an individual from infancy to adolescence was approximately \$830 for a girl and \$500 for a boy (only girls receive the new HPV vaccine) - equivalent to the cost of 22 and 13 hours of hospitalization, respectively (based on an \$814/hospital day ward rate¹).

This report is a follow-up to the 2006-2007 report, which was released in March of 2009 (available at: www.bccdc.ca). The purpose of *Immunization in British Columbia, 2008* is to update HCPs and consumers of BC's immunization program on the progress on implementation of ImmunizeBC, the strategic framework for immunization in British Columbia (available at: www.health.gov.bc.ca, filed under "Reports and Publications"). ImmunizeBC is a province-wide initiative which aims to increase the uptake of vaccines, ensure the immunization program is supported by strong evidence, promote quality across the system, and build capacity to ensure long-term sustainability. To achieve these goals, ImmunizeBC has outlined six priority actions. This report presents immunization-related highlights from 2008, reports the 2008 immunization coverage rates for the province, and describes progress on all six of the priority actions.

ImmunizeBC Priority Actions

- Promote the immunization program publicly and with healthcare professionals.
- Improve access to immunization services.
- Ensure an adequate supply of knowledgeable, trained service providers.
- Create an integrated immunization registry.
- Improve the vaccine inventory management system.
- Establish an immunization research agenda that includes the socio-cultural aspects of vaccine delivery and uptake.

¹Inter-provincial standard ward rate for a community hospital. Source: Health Information Support Division, Knowledge Management and Technology Division, Ministry of Health

Highlights from 2008

Human Papillomavirus (HPV) Vaccination in Schools

Perhaps the most significant change during 2008 was the rollout of the HPV vaccine to girls in grades 6 and 9. Following Health Canada approval in 2006 and the National Advisory Committee on Immunization (NACI) recommendation in 2007, HPV vaccine program options were reviewed by the BCISC and a recommendation made by the BC Communicable Disease Policy Committee in April 2007. This recommendation was supported by mathematical modelling of the impact of HPV immunization at different ages² in addition to an economic analysis³. Using BC's \$39 million (over three years) allocation of the \$300 million federal funding for this vaccine, HPV immunization started in September 2008. The vaccine has been shown in several large clinical trials to be extremely effective in preventing cancer of the cervix due to two common HPV strains. The vaccine is a regular part of the ongoing grade 6 school immunization programs. For grade 9 girls, the vaccine will be offered as a "catch-up" until June 2011.

Prior to the rollout of the HPV vaccine, effort was put into educating public health immunizers about the program. This included a "Train the Trainer" seminar held in April 2008 and regional training teleconferences. Information for health professionals was posted on www.immunizebc.ca and included both "questions and answers" and addressed common myths about the vaccine.

A 2007 study identified factors which influenced parents' decisions about HPV immunization in BC. Surveys of parents from BC and the Yukon Territory found that 62.8% of parents intended to vaccinate their daughters – the lowest regional rate across Canada⁴. In general, positive attitudes toward HPV vaccination were associated with factors such as a younger parental age, or the belief that someone they knew would develop cervical cancer⁴. Conversely, parents who had no intention to vaccinate their daughters tended to be older parents or those who had concerns regarding the effect of the HPV vaccine on sexual behaviour⁴. Based on these findings, BC's immunization planners decided that education about HPV should focus on its efficacy in preventing cervical cancer. Parents should be assured that sexual education and preventative measures such as HPV vaccine lead to later – not earlier – onset of sexual activity and promote safe sexual activity. Additionally, as recommendations from HCPs were identified as an important influence on parental intentions, ongoing efforts need to be made to ensure that HCPs receive sufficient support and education regarding the HPV vaccine.

² Günther OP, Ogilvie GS, Naus M, Young E, Patrick DM, Dobson S, *et al.* Protecting the next generation: what is the role of the duration of human papillomavirus vaccine-related immunity? *J Infect Dis.* 2008 Jun 15;197(12):1653-61.

³ Garnett GP, Kim JJ, French K, Goldie SJ. Chapter 21: Modelling the impact of HPV vaccines on cervical cancer and screening programmes. *Vaccine.* 2006 Aug 31;24 Suppl 3:S3/178-86.

⁴ Ogilvie GS, Remple VP, Marra F, McNeil SA, Naus M, Pielak KL, *et al.* Parental intention to have daughters receive the human papillomavirus vaccine. *Can Med Assoc J.* 2007;177(12): 1506-1512.

Changes to Immunization Guidelines

British Columbia's immunization program has provided publicly-funded vaccines for routine childhood immunization against diphtheria, pertussis, tetanus, polio, *Haemophilus influenzae* type b, measles, mumps, rubella, and hepatitis B for many years. Since the implementation of the National Immunization Strategy in 2003 (available at www.phac-aspc.gc.ca/publicat/nis-sni-03/index-eng.php), BC has been able to expand its program to include vaccines against invasive pneumococcal disease (IPD), meningococcal C disease, chickenpox, as well as pertussis-containing vaccine for adolescents. Program policy and routine vaccines continue to change. While the introduction of the HPV vaccine into the immunization schedule was a significant event, several other changes were seen in 2008 and are outlined in this section.

Mumps Outbreak

From February to September 2008, BC experienced an outbreak of mumps in the Fraser Valley. One hundred and eighty cases of mumps were reported. It is likely that many more cases occurred.

The outbreak clustered around a faith-based community and nearly half of the cases were in un-immunized individuals.

School-aged children were most affected by the outbreak and the majority of cases were in males. Complications were reported in approximately 16% of cases, including one case of mumps meningitis. Fortunately, no deaths occurred as a result of this outbreak.

Changes in Mumps Immunization Policy

In 2008, an outbreak of mumps originated in an un-immunized, religious community in the Fraser Valley. The disease spread to people in the community at large, including some individuals who had already been immunized with one dose of mumps vaccine. Fraser Health (FH) responded by holding immunization clinics for students at middle and secondary schools in Chilliwack, as well as at public health immunization clinics throughout FH communities. About 8,000 additional doses of vaccine were distributed. This outbreak demonstrated the need for a second dose of mumps vaccine for protection against mumps and resulted in changes to the provincial immunization schedule in BC. Media promotions were initiated in all Fraser communities highlighting the importance of immunization and the fact that mumps remains a threat to society.

Current recommendations for mumps vaccine are that all individuals born on or after January 1, 1970 receive 2 doses. One dose is recommended for all individuals born January 1, 1957 to December 31, 1969 who do not have evidence of immunity to mumps disease; those born prior to 1957 are historically more likely to have contracted a case of mumps in their lifetime and developed immunity. In general, people who had mumps and were diagnosed by a laboratory test are considered immune and do not need mumps vaccine. However, mumps vaccine in Canada is given as a combined vaccine with measles and rubella protection and can be given to protect against these other two diseases, even to mumps-immune people.

Mature Minor Consent

Informed consent is an essential pre-condition to providing immunization. In BC, there is no minimum legal age of consent for healthcare. While effort is made to seek parental or guardian consent prior to immunization, children under the age of 19 who are able to understand the risks and benefits may consent to or refuse immunizations, regardless of the parent's or guardian's wishes. It is recommended that parents/guardians and their minor children discuss immunizations beforehand, and ask the nurse or doctor any questions that may arise.

The principle of mature minor consent has become increasingly topical with the school-based rollout of HPV vaccine to girls in grades 6 and 9. Mature minor consent is supported by the British Columbia Infants Act and has a long history of support as a medically ethical principle.

Mature minor consent is crucial for avoiding missed immunization opportunities.

Injection Techniques

Aspiration (the practice of drawing back the plunger of the syringe prior to injection) before immunization was a common and long-standing practice by health professionals to avoid inadvertently injecting vaccines intravenously. Recent evidence indicates that this practice is unnecessary as there are no large blood vessels in the body sites used for injection. Aspiration may increase the time it takes to immunize and is more painful for the client. As well, new single-use safety syringes may not permit withdrawal of the plunger. Both national and BC immunization policy has changed such that aspirating before injection is no longer recommended.

First Nations Health

First Nations and Inuit Health is a branch of Health Canada that works with First Nations communities and organizations across Canada to improve the health of First Nations and Inuit people. In 2007, a First Nations Health Council was created in BC as a coordinating body to implement a 10 year Tripartite First Nations Health Plan (between the province of BC, the federal government and First Nations communities).

First Nations and Inuit Health follows the BC immunization guidelines and, in general, administers provincially-funded vaccines. In 2008, FNIH continued to actively participate on provincial immunization committees and working groups with the goal of increasing partnership and integration of immunization programming between the provincial health authorities and First Nations communities at the local level.

In 2006, FNIH began utilizing the Immunization Competency Program as per BCCDC immunization guidelines for all Registered Nurses (RNs) who work in public health and provide immunizations (for more information, see the Communicable Disease Control Manual, Immunization Chapter II, Section IA, available online at www.bccdc.ca). The Immunization

Presently, there are approximately 160 CHNs who provide public health services to 203 First Nations communities in BC.

Competency Program has been adopted as the standard to provide immunizations in all health authorities and in all First Nations communities in BC. Since December 2005, a number of Community Health Nurses (CHNs) have completed either the basic or the recertification Immunization Competency Program. The CHNs recertify every 3 years. Using the same certification program and setting the same standard of practice has facilitated the movement of CHNs between First Nations communities and public health units within local health authorities.

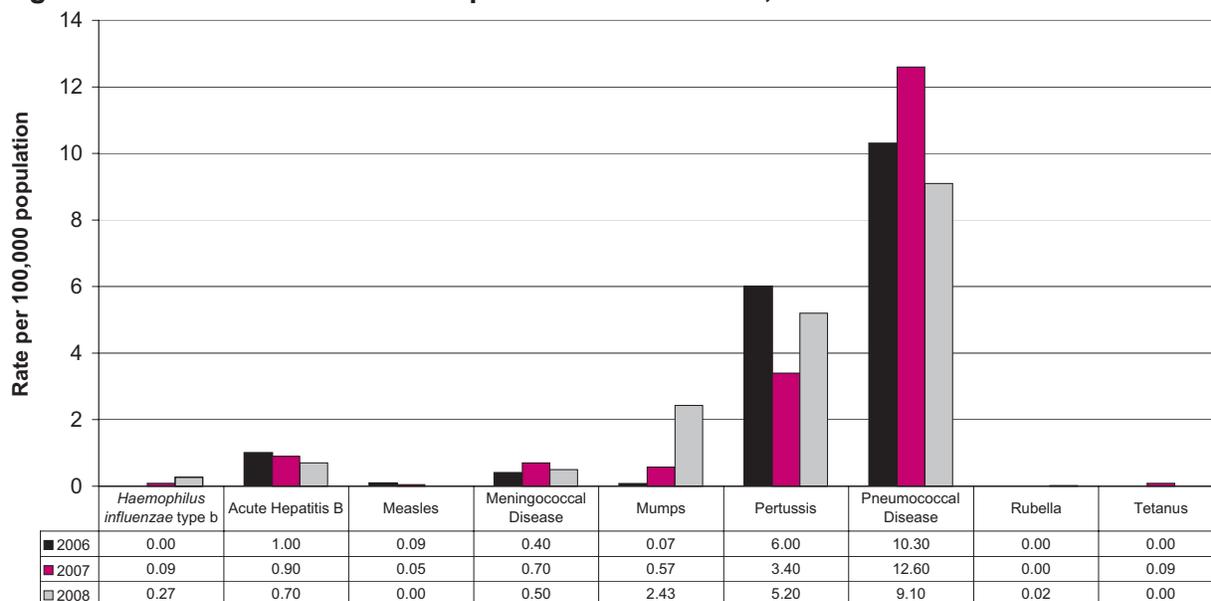
Rates of Vaccine-Preventable Diseases

As part of BC’s immunization program evaluation process, the rates of 10 reportable, vaccine-preventable diseases are annually assessed and monitored for trends. This section briefly describes the cases reported for these diseases in 2008. An in-depth presentation of data on influenza and other disease rates can be found in the *BC Annual Summary of Reportable Diseases*, available at www.bccdc.ca under Annual Reports.

Figure 1 illustrates the annual rates for *Haemophilus influenzae* type b, hepatitis B, measles, meningococcal disease, mumps, pertussis, pneumococcal disease, rubella, and tetanus in BC. In 2008, the highest number of *Haemophilus influenzae* type b cases in over a decade was reported. Increases were also seen in mumps and pertussis rates with the majority of the former attributable to the Fraser Valley outbreak and the latter continuing a historically-demonstrated trend of cyclical peaks in pertussis cases. In contrast, hepatitis B cases have been below the national rate since 2002 and continued to decline this year. Pneumococcal disease rates have declined since 2007, as have those for meningococcal disease. No cases of either tetanus or measles were reported. Trends for seasonal influenza are presented in the *BC Annual Summary of Reportable Diseases* and in greater detail than other diseases in order to compare the year-round timing and levels of flu activity with previous seasons. Compared to preceding years, the 2008/09 influenza season was milder with a later peak in activity.

Despite low or declining rates overall, the occurrence of outbreaks and ongoing detection of new cases every year indicate there is room for improvement.

Figure 1. Annual rates of vaccine-preventable diseases, BC



DATA SOURCE: 2008 *BC Annual Summary of Reportable Diseases*

NOTES:

- Reported meningococcal disease rates include all pathogenic serotypes: A, B, C, Y and W135. The BC routine immunization schedule currently only includes a vaccine against serotype C.

Immunization Coverage

Coverage rates are important measures of the success of immunization programs, serving as indicators of the level of population-wide protection against vaccine-preventable diseases. These rates may also indicate the completeness of records in the immunization registry and public awareness of the health benefits of immunization.

If vaccine coverage rates fall, the potential exists for a disease to rapidly spread in the under-immunized or un-immunized population.

Provincial advisory groups continually review and refine BC's immunization coverage surveillance methods. In BC, coverage rates are calculated for children at their second birthday and at select milestones in school-based programs using source records from the immunization registries and/or those that are paper-based, aggregated from health regions. Two registries are used: the integrated Public Health Information System (iPHIS) and the Primary Access Regional Information System (PARIS); the latter is used in Vancouver and Richmond.

For adults, coverage rates are monitored for influenza vaccination among healthcare workers (HCW) in ACF and LTCF, and residents in LTCF. The Workplace Health Indicator Tracking and Evaluation (WHITE) database, housed at Occupational Health & Safety Agency for Healthcare in British Columbia and populated by regional occupational health programs, houses data for this purpose. As a web-based system, it can be used to record and track the immunization status of healthcare workers.

Data for residents of BC are also available from the Canadian Community Health Survey (CCHS), a periodic, national telephone survey by Statistics Canada that provides data on influenza immunization coverage among community-based seniors and people aged 12-64 with chronic medical conditions. Similarly, the biennial adult National Immunization Coverage Survey (aNICS) is a telephone survey conducted by the Public Health Agency of Canada (PHAC) which provides adult coverage information; vaccines assessed vary and new vaccines can be added for review. Provincial and regional coverage rates are accessible at www.bccdc.ca under "Immunization Coverage" within the Immunization & Vaccines section.

2008 Coverage Summary

Table 1. Summary of the immunization coverage rates in 2008, BC

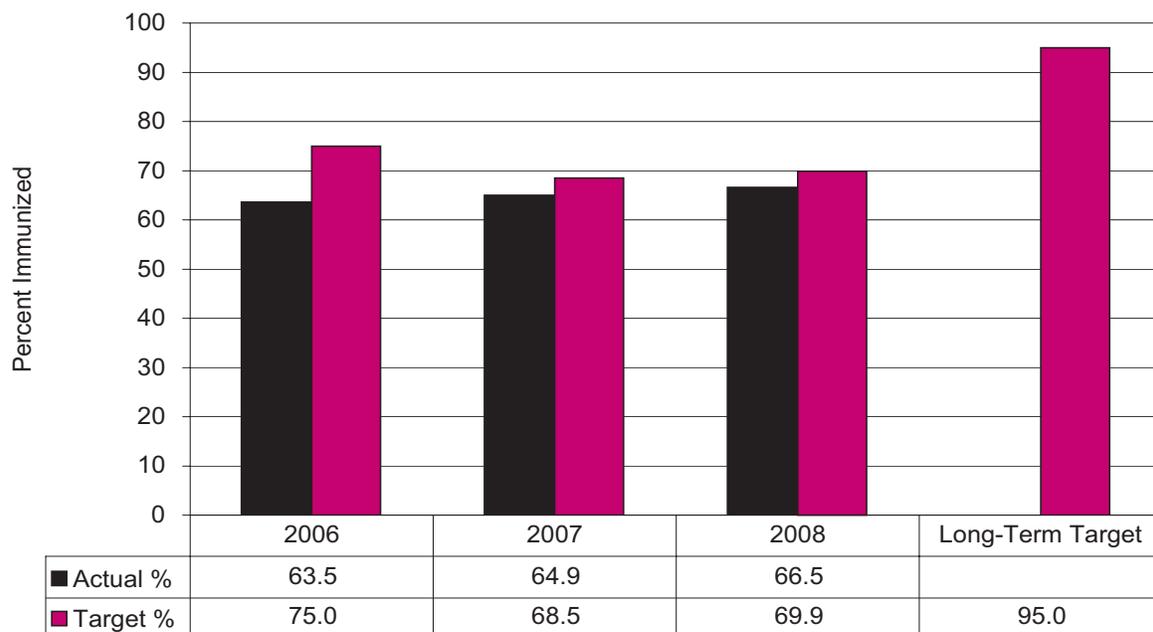
Target Group	Vaccine(s)	Coverage Rate (%)	Target (%)*	Data Source
2nd birthday	Fully up-to-date (DTaP-IPV-Hib, Hepatitis B, Measles, Mumps, Rubella, Meningococcal C, Pneumococcal, Varicella)	66.5	95.0	iPHIS
Kindergarten	DTaP-IPV	79.5	95.0	iPHIS/PARIS/aggregate reports from health regions
	Measles	87.1		
	Mumps/Rubella	92.0		
	Varicella	76.9		
	Hepatitis B	86.9		
Grade 6	Hepatitis B	87.4	95.0	iPHIS/PARIS/aggregate reports from health regions
	Meningococcal C	91.0		
	Varicella	89.1		
	HPV (1 dose)	64.7	N/A	iPHIS/PARIS/aggregate reports from health regions
Grade 9	Tetanus/Diphtheria	88.0	95.0	iPHIS/PARIS/aggregate reports from health regions
	Pertussis	85.9		
	HPV (1 dose)	66.4	N/A	iPHIS/PARIS/aggregate reports from health regions
Adults 18-64 with chronic condition	Influenza (12-64)	38.7	N/A	2007 CCHS
	Influenza	45.6	80.0	2006 aNICS
	Pneumococcal	16.8	80.0	
	Hepatitis A	26.2	N/A	
	Hepatitis B	31.7		
	Tetanus	47.6		
	Pertussis	2.6		
	Varicella	11.7		
Adults ≥65, community-dwelling	Influenza (2007)	64.5	80.0	2007 CCHS
	Influenza (2006)	68.5	80.0	2006 aNICS
	Pneumococcal 23	40.9	80.0	
	Hepatitis A	10.9	N/A	
	Hepatitis B	9.1		
	Tetanus	24.4		
	Pertussis	3.0		
ACF Staff	Influenza	41.6	60.0	WHITE/aggregate reports from health regions
LTCF Staff	Influenza	63.5	80.0	WHITE/aggregate reports from health regions
LTCF Residents	Influenza	91.2	≥90.0	WHITE/aggregate reports from health regions

*Target rates represented are either formally or informally defined targets.

Coverage in Two-Year-Olds

In 2008, 66.5% of two-year-old children were completely up-to-date on their recommended vaccination schedules based on iPHIS data (Figure 2). Conversely, over one third of children in BC were not fully protected from serious, infectious diseases by their second birthday. Since 2006, a slow upward trend in coverage has been observed, moving the province towards its short- and long-term immunization targets. The long-term target coverage rate is 95% and interim targets have been set at 5% increases over the previous year.

Figure 2. Immunization coverage rates: up-to-date by two years of age, BC



DATA SOURCE: integrated Public Health Information System

NOTES:

- These bars depict the percentage of two-year-olds who have had all their recommended vaccines by the time they reached their second birthday. Thus, the 2008 data report the coverage rates for two-year-olds born in 2006.
- “Up-to-date” is defined as: 4 valid doses DTaP-IPV-Hib, 3 doses hepatitis B, 2 doses MMR, 2 doses meningococcal C, 3 doses pneumococcal, and 1 dose varicella vaccines.
- Data do not include the majority of Vancouver Coastal Health (VCH) toddlers. An immunization survey conducted in VCH in 2005 showed 70.3% of VCH children were up-to-date.

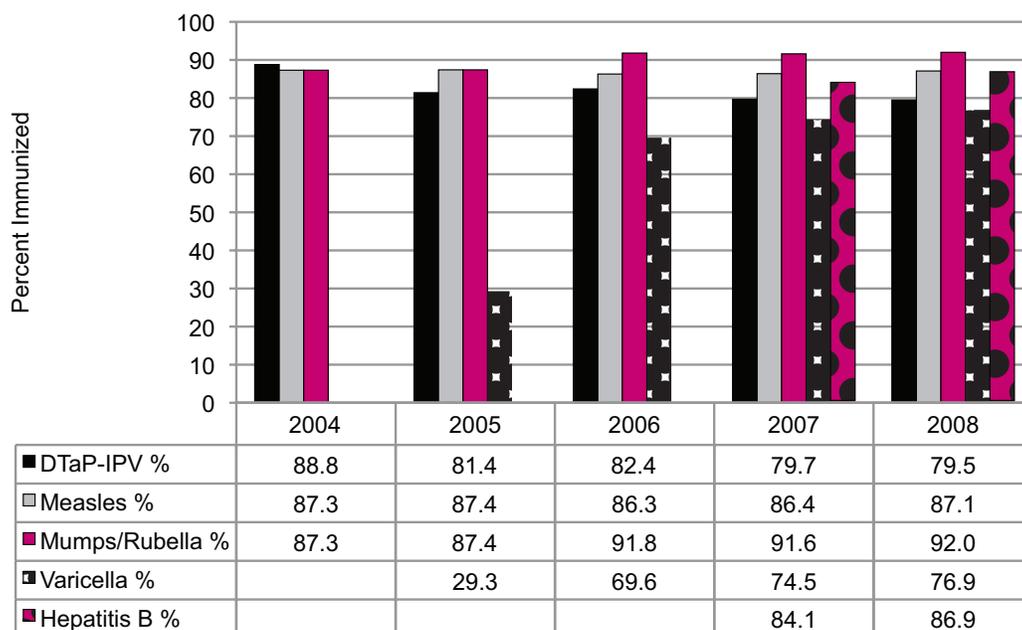
Coverage in School-Aged Children

Immunization coverage rates of children in kindergarten, grade 6 and grade 9 are shown in Figures 3-5. Coverage statistics are gathered as of June 30th every year and reported by BCCDC in early fall. Immunization coverage rates reported in 2008 are a reflection of the 2007/08 school year. In contrast to other coverage rates, no long-term targets have been formally identified for school-aged children. However, BC continues to strive toward achieving the highest coverage possible.

Kindergarten provides an opportunity to readily assess the immunization status of the population due to compulsory school enrolment. British Columbia coverage data include children enrolled in public and private schools, as well as those who are home-schooled.

Immunization rates in kindergarten are higher than rates at 2 years of age as children have had more opportunity to receive recommended vaccines. The one exception is DTaP-IPV which is given in 5 doses beginning at 2 months of age, with a 5th dose at 4-6 years. DTaP-IPV coverage rates have declined by almost 3% since 2006. The 4th or 5th dose must be offered after the fourth birthday for the child to be considered up-to-date at kindergarten.

Figure 3. Immunization coverage rates: school-based (kindergarten), BC



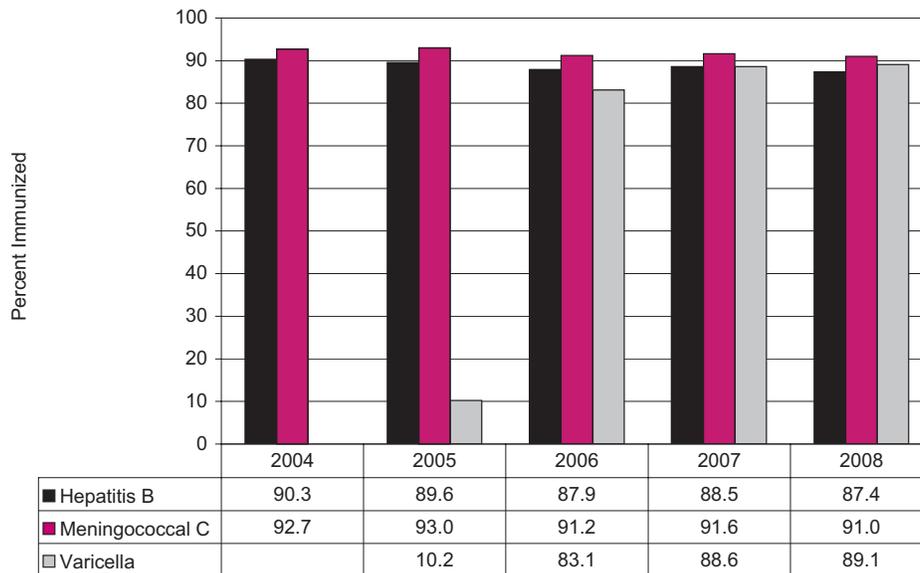
DATA SOURCE: integrated Public Health Information System, Primary Access Regional Information System, aggregate reports from health regions

NOTES:

- In 2005, the definition of up-to-date for age for DTaP-IPV was changed to specify that the fourth or fifth dose of DTaP-IPV vaccine must have been received after the fourth birthday to be counted as up-to-date for age. This revision resulted in a drop in the proportion of children up-to-date for age for DTaP-IPV in 2005.
- In 2006, the definition of up-to-date for age for mumps/rubella was changed to requiring only 1 dose. In prior years, two doses of mumps/rubella were deemed up-to-date. This accounts for the increase in mumps/rubella immunization rates in 2006, 2007 and 2008.
- Children are considered up-to-date for varicella if they received 1 dose of varicella vaccine after their 1st birthday, or are known to have had chickenpox or shingles in the past. Children protected by previous disease were not included in the 2005 definition of up-to-date for varicella but were in subsequent years; as a result, the proportion of children up-to-date increased.

As shown in Figure 4, hepatitis B and meningococcal C vaccine uptake rates for grade 6 remained high and steady. Chickenpox vaccine uptake also remained high and, from 2005 onward, includes children with a prior history of chickenpox.

Figure 4. Immunization coverage rates: school-based (grade 6), BC



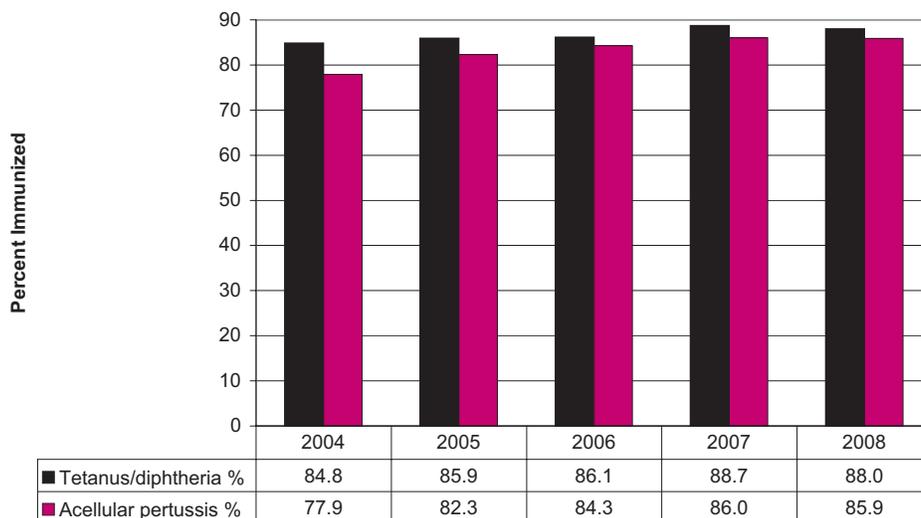
DATA SOURCE: integrated Public Health Information System, Primary Access Regional Information System, aggregate reports from health regions

NOTES:

- Children are considered up-to-date for varicella if they received 1 dose of varicella vaccine after their 1st birthday, or are known to have had chickenpox or shingles in the past. Children protected by previous disease were not included in the 2005 definition of up-to-date for varicella but were in subsequent years; as a result, the proportion of children up-to-date increased.

As shown in Figure 5, grade 9 coverage rates have hit a plateau.

Figure 5. Immunization coverage rates: school-based (grade 9), BC



DATA SOURCE: integrated Public Health Information System, Primary Access Regional Information System, aggregate reports from health regions

NOTES:

- 14 out of 16 health service delivery areas (HSDA) measure coverage for diphtheria, tetanus and pertussis as the proportion of students who received a dose in grade 9. Two HSDAs count students as immunized if they have a completed primary series, plus the grade 9 booster. Despite these differences, and assuming consistency in reporting practices, overall trends in immunization coverage can be assessed by examining these data.

The new HPV vaccine program in BC started in September 2008. Overall, 14,378 grade 6 girls (64.7%) and 16,537 grade 9 girls (66.4%) were immunized with a first dose in 2008 (Figure 6). Series completion data will be reported in 2009 following the end of the 2008/09 school year.

Figure 6. Immunization coverage rates: 1st dose HPV vaccine (grade 6, 9 girls - 2008), BC



DATA SOURCE: integrated Public Health Information System, Primary Access Regional Information System, aggregate reports from health regions

Coverage in Adults

Influenza Coverage

The CCHS is utilized in conjunction with reports from health regions to provide information about self-reported receipt of influenza vaccine in the most recent season. This survey is conducted by Statistics Canada every two years using telephone surveys of representative samples of Canadians.

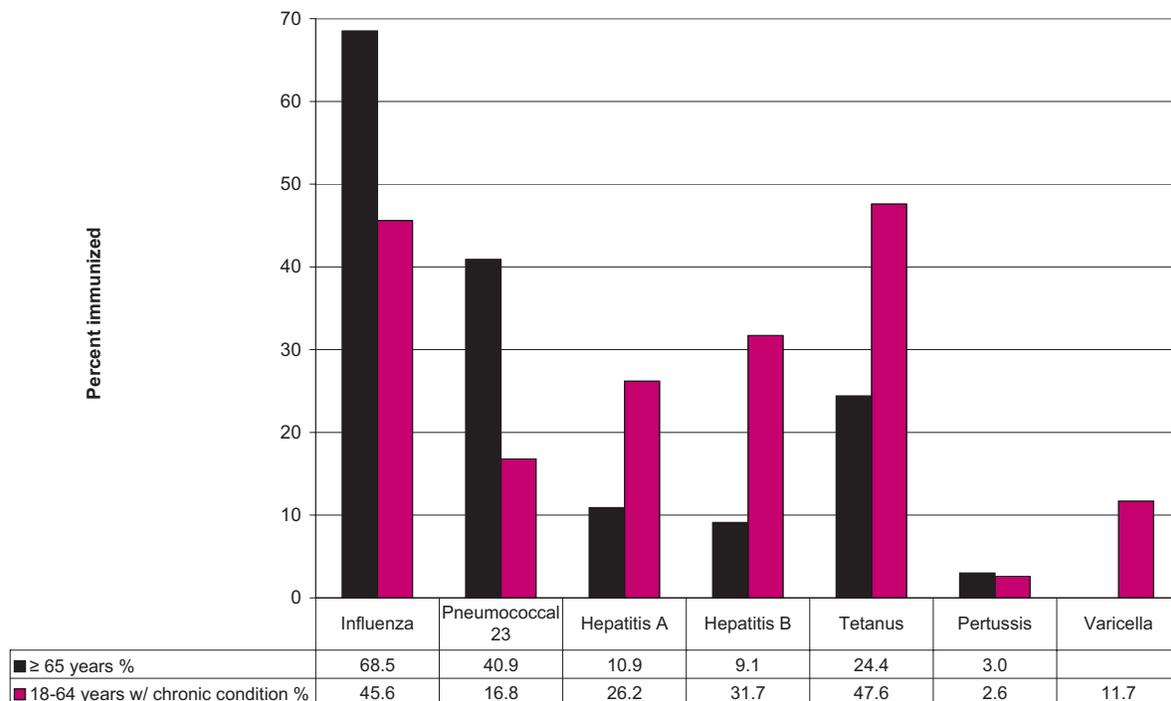
Coverage rates based on CCHS data demonstrated a decrease in 2007 for community-dwelling seniors and in all health regions compared to 2005 (Figure 11, Appendix C). The reduction ranged from 3.3% to 9.8%, varying by region. In BC adults under the age of 65 living with a chronic health condition, the coverage rates also decreased from 2005 to 2007 with reductions ranging from 1.9% to 15.6% in all cohorts excluding people with cancer which had an 11.2% increase in coverage (Figure 12, Appendix C). Approximately 40% of the BC population in this age group with any chronic condition self-reported vaccination against influenza in 2007. Populations with diabetes had the highest coverage at 52.1%; those with other conditions had coverage rates of 30% or more with the lowest rates among those with asthma (33.2%).

In addition to high risk groups, coverage is also assessed for HCWs who are in contact with these populations. Overall, influenza immunization coverage rates within healthcare facilities (staff and residents inclusive) in 2008 declined in comparison to 2007 rates. Rates fell to 63.5%, 41.6% and 91.2% for LTCF staff, ACF staff and LTCF residents, respectively, falling short of or maintaining the target rates of 80%, 60% and 90%. Detailed results of these surveys can be found in Appendix C (Figures 13-15).

Coverage for Other Vaccine-Preventable Diseases

The aNICS is conducted every two years using telephone surveys of a representative sample of Canadians. In order to obtain BC-specific coverage estimates, BC purchased an over-sample of respondents in the 2006 aNICS. Figure 7 illustrates these self-reported immunization coverage rates for seven vaccine-preventable diseases in two high risk groups – adults aged 65 years or over and those aged 18 to 64 living with a chronic condition.

Figure 7. Immunization coverage rates: high risk groups (seniors ≥65 years of age and adults aged 18-64 with a chronic condition, 2006), BC



DATA SOURCE: adult National Immunization Coverage Survey (Public Health Agency of Canada, 2006)

NOTES:

- Pneumococcal 23: The chronic condition group does not include individuals with asthma as their only chronic condition for pneumococcal vaccine coverage.
- Varicella: This proportion is comprised of the adults who obtained immunity from the vaccine and does not include the significant proportion of those who would have developed natural immunity from acquired disease.

Future projects aim to integrate the various sources of immunization coverage results into one comprehensive registry. Overall trends in adult immunization uptake can be informed by examining these data. Results from the CCHS and aNICS surveys conducted in 2008 will be analyzed and reported upon in the next few years.

Priority Action #1: Immunization Promotion

Ensuring access to reliable and current information on immunization is a cornerstone of effective promotion not only for the clients of an immunization program, but also the HCPs who have roles as immunizers and influencers. Several initiatives in 2008 sought to bring information about vaccines to audiences all over the province. From the launch of the new ImmunizeBC website to poster campaigns, the approaches used were both diverse and extensive.

Launch of ImmunizeBC

The ImmunizeBC website (www.immunizebc.ca) was launched in 2008 to promote the immunization program publicly and with HCPs. Key stakeholders from across the province advised on content for the website. The site provides comprehensive information for immunization consumers about each disease and vaccine, why immunization is important, vaccine schedules, and links to other reputable sources of information. For HCPs, information is provided regarding new vaccines and immunization policy (including links to product monographs), as are links to other sources of information, including the Immunization Report in BC, 2006-2007. In 2008, www.immunizebc.ca had an average of about 7,000 visitors per month.



The “Two-Year-Old” Campaign featured on the ImmunizeBC website (www.immunizebc.ca) emphasized that keeping a child safe involves protection against visible and “invisible” dangers like viruses and other pathogens.

“Two-Year-Old” Campaign

In 2008 a campaign to promote immunization in young children was launched, targeting the parents of children less than two years of age. Brochures, posters and videos were developed to promote the theme of protecting children from the unseen dangers of communicable disease by

encouraging parents to fully immunize their children on time. Advertisements for this campaign were also placed in newspapers and magazines and run on radio and television stations. This campaign was used to brand immunizebc.ca as a source of credible, immunization-related information and all advertisements encouraged the public to use the website. The public was also encouraged to contact a public health nurse (PHN) or their doctor to get more information.

Part of the promotion campaign involved an online component utilizing a search engine ad campaign encouraging British Columbians to visit the ImmunizeBC website. Known as a “paid search” campaign, ImmunizeBC purchased search terms from Google, (e.g. “immunization”), that would allow ImmunizeBC advertisements to appear when users searched these terms. When a user clicked on the link it would take them to www.immunizebc.ca. Visitors who were directed to the site through this link were also tracked along a number of parameters such as how long they stayed on the site, what pages they visited, what documents they downloaded etc. as a means of understanding how the site could better suit the needs of the consumer.

The success of the “two-year-old” campaign was evaluated in a number of ways including review of website visitor comments, web analytics (specifically the number of site visits), a parental survey measuring awareness, attitudes and beliefs, and impact on immunization rates in young children. Traffic to the ImmunizeBC website more than doubled following the Google ad campaign. The parental survey conducted before and after the campaign revealed not only a significant increase in parents’ awareness and knowledge related to immunization, but also a significant increase in their overall support for immunization after the campaign. In terms of overall health behaviour, during the first quarter of 2008 when the campaign ran, there was a 10% increase in the number of shots given of several vaccines when compared to the previous two years. For the entire year, the coverage rate for children completely up-to-date by two years of age increased from 64.9% in 2007 to 66.5% in 2008; coverage for children almost up-to-date (excluding the 18 month booster) in this age group increased by 6.2% over the same time period. These increases may be, in part, attributable to this campaign.

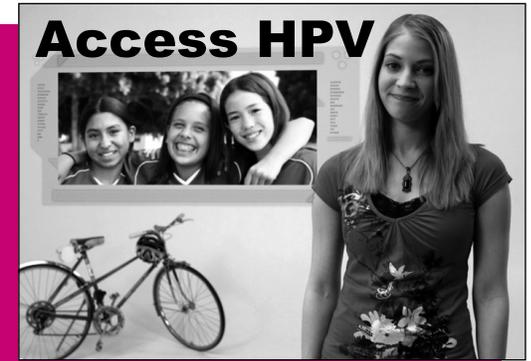


Immunization Posters

With the support of VCH, general immunization posters and stand up displays were created and distributed throughout the province to physicians and public health offices. As an example, one wall poster was entitled “Immunization Protects Against Serious Disease” and emphasized the seriousness of the various vaccine-preventable diseases using diagrams that illustrated the health complications associated with each.

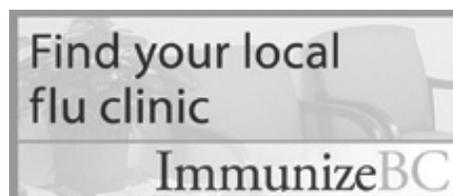
HPV Vaccination Campaign

The campaign to promote uptake of the HPV vaccine was educational in nature and targeted public health staff, students, and parents. A series of HPV videos on DVD was produced and distributed to schools and public libraries throughout BC. The promotional video “Access: HPV” targets girls in grades 6 and 9 and provides clear and factual information about HPV, cervical cancer and vaccination. Targeted at the parents of children who would be getting vaccinated, “10 HPV Vaccines Myths” with Associate Director of STI/HIV at BCCDC, Dr. Gina Ogilvie, dealt with evidence-based information related to debunking the most common myths related to HPV. Other videos made available online included “Carmen’s Story”, one woman’s experience with HPV and treatment of pre-cancerous cervical abnormalities as well as “Summer’s Story”, a young man’s account of his wife’s diagnosis, treatment and eventual death as a result of cervical cancer. These resources can be found at www.immunizebc.ca under “hpv (human papillomavirus)” within the “Diseases and Vaccinations” section of the site.



Influenza Campaign

In 2008, the annual fall influenza immunization promotion program consisted of radio advertisements aired at the start of the influenza season on stations throughout the province. A series of posters was created for both the public and healthcare workers in addition to a new version targeting First Nations people. An online flu clinic locator allowed users to quickly and easily find nearby public and private influenza clinics using their postal code via www.immunizebc.ca.



Visit www.immunizebc.ca during flu season to find nearby flu clinics using the online flu clinic locator.

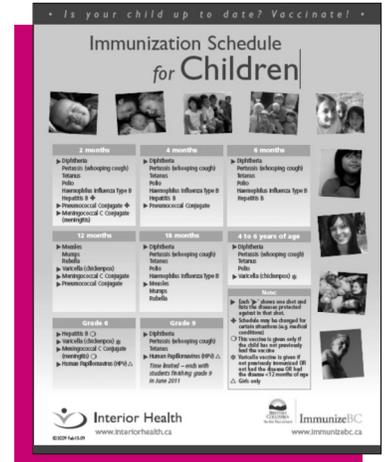
Health Region Promotion Initiatives

Interior Health



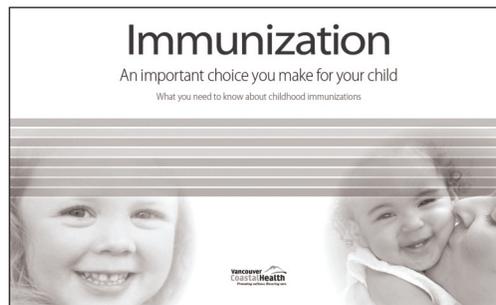
National Immunization Awareness Week was celebrated across Interior Health (IH) from April 20-26, 2008. The provincial theme of “You protect your child from the dangers you can see... what about the ones you can’t?” was used to remind parents of the importance of immunization to protect against vaccine-preventable diseases. Newspapers across the region featured articles and banner ads promoting the campaign. Public health nurses got into the creative spirit of the week and “Sir Ringe” made a special guest appearance at the Oliver Health Fair.

Interior Health also updated and distributed a new Immunization Schedule for Children poster to all IH physicians and daycare facilities. Enlisting the support of physicians and daycare operators to display this poster in waiting areas and pick up/drop off areas is expected to help increase awareness of the immunization schedule and the importance of staying up-to-date.



Vancouver Coastal Health

Vancouver Coastal Health produced and distributed *Immunization: An Important Choice You Make for Your Child* to physician offices and PHNs. It targeted the “cautious” parent defined as one who would benefit from extra teaching and discussion, and who would likely make the decision to immunize once their questions were answered. Secondary audiences included other parents, practicing healthcare providers, students and messengers of health information. The book is available at www.vch.ca/your_health/health_topics/immunization_&_vaccination/ and can be displayed in clinic waiting rooms and/or used for one-on-one discussions with parents.



Immunization: An Important Choice You Make for Your Child

Vancouver Island Health

Vancouver Island Health (VIH) developed new promotional brochures entitled “You Owe it to Your Child” to include in all newborn baby packages distributed by PHNs as part of the first postnatal home visit. These brochures were also included in the one-year-old Child Health Clinic (CHC) packages and the brochures were distributed to physicians’ offices. During the first post-natal visit, HealthLink BC Health Files about immunization for infants at 2 months of age were distributed and the importance of receiving all vaccines on schedule was reinforced. In addition, all families received a call 6 weeks after the birth of their child to remind them to book an immunization appointment.

To promote influenza immunization for eligible families, an article in the November 2008 issue of *Island Parent* entitled “Protecting Your Child from Colds and Flu” was published.

Northern Health

Northern Health (NH) struck an immunization promotion working group in 2008 to focus on influenza promotion in the fall season. The group included representatives from Fort St. John, Dawson Creek, Quesnel, Prince George, Smithers, and Terrace.

The promotion plan implemented involved various forms of media. Not only was the NH website (www.northernhealth.ca) used as a platform for influenza immunization promotion, but radio public service announcements and promotion through local radio morning shows in Quesnel, Prince George and Fort St. John were utilized as well. Posters were put up in senior centres, the Canadian Cancer Society, and Childcare Resource and Referral centres throughout the region. Articles and advertisements (e.g. providing clinic information) were placed in newsletters and newspapers in various communities.

In order to similarly promote influenza immunization among HCWs, paystub messaging and email notifications were also used.

Priority Action #2: Improving Access

British Columbia is a large, diverse province covering 947,800 square kilometres with a population of 4.4 million (December 2008). The population includes approximately 87,000 children less than two years of age, 43,000 children in kindergarten, 49,000 children in grade 6, and 53,000 teenagers in grade 9. These are the main target groups for BC child and adolescent immunization programs, totalling 232,000 individuals. Additionally, nearly one million BC residents receive an influenza vaccine yearly (inclusive of some that belong to the previously mentioned groups).

A priority of the ImmunizeBC strategic plan is to improve access to immunization services for all BC residents including those living in rural or remote settings, working parents, and new Canadians. In 2008, barriers were identified and addressed by looking for innovative ways to extend service provision and engage hard-to-reach populations. Immunizers implemented enhanced and flexible hours, provided services in non-traditional settings, and offered outreach programs. Each health region approached this task in a way suited to their unique populations. A few highlights from 2008 are described in this section.

Fraser Health



Better health.

Best in health care.

Fraser Health implemented a number of strategies to improve client access to immunization services. One of these strategies included offering immunization services at a variety of venues in addition to public health clinics. Examples of these venues included schools and apartment buildings with large immigrant populations. Lunch clubs and baby programs designed for marginalized women were also targeted. Additionally, FH held New Canadian Clinics and also provided scheduled and drop-in outreach clinics in selected First Nations' communities. Public health nurses also provided street outreach and immunized clients at food banks, the public SkyTrain station, and massage parlours.

Another strategy FH has adopted to help clients access services is offering a mix of scheduled and drop-in clinics for immunization. Daytime and evening appointments are both available at the Health Units.

Vancouver Island Health

Numerous efforts were undertaken by VIH to improve access to immunization services for their clients, which include infants, school-aged children, First Nations communities, and adults. For young families, immunization can be inconvenient; to address this, VIH offered both booked appointments and drop-in visits for clinics, as well as Saturday clinics in some locations. Additionally, regular monthly clinics are held in remote areas to ensure opportunities for immunization exist.



In the same year, VIH offered special kindergarten clinics at the Health Units. These were promoted in school newsletters and on posters in the schools. For students in grade 6 or grade 9 who were unable to attend school-based clinics, immunizations were offered at Health Units during professional development days and other school holidays. These students were also offered vaccine when they attended Youth Health Clinics.

Working with the First Nations communities in the Port Hardy area, VIH has augmented infant and childhood immunization services to First Nations community members by maintaining telephone contact with parents and caregivers. In Port Alberni, a portion of the taxi transportation budget was used to bring clients to clinics when transportation was an issue. Family Support workers, as part of their work with families facing complex social challenges, helped to facilitate access to immunization by providing transportation, as well.

To increase access to immunization for adults and marginalized populations, clinics were offered in a variety of settings such as malls, churches, community centers, food banks, and community outreach centres. A variety of times were offered including evenings and Saturdays and extra PHNs were added where possible. These efforts aimed to reduce clinic appointment wait times.

Priority Action #3: Training and Quality

Forum on Immunizing in Schools

In June 2008, the BCISC convened a forum on the topic of immunization in schools in order to support the rollout of the new HPV vaccine in the fall. Over two days, presentations were given on such topics as “Vaccine delivery by Licensed Practical Nurses in schools”, “Building relationships with schools”, “Differentiating between anxiety, syncope and anaphylaxis”, “Legal issues for consent and records”, and “Managing the pain of injection: the example of HPV vaccine” among many others. Discussion sessions covered different areas such as developing and reaching targets for school-based programs, marketing to parents and students, and costing of school-based immunization programs. Proceedings are available on the BCCDC website (www.bccdc.ca) in the section “Immunization & Vaccines”, filed under the reference materials listed for health professionals.

Benefit Risk Communication

In response to immunizers’ requests for more assistance in dealing with parent questions, the ASK Approach was developed in 2008 to facilitate benefit/risk communication training for immunizers. Through role play, it allows immunizers to practice answering difficult immunization questions in a variety of situations and with a variety of topics. The ASK tool allows immunizers to enhance their communication skills and confidence in a safe practice setting.

The ASK Approach

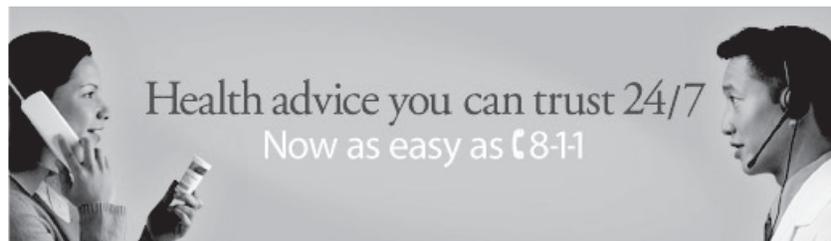
Acknowledge your client’s concerns.
Steer your conversation.
Know the facts well!



Along with the ASK tool, a quick reference guide was also provided to immunizers. The *Immunization Communication Tool* supplies both clinical evidence and plain-language answers to common immunization questions laid out in a side-by-side flip chart format for ease of use. Topics covered included multiple injections, vaccine misconceptions, vaccine components, vaccine versus natural disease, why we immunize, do vaccines work, and does healthy living obviate the need for immunization. This quick guide is available to download on the ImmunizeBC website (www.immunizebc.ca) under “For Health Professionals”.

HealthLink BC 8-1-1

In 2008, the BC NurseLine was combined with several other successful health services to become HealthLink BC. Accessible by dialing 8-1-1 or visiting www.healthlinkbc.ca, HealthLink BC provides comprehensive, non-emergency health information with answers to questions about a variety of health topics, help in identifying symptoms, and advice on when to seek medical treatment. This service provides the public with general immunization information, vaccine-specific information, and locations where individuals can be vaccinated. This website also houses the HealthLink BC HealthFiles used as the standard source of information that supports informed consent for immunization.



Highlights from the Health Regions

Interior Health

New Immunization Communications Workshops

In response to the identified need of regional PHNs for help with answering difficult immunization questions, the Interior Health Communicable Disease (CD) Program Consultants developed a traveling Immunization Communication workshop in 2008.

One hundred and ninety five participants took part in one of nine half-day workshops across the region. The workshops provided an excellent opportunity for learning immunization communication techniques in an interactive environment and included the use of the new ASK Approach collaborative communication technique and role-play game. Over 83% of attendees reported an increase in their confidence level in addressing vaccine concerns with clients.



Interior Health

Immunization Orientation for New PHNs

Interior Health Program Consultants from three different program areas (Communicable Disease, Early Childhood Development, and Child & Youth) collaborated to provide their PHN leaders with an Immunization Orientation session covering

- the Immunization Improvement Plan,
- harm reduction,
- vaccine wastage reduction,
- roll out of the HPV and Infanrix-HEXA vaccine programs,
- immunization competency standards,
- influenza immunization, and
- immunization promotion.

Follow-up sessions and an orientation manual covering these topics were made available to new PHNs to provide further information on these key topics.

Fraser Health

Mass Immunization Clinic Orientation

Fraser Health's CD team developed a half day Mass Immunization Orientation for PHNs and RNs hired to immunize at influenza and school-based immunization clinics. Topics covered in the orientation included immunology and vaccinology, disease-specific information, vaccine-specific information, adverse reactions, management of anaphylaxis, obtaining informed consent and documentation.

The CD team plans to expand this orientation to include a practical "hands-on" component to help newly hired nurses feel more comfortable stepping into a mass clinic situation. New nurses will benefit from the opportunity and practice of preparing vaccines, landmarking injection sites, and setting up a mass immunization clinic station prior to working in their first clinic.

Vancouver Coastal Health

Enhancing Communication Effectiveness Using the ASK Approach

More than 100 VCH PHN immunizers attended a benefit/risk interactive communications workshop in the summer of 2008. The workshop incorporated the new ASK Approach collaborative communication technique and role-play game. The workshop was well received and positive feedback included "a great example of putting knowledge into practical application" and "it's so great to have easy-to-use resources and get tangible results."

School Immunization Program Goes LEAN

Through a grant from the BCISC, Vancouver public health conducted a LEAN assessment of the school immunization program. Based on Toyota's process improvement model, LEAN assessments attempt to increase efficiency through the critical evaluation of internal processes and identification of ways to reduce resource wastage. Areas of focus included processing of consent-to-immunization forms before the clinic at the school, packing and transporting vaccines and other supplies, setting up and taking down the clinic, vaccination of the student(s), and documentation issues. As a result of the LEAN, Vancouver public health achieved a 14% (elementary school) to 27% (high school) reduction in time per immunization per client. The total pilot clinic time was reduced by 16 minutes and there is the potential to recover 780 PHN hours, equivalent to 20.8 weeks or \$32,812 that is currently spent.



northern health

Northern Health

Improving Coverage Rates through Audits

The two-year-old immunization coverage rate in NH increased from 66.8% in 2007 to 70.0% in 2008. While a formal evaluation of the reasons behind this has not been completed, initial evidence suggests it is related to new, more intensive auditing of immunization records. In doing this, the opportunities to find infants who are behind in their immunizations or have moved and no longer live in NH have increased.

Priority Action #4: Immunization Registry

British Columbia uses two major immunization registries to capture immunization records: iPHIS and PARIS. The latter is used by the Vancouver and Richmond HSDAs.

In the summer of 2008, additional training to optimize use of the 'mass module' in iPHIS was provided. This module allows for import of class lists and subsequent rapid updating of immunization records. It has primary value in supporting delivery of school-based immunization services. Agreements with all regions were established to ensure that HPV vaccinations given to grade 6 and 9 girls would be entered into the immunization registries. This will allow for later linkages to Pap test screening registries and will help to evaluate the effectiveness of the vaccine, designed to prevent pre-cancerous and cancerous changes to the cervix.

Additionally, the BC Immunization Registry Network submitted a request to the Ministry of Health to evaluate the complete run and accuracy of Medical Services Plan (MSP) vaccine-specific billing codes used by physicians. These codes can eventually populate the immunization registries.

Future plans are to use the bar codes on all vaccine vials, ampoules, pre-filled syringes, and packages to automate identification and tracking of vaccines for inventory management and immunization registries.

Priority #5: Vaccine Management

There is an ongoing process to decrease vaccine wastage and to optimize cost-effective management of vaccines involving several stakeholders at the local, provincial and national level. Developments in 2008 are detailed below.

Expenditures

The introduction of the HPV vaccine to grade 6 and 9 girls increased the 2008/09 fiscal year vaccine expenditures. The overall value of vaccines distributed from BCCDC increased from \$34 million in 2006/07 (Figure 8) to \$42 million in 2008/09 (Figure 9). The percentage of the budget allocated to school-based vaccines increased from 10% in 2006/07 to 31% in 2008/09. To accommodate this increase and to prepare for an influenza pandemic, BCCDC Pharmacy doubled its central refrigerator capacity in 2008.

Figure 8. Publicly-funded vaccines in BC, fiscal year 2006/07

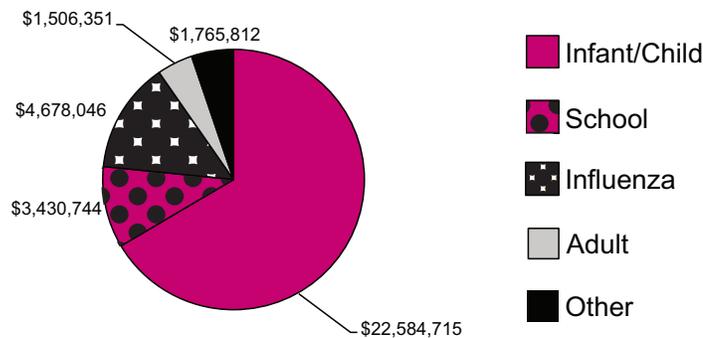
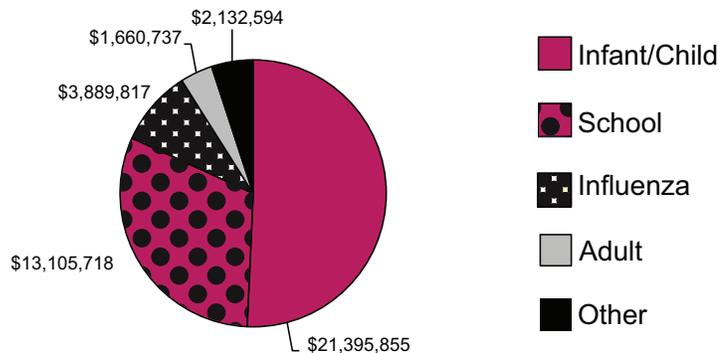


Figure 9. Publicly-funded vaccines in BC, fiscal year 2008/09



Warehouse and Pharmacy Operations

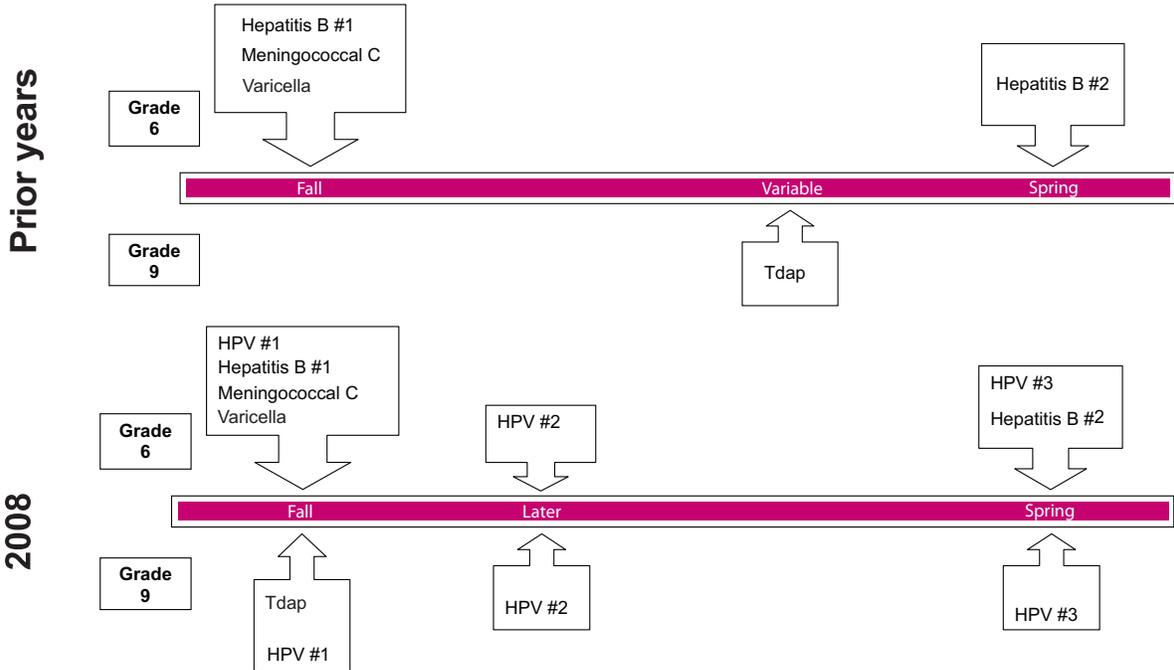
In 2008, BCCDC’s Pharmacy and Vaccine Services created a new position for a Director of Warehouse and Pharmacy Operations. The new Director’s responsibilities include logistics management and inventory control. The objectives are to increase the coordination of Pharmacy services, to improve inventory management (and thus prevent both stock-outs and over-ordering), and to ensure all vaccines in BC reach their destination in good condition.

Realignment of School Immunization Schedules

Starting with the 2008/09 school year, extra visits for immunizations were added in grades 6 and 9 to accommodate the HPV vaccine schedule of three doses over 6 months.

Grade 6 girls concurrently receive their first dose of the HPV vaccine, hepatitis B vaccine, meningococcal C conjugate vaccine, and may receive varicella vaccine if they have never had chickenpox. For grade 9 girls, the tetanus, diphtheria, and pertussis (Tdap) vaccine is now administered at the same visit as the first dose of HPV vaccine early in the school year. This “front-loading” of the school immunization schedule (Figure 10) is consistent with best practices outlined in the 7th edition of the Canadian Immunization Guide, which recommends that individuals should receive all vaccines for which they are eligible at every encounter with a health professional. This represented a significant change in practice for public health in BC.

Figure 10. Previous and realigned immunization schedules



NOTES:
 • The HPV program will end for grade 9 girls after the 2010/11 school year.

Vaccine Wastage

As part of overall efforts to reduce healthcare spending, more emphasis has been placed on reducing vaccine wastage. Wastage is defined as the value of vaccines returned from the health regions to BCCDC (generally due to cold chain incidents or expiry) divided by the value of vaccines shipped from BCCDC to these regions over the same time period. Vaccine returns data for fiscal years 2006/07 and 2007/08 indicated a wastage rate of 6%. In the early spring of 2007, a provincial working group was formed to reduce wastage to 3%. Results for fiscal year 2008/09 indicate a wastage rate of 4.6%.

Refrigerated Transport

In October 2008, BCCDC Pharmacy and Vaccine Services implemented the use of refrigerated (“reefer”) trucks to minimize vaccine wastage due to breaks in the cold chain between BCCDC and the health regions. More than 80% of all vaccines shipped in the province began to be distributed using reefer trucks. A preliminary evaluation indicated that the use of refrigerated trucks significantly decreased the number of cold chain incidents. The trucks use predefined routes for delivery and a set schedule for deliveries of vaccine to the health regions; each health unit has certainty in receiving its supply on a specific day of the week. These improvements have helped the vaccine delivery system become more efficient and reliable.

Priority Action #6: Program Evaluation and Research

BCCDC partners with the University of British Columbia (UBC) to conduct research on the surveillance, control, and prevention of communicable disease, including vaccine-preventable diseases. BCCDC aims to be an internationally recognized centre of excellence linking academia, governments and public health organizations in the understanding, management, and prevention of infectious diseases of public health significance. As research and program evaluation in these key areas fuel the expansion of knowledge in vaccine program delivery, evidence-based course corrections are made accordingly.

Three Dose Pneumococcal Conjugate Vaccine Program Evaluation



In recent years, studies on pneumococcal conjugate vaccine have shown that a three-dose schedule provides comparable protection to a four-dose schedule in preventing IPD. In January 2007, BC moved from a four-dose to a three-dose schedule to achieve cost savings and improve immunization coverage rates while continuing to effectively protect against preventable strains of IPD. A comprehensive program evaluation completed in 2008 reviewed the impact of this program change after one year and identified areas requiring further improvement. Data were collected from databases and

analyses were done around the three goals of cost reduction, improved coverage and effective control of IPD. The study found that:

- Cost savings of \$1.29 million were achieved with the program change.
- Cold chain failures and vaccine wastage rates were lower than anticipated for this vaccine; over 4,400 doses (or 3.1% of doses distributed) were returned to BCCDC in the 2007-08 fiscal year, 96% of these returns were due to cold chain failure.
- The uptake of the three-dose schedule was good and coverage rates exceeded expectations.
- The three-dose schedule is effective. No vaccine failures were reported among infants and children on a 3-dose schedule who had received their doses on time, and following receipt of 2 or more doses.

Rates of IPD among children under five years old in BC have fallen by 70% since the introduction of conjugate pneumococcal vaccine in 2003. Following the change to three doses in 2007, the rates of IPD among children less than five years old continued to decrease from 16.8 per 100,000 residents in 2007 to 14.1 reports per 100,000 in 2008. In children under one year

old, the number of cases of IPD increased to eight in 2008 from four in 2007, but none of the IPD cases which occurred in 2008 were in children who had been immunized. Overall results in 2008 indicate that three doses are as effective as four doses in preventing IPD in BC.

Program Evaluation in the Northern Health Region

New Survey Highlights Way Forward For Infant-Preschool Immunization

In 2008, NH completed a comprehensive review of the Public Health Infant-Preschool Immunization Program. Activities included region-wide surveys of parents, PHNs and physicians to learn about their perspectives on early childhood immunization. A literature review and interviews with representatives of other health regions contributed best practice information.

Survey findings highlighted many positive features in the current delivery of the early childhood immunization program including comprehensive CHCs and high quality service and information provided by PHNs. The surveys also identified supports and barriers experienced by families in accessing immunization services in a timely way. The PHNs and physicians suggested improvements in communication, community education, outreach, and access. Recommendations arising from the review are to:

- Retain the immunization program within the Northern Health region's public health programs for policy leadership and coordinated delivery of immunization services.
- Continue the comprehensive CHC service as the primary method of early childhood immunization program delivery. CHCs provide more than just immunization services – they also include growth and development assessment, anticipatory counselling, and support for the parents.
- Pay special attention to strategies for improving access - such as extended clinic hours and community locations - that will facilitate better attendance and increase immunization rates.
- Continue immunization promotion, education and communication.

In 2009, NH will use these findings and recommendations to create a regional plan for the Infant-Preschool Immunization Program.

Northern Health's immunization promotion working group, in addition to enhancing the promotion of influenza clinics at a regional level, has also developed an influenza clinic survey that was distributed to the public giving them an opportunity to provide feedback and suggestions for improvement.

Michael Smith Foundation for Health Research Funding

In the summer of 2008, a funding competition was held by the Michael Smith Foundation for Health Research (www.msfr.org) with \$200,000 provided by the MHLS for the competition. Three proposals were accepted. One of the proposals will adapt and validate a questionnaire for parents of children with and without an adverse event following immunization and will determine the influence of adverse events following immunization on subsequent immunizations. Another successful proposal will aim to refine the cost-effectiveness of HPV immunization by creating a comprehensive and dynamic mathematical model to understand bi/quadrivalent vaccine impact, cross protection, and HPV-related cancers in men. The final proposal, Partners in Prevention, will involve surveying family physicians to determine their needs for the delivery of a high quality and effective immunization service.

Vaccine Evaluation Centre Update

The VEC is a key research centre located at BC Children's Hospital (BCCH) and is a joint initiative between the hospital and UBC, established in 1988. It was the first academic centre for independent vaccine research in Canada and over the last 20 years has been a national leader in vaccinology research. The VEC also serves as the coordination center for the Canadian Association for Immunization Research and Evaluation which assists in networking Canadian vaccinologists to increase and improve vaccine research capacity in Canada. Research projects at the VEC span pre-licensure vaccine clinical trials, epidemiology research, post-marketing evaluation of immunization programs (including optimizing immunization schedules), promotional and programmatic research, as well as laboratory-based assay development. Research projects underway in 2008 included:

- Applied public health research in preparation for and during an influenza pandemic. The VEC is one of the primary sites in the pan-Canadian research network involving more than 80 Canadian researchers. This network will provide Canada with timely information on the safety and effectiveness of the pandemic influenza mass immunization program.
- Vaccine safety monitoring – the Immunization Monitoring Program ACTIVE (IMPACT) network of 12 Canadian paediatric hospitals conducts active surveillance for immunization-related adverse events and hospitalizations for vaccine-preventable infections including rotavirus. The data center for the network is hosted by the BCCH.
- HPV vaccine study examining whether administration of two doses of vaccine to girls 9-13 years of age separated by six months instead of the recommended three doses at zero, two and six months will not be inferior.
- Evaluation of the provincial infant meningococcal immunization programs.
- Assessment of supports required to assist BC physicians in immunization delivery.
- Practical consequences of minor adverse events following immunization.
- Improving uptake of influenza vaccine in HCWs.
- HPV vaccine responses in HIV-positive girls and women.

- Studies of the development of the innate immune system from birth to age two years. The information will be important to improving immune responses to immunization.
- Expanded immuno-technology with the development of several new immuno-assays for HPV and influenza. This was used to evaluate the effectiveness of using two doses of the HPV vaccine.
- The use of topical adjuvants as a practical means to enhance responses to injected vaccines.

In 2008 the VEC organized a workshop at UBC to determine the research needs of preventing infections in Aboriginal children in BC. A number of care providers gathered along with First Nations people to learn about knowledge gaps and generate research questions.

8th Canadian Immunization Conference



The biennial Canadian Immunization Conference was held in 2008 in Toronto under the theme of “Partnership, Innovation and Education”. The strong presence of BC’s representatives was demonstrated in the wide range of oral and poster presentations (see Appendix D for full list). Several of these topics address the ImmunizeBC priority action of establishing an immunization research agenda with the goal of understanding the socio-cultural aspects of vaccine delivery and uptake, some of which are highlighted below:

Oral presentations included:

Knowledge Gaps for Pandemic Planners. This presentation identified the knowledge gaps in pandemic influenza planning including the key area of psychosocial support for HCWs. Issues outlined included lack of comprehensive planning guidelines, lack of implementation policy, and insufficient support resources for front-line HCWs.

Using the Immunization Competencies for Health Professionals as a basis for developing an on-line immunization course for BC nurses. This presentation described how BC used the immunization competencies (available at www.bccdc.ca under “Immunization & Vaccines”, in the subsection “For Health Professionals”) to develop an on-line immunization course. A virtual tour of one module was provided.

Reaching the transient population in Downtown Eastside (DTES) Vancouver. This presentation explored communication strategies used to reach a transient population during the 2008 outbreak of IPD in Vancouver’s DTES, an area known for its poverty, high prevalence of communicable diseases and active injection drug use. The presenters identified three vital strategies: learn about, know, and understand your target population; determine their priorities and ensure yours meet theirs; and engage and work with other service providers already established in the targeted community.

Case study: Designing education materials from research to evaluation. A case study demonstrating the process VCH took to develop strategies to improve immunization uptake at the regional level. This case study described the importance of completing a thorough assessment, strategic planning, implementation and evaluation in the development of a webcast training session, the *Immunization Communications Tool* booklet, and a benefit/risk communications workshop on the ASK Approach.

Case study: Designing a social marketing campaign from research to evaluation. A case study demonstrating the process BC undertook to develop strategies to improve immunization uptake at the provincial level, using a social marketing campaign targeted at parents of infants two years old and under, as well as HCWs. Emphasis was placed on the process of developing creative approaches, field testing ideas with the target population, and methods of evaluating the impact of the overall campaign through surveys, web statistics and changes in health behaviour.

Posters presented included:

- Results from a study that suggests the use of simultaneous injections for the delivery of multiple immunizations may reduce pain and distress in comparison to the sequential administration method.
- Key issues in immunizing children who fear needles. These included the stress felt by immunizers when immunizing needle-resistant children, the ethical dilemma of immunizing in cases of extreme child resistance, the difficulty and endangerment caused by adult behaviours in response to this resistance, and the lack of consistent resources to help immunizers deal with these issues.

Conclusion

Since the launch of the ImmunizeBC Strategic Framework in 2007, BC has made substantial strides in attaining the goals of increasing vaccine uptake, providing current and evidence-based information, building program capacity and promoting quality across the system. BC has a comprehensive immunization program and exhibits national leadership in areas of immunization promotion, education, program evaluation, and research.

Together, through immunization research, education and promotion, the risk of vaccine-preventable diseases in BC is decreasing. Over the next few years, other important, new vaccines will likely be introduced in BC. These new vaccines will prevent diseases such as rotavirus gastroenteritis infection in babies and young children, and shingles in older adults caused by the herpes zoster virus.

Priorities for 2009

- Transition to Infanrix-HEXA, a hexavalent infant vaccine replacing pentavalent and monovalent products currently provided in two separate injections.
- Promotion
 - Focus on First Nations and Adults
- Research
 - Vaccine stability
 - Influenza
 - HPV attitudinal survey of parents
 - HPV vaccine 2 dose immunogenicity study
- Service Providers' Education
 - Finalize online immunization training modules
 - Partners in Prevention (Assessing doctors' needs to deliver a quality immunization program)
- Vaccine Management
 - Reduce wastage, especially for HPV vaccines
 - Improve inventory-management practices
- New Projects
 - Evaluate new pneumococcal conjugate vaccine options – PCV 10, 13
 - Evaluate use of a combination vaccine MMRV
 - Renew www.bccdc.org and transfer to new address: www.bccdc.ca
 - Plan for the Olympics
 - Apply the lessons learned from the 1st year of HPV immunization to the 2nd year
 - 2009 Pandemic Influenza A/H1N1 planning
 - Develop and evaluate provincial informed consent forms (e.g., for school-based programs and adults incapable of consenting for self)

Appendix A: 2008 BCISC Members

Office of the Provincial Health Officer
 Dr. Eric Young - Co-Chair

Ministry of Healthy Living and Sport
 Craig Thompson

BCCDC
 Dr. Monika Naus – Co-Chair
 Karen Pielak

First Nations and Inuit Health Branch
 Karen McColgan

FHA
 Christine Halpert

IHA
 Bev Grunert

NHA
 Jill Walker

VCHA
 Linda Poirier

VIHA
 Donna McNeil

Health Officers’ Council
 Dr. Charl Badenhorst
 Dr. Elizabeth Brodtkin

Vaccine Evaluation Centre, BC Children’s Hospital
 Dr. Simon Dobson

Family Physician
 Dr. Michelle Linekin

Appendix B: BC Contributions to Research (2008)

While there were many significant contributions to the field of research in immunization in 2008, this report focuses on research that examines the socio-cultural aspects of vaccine delivery and uptake, as per the priority action outlined in the strategic framework for immunization in BC. The following list of publications is not meant to be comprehensive; it has been compiled to provide a snapshot of the various studies in which BC researchers took part.

Anema A, Mills E, Montaner J, Brownstein JS, Cooper C. Efficacy of influenza vaccination in HIV-positive patients: a systematic review and meta-analysis. *HIV Med.* 2008 Jan 10;9(1):57-61.

Buxton JA, Kim JH. Hepatitis A and hepatitis B vaccination responses in persons with chronic hepatitis C infections: A review of the evidence and current recommendations. *Can J Infect Dis Med Microbiol.* 2008 March;19(2):197-202.

Norton SP, Scheifele DW, Bettinger JA, West RM. Influenza vaccination in paediatric nurses: cross-sectional study of coverage, refusal, and factors in acceptance. *Vaccine.* 2008 Jun 2;26(23):2942-8.

Ogilvie GS, Remple VP, Marra F, McNeil SA, Naus M, Pielak K, *et al.* Intention of parents to have male children vaccinated with the human papillomavirus vaccine. *Sex Transm Infect.* 2008 Aug ;84(4):318-23.

Pielak KL, McIntyre CC, Remple VP, Buxton JA, Skowronski DM. One arm or two? Concurrent administration of meningococcal C conjugate and hepatitis B vaccines in pre-teens. *Can J Public Health.* 2008 Jan-Feb;99(1) :52-6.

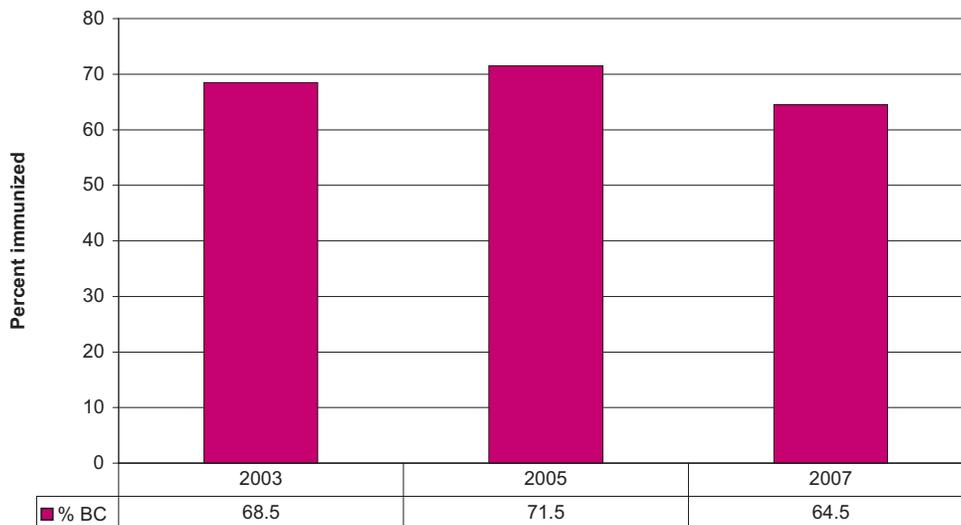
Sebastian R, Skowronski DM, Chong M, Dhaliwal J, Brownstein JS. Age-related trends in the timeliness and prediction of medical visits, hospitalizations and deaths due to pneumonia and influenza, British Columbia, Canada, 1998-2004. *Vaccine.* 2008 March 4;26(10):1397-1403.

Skowronski DM, Tweed SA, De Serres G. Rapid decline of influenza vaccine-induced antibody in the elderly: is it real, or is it relevant? *J. Infect. Dis.* 2008 Feb 15;197(4):490-502.

Appendix C: Influenza Coverage Rates

Community-dwelling seniors' influenza vaccine coverage rates have fluctuated over the last 3 reporting periods of the CCHS (Figure 11). Rates increased in 2005 to 71.5% from 68.5% in 2003, but then declined to an even lower level of 64.5% in 2007. These results are based on self-reported receipt of influenza vaccines within the last year from the survey date.

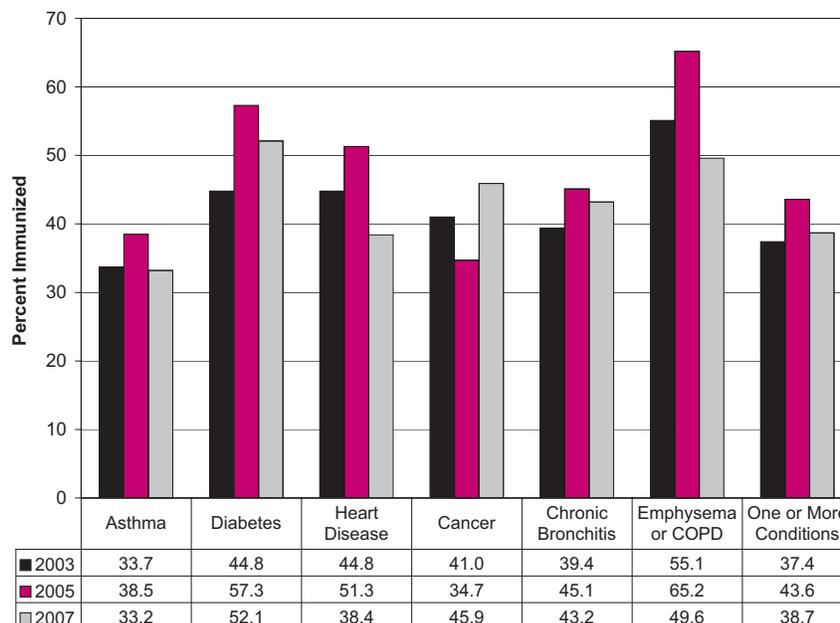
Figure 11. Influenza immunization coverage rates: community-dwelling adults, ≥65 years of age, BC



DATA SOURCE: Canadian Community Health Survey (Statistics Canada, 2003, 2005, 2007)

BC adults aged 12 to 64 years with a chronic health condition that puts them at greater risk for complications of influenza experienced a 6% increase in coverage in 2005 over 2003 (Figure 12). In 2007, coverage rates decreased overall in comparison to the 2005 data; only those who self-reported cancer reported an increase (11.2%) while reductions ranged from 1.9% to 15.6% in others. Populations with diabetes had the highest coverage at 52.1%.

Figure 12. Influenza immunization coverage rates: high risk adults 12-64 years of age, BC



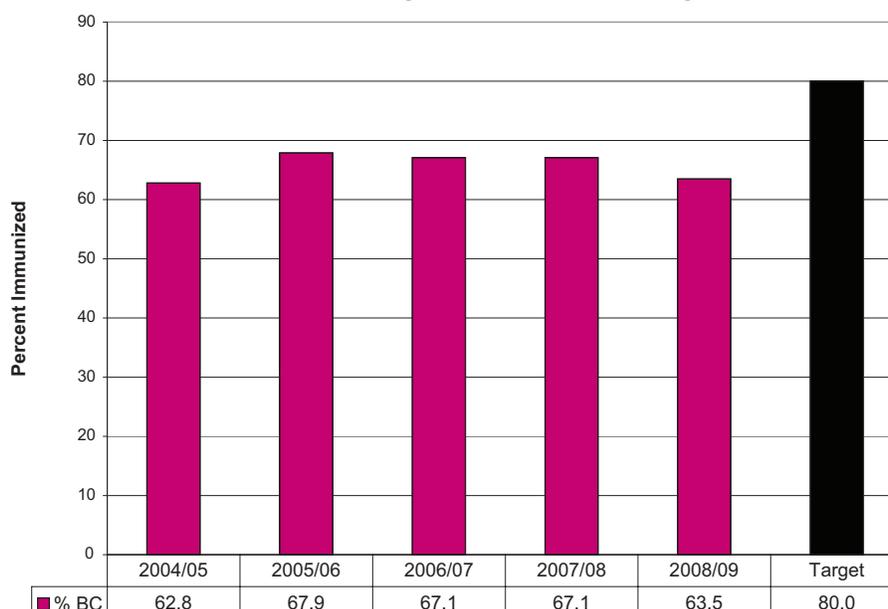
DATA SOURCE: Canadian Community Health Survey (Statistics Canada, 2003, 2005, 2007)

NOTES (Figure 11, 12):

- Data for the Canadian Community Health Survey were gathered in 2003, 2005, and 2007 using a cross-sectional telephone survey of a representative sample of Canadians.
- The user is advised that the estimate for Emphysema or COPD has high sampling variability.

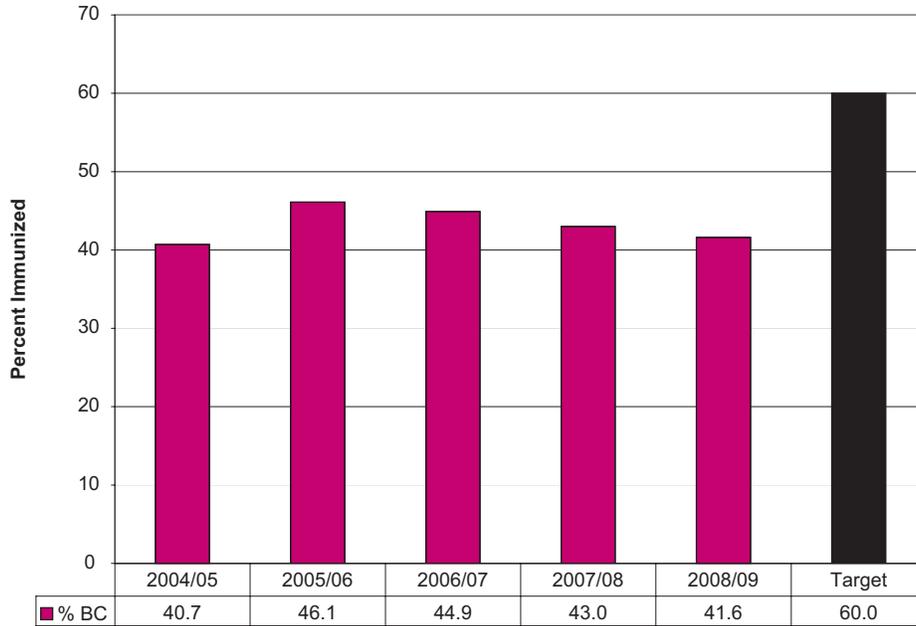
Influenza immunization coverage rates are assessed for staff of LTCFs, staff of ACFs, and residents of LTCFs. While the target coverage rates are 80%, 60% and 90% or above, respectively, the actual coverage rates in 2008 were 63.5%, 41.6% and 91.2% (Figures 13-15). Compared with 2007, 2008 showed a slight decline in coverage for these three target groups.

Figure 13. Influenza immunization coverage rates: staff of long-term care facilities, BC



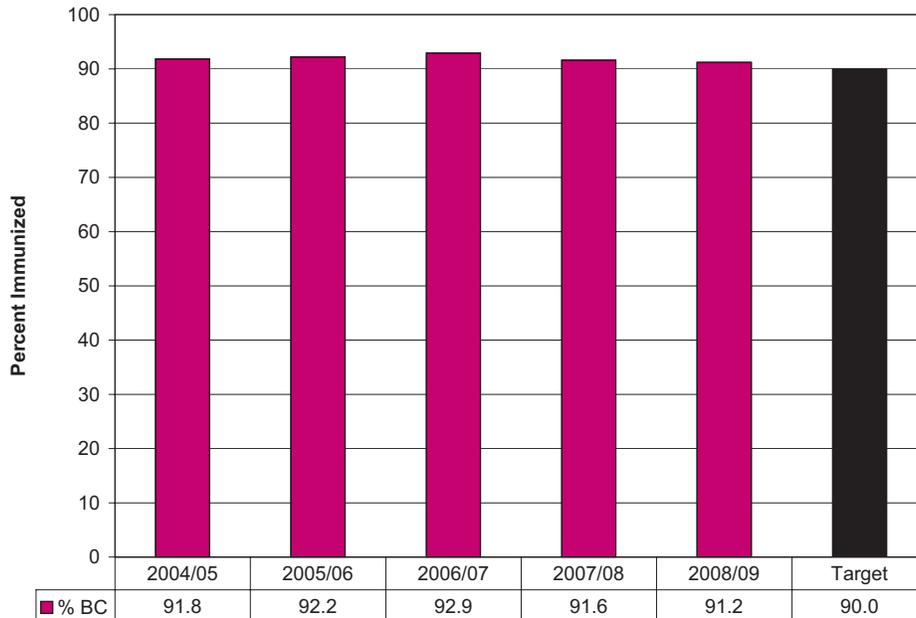
DATA SOURCE: Health region reports, Workplace Health Indicator Tracking and Evaluation records

Figure 14. Influenza immunization coverage rates: staff of acute care facilities, BC



DATA SOURCE: Health region reports, Workplace Health Indicator Tracking and Evaluation records

Figure 15. Influenza immunization coverage rates: residents of long-term care facilities, BC



DATA SOURCE: Health region reports, Workplace Health Indicator Tracking and Evaluation records

NOTES (Figure 13-15):

- Long Term Care Facilities: residential facilities with 50% or more residents aged ≥ 65 years AND are either (a) licensed under the Community Care and Assisted Living Act and provide some healthcare services, or (b) licensed under the Hospital Act.
- Acute Care Hospitals: non-profit institutions that are designated as a hospital by the Minister and are operated primarily for the reception and treatment of persons (a) suffering from the acute phase of illness or disability, (b) convalescing from or being rehabilitated after acute illness or injury, or (c) requiring extended care at a higher level than that generally provided in a private hospital.
- Staff: persons who work or train on a full-time, part-time, or casual basis in a facility or hospital who have direct or indirect contact with patients or residents, regardless of whether they are healthcare providers.
- The Workplace Health Indicator Tracking and Evaluation database is used for tracking and recording the immunization status of healthcare workers.

Appendix D: 8th Canadian Immunization Conference – BC Contributions

Conference presentations are available at: www.phac-aspc.gc.ca/cnic-ccni/2008/index-eng.php

Presentations:

The A.S.K. approach to immunization communication: Communication tools and strategies for the front line. Provided practical tips for communicating with parents using the A.S.K approach (Acknowledge client concerns, Steer the conversation, Know the facts well). (**Derban A** – BCCDC, **Jarvos L** – FH, **McNeil D** – VIH, **Pringle J** – VCH, **Roe I** – BCCDC, **Smrek J** – IH, **Smythe M** – VCH)

Adjuvants, the vaccinologist’s secret: Focus on early life vaccine responses. Described why adjuvants are necessary for optimal long-lived immune responses and how they work. (**Kollmann T** – UBC)

Adjuvants and preservatives: What are they? Examined the benefits and challenges of current and near-future changes in adjuvants and preservatives. (**Lajeunesse C** – UBC)

Case study: Designing a social marketing campaign from research to evaluation. A case study demonstrating the process of developing strategies to improve immunization uptake at the provincial level. (**Roe I** – BCCDC)

Case study: Designing education materials from research to evaluation. A case study demonstrating the process of developing strategies to improve immunization uptake at the Vancouver Coastal Health regional level. (**Poirier L** – VCH, **Derban A** – BCCDC)

The effect of routine vaccination on invasive pneumococcal infection in Canadian children: 2000-2008, a report from the immunization monitoring program – active (IMPACT) network. Reported the results of routine pneumococcal vaccination rates on invasive pneumococcal infection using data from the IMPACT network. (**Bettinger J** - BCCH – VEC)

Facing the issues: Legal, ethical, informed consent – Ethical Issues in Canada & New Initiatives in Informed Consent. Provided an overview of the ethical and legal issues that affect the public as they make decisions to immunize as well as the issue of informed consent for immunization. (**Naus M** – BCCDC, **Jarvos L** – FH)

HPV lessons learned: Counseling teens and their parents. Proposed communication strategies that support individual informed decisions. (**Dobson S** - BCCH)

Immunization: Past, Present and Future. Described the “distance traveled” and the challenges and opportunities for the future of immunization. (**Scheifele D** - UBC)

Introduction of innate immunity and Toll-like receptor (TLR) signaling. Described the innate immune system and the role of TLRs in fighting infections. (**Turvey S** – UBC)

Knowledge Gaps for Pandemic Planners. Identified the knowledge gaps in pandemic influenza planning. (**Henry B** - BCCDC)

Monitoring influenza vaccine programs: How can we do better? Monitoring vaccine effectiveness. Examined traditional and novel methodologies to monitor influenza vaccine effectiveness. (**Skowronski DM** – BCCDC)

New Vaccines in Canada – From Concept to Implementation: The HPV Story. A case study demonstrating how vaccines become authorized for sale and then implemented in publicly-funded programs. (**Dobson S** - BCCH)

Reaching the transient population in Downtown Eastside (DTES) Vancouver. Explored communication strategies used to reach a transient population. (Gustafson R – VCH)

Selection bias in the measure of vaccine protection against serious but non-specific influenza outcomes in seniors: Examination through linked Manitoba databases. Described the selection bias issue involved in measuring vaccine protection against serious but non-specific influenza outcomes in seniors. (Hottes TS – BCCDC)

Strategies to get physicians engaged and pay more attention to the cold chain. Described strategies used to liaise with immunizing physicians to increase their awareness of the cold chain in order to maintain vaccine effectiveness. (Guenther M – VCH)

The top significant articles of 2008 for front line workers. Needle length for intramuscular injections and strategies to reduce the acute pain of immunization injection. (Tan B – Royal University Hospital, Pielak K - BCCDC)

Using evidence to implement a vaccine program cost effectively: The Prevnar story. A case study that demonstrated framework usage for assessing vaccines for publicly-funded programs. (McIntyre C – BCCDC)

Using the *Immunization Competencies for Health Professionals* as a basis for developing an on-line immunization course for BC nurses. Provided an overview of the development process for the immunization competency course and a snapshot of one of the modules. (Miroslaw C - BCCDC)

What drives new vaccine development: Who gets to decide what conditions are targeted? Described how conditions are targeted for vaccine development from the public health perspective. (Skowronski DM – BCCDC)

Posters topics:

- *Cellular Immunity to Diphtheria and Tetanus Toxoids and Acellular Pertussis Vaccine Antigens is Prominent in 4-5 Year Old Children* (Scheifele D, Ochnio J, Halperin SA, Wang J)
- *Cost Effectiveness of a Publicly Funded Hepatitis B Vaccination Program for Blood Donors in British Columbia* (Bigham M, Waters ST, Bigham M)
- *Do Simultaneous Injections Reduce Distress and Pain in Infants Receiving Multiple Injections?* (Hanson D, Hall W, Bhagat R, Mills L, Slomba N, Hernandez M, Au S)
- *East Meets West: The Mumps Experience in British Columbia* (Maureen A, Naus M, Arsenault G, Brodtkin E, Petric M, Peters L, Cerillo N)
- *Evaluation of the Three-Dose Schedule of Conjugate Pneumococcal Vaccine in British Columbia* (Anderson M, Patrick D, David ST, Li M, MacDougall L, McIntyre C, Wong R, Hoang L, Naus M)
- *Hepatitis A Vaccine Use by Canadian Travelers is Inadequate: Results of a Nationwide Survey* (LaJeunesse C, Ochnio J, Scheifele D, Duval B, De Serres G, Gilca V, Ho M, Milner R, LaJeunesse C)
- *Identification of Acute Vaccine-Preventable Hepatitis in Individuals with Chronic Hepatitis in British Columbia from 1991 to 2007* (Buxton JA, Yu A)
- *Identification of Chronic Hepatitis B and Hepatitis C Co-Infection in British Columbia from 1991 to 2007* (Buxton JA, Yu A)
- *Immunization Coverage at Two Years of Age, British Columbia, 2004-2007* (David ST, Naus M, Wong R, Anderson M, McIntyre C, Chong M)
- *Immunization Education and Resource Development: Vancouver Coastal Health's Experience with Field-Testing – An Important Step in the Process* (Morgana T, Zinser K, Smythe M, Poirier L, Weatherill S)

- *Immunization of Neonates: Greater Protection, Stronger and Broader Immune Responses and a Unique Memory T Cell Profile* (Reikie B, Smolen K, Loeffler DI, Blimkie DP, Kollmann TR)
- *Immunizing Children Who Fear Needles: Key Issues for Nurse Immunizers* (Ives M)
- *Impact of Knowledge, Attitudes and Barriers to Immunization on Uptake of Varicella Vaccine in Toddlers Following Targeted Mail Reminders, British Columbia* (David ST, Naus M, Chong M, McIntyre C)
- *An Innovative Approach to Foster HPV Vaccine Research and Education in Canada* (Dobson S, Duval B, Fung Kee Fung M, Sauvageau C, De Wals P, Mayrand MH, Franco E)
- *A Nationwide Survey of Past Hepatitis A Infections Among Canadian Adults* (LaJeunesse C, Ochnio J, Scheifele D, Duval B, De Serres G, Gilca V, Ho M, Milner R, LaJeunesse C)
- *Paediatric Estimates of RSV- and Influenza-attributable Hospitalization Vary by Statistical Method and Require Validation* (Gilca R, De Serres G, Buckeridge DL, Skowronski DM, Boivin G)
- *Trivalent Influenza Vaccine Effectiveness Against Infant/Toddler Hospitalization During Three Canadian Winters: A Report from the Immunization Monitoring Programt – ACTive (IMPACT)* (De Serres G, Moore DL, Vaudry W, Scheifele DW, Halperin SA, Dery P, McGeer A, Embree J, Lebel MH, Le Saux N, Law BJ, Skowronski DM)
- *A Unique Canadian Model of Investigators & Industry Research Sponsors Working Together to Improve Vaccine Research Culture & Opportunities* (Bjornson G, Scheifele D, Duval B, Halperin SA, Ward B)
- *Use of a Topical Anaesthetic for Pain Reduction in Adolescent HPV Immunization* (LaJeunesse C, Fan S, Kallos A, Bettinger J, Marty K)
- *Using Passive Adverse Events Surveillance Data to Respond to Inquiries About Vaccine Safety* (David ST, Anderson M, Naus M, McIntyre C, Wong R, Tang W)
- *Vaccinated Children Among Hospitalized Meningococcal Cases Across Canada, IMPACT 2002-2006* (Bettinger J, Le Saux N, Scheifele DW, Halperin SA, Vaudry W, Tsang R)
- *Vaccination Strategies for Hepatitis B: Is There Still Controversy?* (Mackie C, Patrick DM, Buxton JA, Tadwalkar S)
- *Varicella Catch-up Program for Toddlers and Preschoolers, British Columbia* (Naus M, Chong M, David S, McIntyre C)

BC Routine Immunization Schedule - 2008

Infants and Adolescents

VACCINE ¹	2 months	4 months	6 months	12 months	18 months	Kindergarten	Grade 6	Grade 9
DTaP-IPV-Hib (diphtheria, tetanus, pertussis, polio, <i>Haemophilus influenzae</i> type b)	✓	✓	✓		✓			
DTaP-IPV (diphtheria, tetanus, pertussis, polio)						✓		
Pneumococcal Conjugate²	✓	✓		✓				
Meningococcal C Conjugate³	✓			✓			✓	
MMR (measles, mumps, rubella)				✓	✓			
Varicella⁴ (chickenpox)				✓		✓	✓	
Influenza⁵				✓				
Hepatitis B³	✓	✓	✓				✓	
HPV (for girls)⁶							✓	✓
Tdap (tetanus, diphtheria, pertussis)								✓

NOTES:

1. The 2010 Childhood Immunization schedule and the 2010 School Immunization Schedule are available at: www.bccdc.ca/imm-vac/immunizationSchedules/default.htm.
2. Children with specific medical conditions that place them at high risk of disease should receive an additional dose of pneumococcal conjugate vaccine at 6 months of age.
3. Meningococcal C and hepatitis B vaccines are given to children in grade 6 if they have not received it previously.
4. Varicella vaccine is given to children in kindergarten and grade 6 only if they have no history of chickenpox after their 1st birthday and no prior receipt of the vaccine.
5. Influenza vaccine is recommended for healthy children aged 6-23 months. A second dose is needed 4 weeks after the first, if receiving vaccine for the first time.
6. The HPV vaccine will be administered to girls in grade 9 for the three years from September 2008 to June 2011. If received in grade 6, it is not repeated in grade 9.



ImmunizeBC



BC Centre for Disease Control
AN AGENCY OF THE PROVINCIAL HEALTH SERVICES AUTHORITY

