Canadian Immunization Conference features latest immunization research

December 6-8, 2016
Shaw Centre, 55 Colonel By Drive, Ottawa, ON K1N 9J2

OTTAWA—The Canadian Immunization Conference features the latest research on immunization, including close to 200 oral abstracts and poster presentations.

Abstracts cover diverse topics such as influenza, HPV, and rotavirus.

These Top 10 Scientific Abstracts will be of particular interest to the media:

1. CANVAS: Active Surveillance for Adverse Events following Immunization with Seasonal Influenza Vaccines, 2015 and 2016 Dr. Julie Bettinger
2. Rotavirus Hospitalizations: A decade (2005 to 2015) of Surveillance Documenting Vaccine Success Dr. Nicole LeSaux
3. Economic analysis of community pharmacists providing influenza vaccination in Ontario Dr. S. Houle
4. Obstacles and opportunities for including males in Canadian human papillomavirus vaccination programs Ms. G. Shapiro
5. Evaluation of new vaccines that have therapeutic indications and lack traditional public health prevention indications: An emerging gap in the vaccine evaluation framework Dr. Robert Van Exan
6. Tracking immigrant immunizations using an mHealth app Dr. Kumanan Wilson & Ms. Michelle Paradis
7. 10 practical tips to increase early childhood immunization coverage rates Ms. Karen Dickenson-Smith
8. Community health aides (CHA): Augmenting the scope of nursing practice in northern Inuit communities Mrs. Tina Buckle
9. What causes changes in mothers’ vaccine hesitancy over time? Dr. Devon Greyson
10. Vaccine Hesitancy in the Web 2.0 Era Mrs. Maryline Vivion

Representatives from the media are required to register in advance in order to attend the conference and access the press room.

NOTE: Abstracts are being presented December 6-8. The oral abstract program provides more details. Interviews with researchers can be arranged through Emma Mallach. Presenters may only be available on the day their abstracts are presented.
Media inquiries:
Emma Mallach
Communications Manager
Canadian Public Health Association
communications@cpha.ca
Until December 5: 613-725-3769, ext. 160
On-site December 6-8: 613-914-1151
1. **CANVAS: Active Surveillance for Adverse Events following Immunization with Seasonal Influenza Vaccines, 2015 and 2016 - Julie Bettinger**

**Co-authors:** Dr. Louis Valiquette, Dr. Brenda Coleman, Dr. Karina Top, Dr. Otto Vanderkooi, Dr. Anne McCarthy, Dr. James Kellner, Dr. Jennifer Isenor, Dr. Gaston De Serres

**Introduction/Background:** The Canadian National Vaccine Safety (CANVAS) network monitors the safety of seasonal influenza vaccines used in Canada each year. By estimating the frequency of adverse events of sufficient severity to cause medical visits or prevent daily activities in vaccinated and unvaccinated adults and children, the network is able to detect signals for adverse events following immunization.

**Methods:** In 2015 and 2016, adults and parents of children were invited to complete an online survey in October and early November for health events occurring in the first 7 days post-influenza vaccination for vaccines or in the prior week for controls. Health events preventing daily activities or requiring medical attention were defined as severe. Those requiring medical attention were followed up by a nurse to obtain additional details.

**Results:** In 2015, among the 22,197 adults and children that were recruited, 14,643 (66%) responded to the online survey. Most participants did not report any health events after the flu shot. A total of 3.4% of vaccinated participants reported a health problem severe enough to prevent their normal daily activities and/or cause them to seek medical care compared with 5.0% of unvaccinated controls. The severe event rate in adults was lower than the background rate (i.e. events occurring in unvaccinated adults), while the rate in children was similar to the background rate. No unexpected adverse events were observed in adults or children.

The most frequently reported events in adults were respiratory (1.4%) and gastrointestinal symptoms (0.9%) and headache (1.6%), while in children they were respiratory symptoms (4.1%) and fever (3.6%). Allergic-like reactions and severe injection site reactions were rarely reported (0.01%).

For medically attended events, at the time of telephone follow-up the reported problem had resolved for 30% of controls and 41% of vaccines, was improving for 60% of controls and 43% of vaccines and was unchanged or worsening for the remainder in both groups. Safety data for influenza vaccines used in the 2016 fall campaign will be presented at the conference.

**Conclusions/Implications for immunization research and evaluation:** No safety signals were detected for the 2015 influenza vaccines. The vaccines had good safety profiles with rates of adverse events in vaccines similar to, or lower than, the background event rates.


**Co-authors:** Scott Halperin, Wendy Vaudry, David Scheifele, Julie Bettinger

**Background:** Since 2005, IMPACT has been doing surveillance for hospitalizations due to laboratory confirmed rotavirus infections. As of January 2012, 6 of 12 sites had initiated publically funded immunization programs with 5 further sites implementing programs later.
Methods: Active, surveillance of patients hospitalized for rotavirus infections was conducted by IMPACT from January 1 2005 to December 31, 2015 at 12 paediatric hospitals. Rotavirus hospitalization data was compared for periods pre (2005-2011) and post (2012-2015) implementation of publically funded immunization programs.

Results: The annual number of cases fell from a high of 730 cases in 2005 to a low of 136 cases in 2015. Initiation of rotavirus vaccine programs has resulted in an 81.4% annual reduction in hospitalizations for rotavirus infection in pediatric hospitals in Canada. From 2012, provinces with programs have shown a significant decrease in the number of hospitalized cases (190 to 69 p<0.0001) whereas the number in provinces without programs increased (135 to 156), although not significantly (p=1.0)

Overall, the average annual number of hospitalizations for children under the age of 2 years fell from 381 in 2005-2011 to 153 in 2012 to 2015 representing a 60% decrease in hospitalizations. However, this decrease has occurred only in provinces with programs. In provinces without programs the number of cases in children < 2 years of age has remained unchanged. Overall, the average yearly number of hospital acquired was 148 in 2005-2011. This decreased significantly (p<0.0001) to an annual average of 23 cases in 2012-2015 in provinces with programs and remained unchanged in provinces without programs. From 2005-2015, overall seasonal peaks have declined.

Conclusions: Publically funded rotavirus vaccine programs have resulted in important reductions in hospitalizations due to community and hospital acquired rotavirus infections in pediatric hospitals in Canada with the greatest decreases seen in provinces with programs that were established as of January 2012. Seasonal peaks have also decreased significantly, decreasing the burden on the healthcare system. Increasing uptake and public funding in the remaining provincial and territorial jurisdictions would further increase this impact of this vaccine nationally

3. Economic analysis of community pharmacists providing influenza vaccination in Ontario - Sherilyn Houle

Co-authors: Nancy Waite, Jeff Mehlretter, Sheri Burns, Natasha Burke, Gord Blackhouse, Daria O'Reilly

Introduction/Problem identification: In 2012, Ontario pharmacists were authorized to administer influenza vaccines to those 5 years of age and older under the Universal Influenza Immunization Program. Increasing the number of individuals vaccinated leads to cost savings through reduced healthcare service use related to influenza infection and indirect costs including work absenteeism.

Purpose: As a recently introduced service, little is known about the economic impact, such as resource use and cost consequences, of pharmacist administered influenza vaccinations.

Methods/Evidence: An economic analysis was performed, comprised of a pre-post comparison of the healthcare resource use and an assessment of the indirect costs associated with vaccination in community pharmacies, physician offices, and public health clinics. The primary analysis was conducted from a Ministry of Health perspective, while a societal perspective was applied for the analysis of
indirect costs associated with productivity gains and losses. Changes in vaccination rates from the 2011/12 to 2013/14 flu seasons were determined from available pharmacy and physician administrative billing data, and provincial vaccine distribution numbers. Efficacy of the vaccine, rates of complications, hospitalizations, and lost productivity due to illness or obtaining the vaccine in different settings were obtained from the literature. Program costs considered both vaccine costs and professional fees for administration.

Two findings were factored into the analysis: a net increase of 480,000 vaccinations realized after pharmacies were able to participate in influenza immunization, and that individuals vaccinated in community pharmacies were generally of lower age and healthier than individuals vaccinated in physicians’ offices. As a result, $763,000 in direct health care savings was estimated in the 2013/14 season versus 2011/12, with an estimated $4.5 million in lost productivity saved due to the accessibility of pharmacy vaccinations outside of typical work hours, and an additional $3.4 million saved from reduced absenteeism due to influenza illness.

Significance of Findings/Outcomes for immunization research and evaluation: Since implementing pharmacy-based influenza immunization, the number of Ontarians being vaccinated has increased, with younger, healthier individuals accessing this new service. While the rates of major complications in this population are lower than among higher-risk patients, the accessibility and convenience of pharmacist-administered vaccination translates to significant savings related to decreased workplace absenteeism.

4. Obstacles and opportunities for including males in Canadian human papillomavirus vaccination programs – Gilla Shapiro
Co-authors: Samara Perez, Zeev Rosberger

Introduction/Problem identification: The human papillomavirus (HPV) is associated with multiple cancers. The Canadian National Advisory Committee on Immunization (NACI) recommends human papillomavirus (HPV) vaccination for females and males aged 9–26 years. All Canadian provinces and territories have instituted school-based publicly funded quadrivalent HPV vaccination programs for females, albeit at different ages and dosing schedules. To date, only Prince Edward Island, Alberta and Nova Scotia have included boys in their school-based quadrivalent HPV vaccination programs. Recently, Manitoba, Ontario, and Quebec have committed to expand their school-based HPV vaccination programs to include boys beginning in September 2016. As other provinces (and countries) are evaluating whether to include boys in public programs, it is essential to understand the underpinnings of this policy decision.

Purpose: The objective of this research was to analyze the obstacles to, and opportunities for, change in HPV vaccination policy in Canada.

Methods/Evidence: We reviewed the academic and grey literature to identify the key factors that have influenced some provinces’ decisions to incorporate boys into their programs.
Significance of Findings/Outcomes for immunization research and evaluation: Canada has been an international leader in initiating public HPV vaccination programs for males in some jurisdictions, alongside Australia, Austria, Israel, and Italy. A number of obstacles to uptake of the HPV vaccine in boys include not receiving a recommendation from a doctor or health care provider, lack of information about the HPV vaccine, negative attitudes toward the HPV vaccine or other vaccines, HPV being over-identified as a woman’s disease, cost, and logistical challenges. Nevertheless, provinces have decided to fund the HPV vaccine for boys following clearer evaluation of cost-effectiveness models, reduction of vaccine costs, consideration of principles of equity, and public advocacy efforts.

5. Evaluation of new vaccines that have therapeutic indications and lack traditional public health prevention indications: An emerging gap in the vaccine evaluation framework - Robert Van Exan

Introduction/Problem identification: A review of the vaccine pipeline reveals that there are a number of new vaccines currently in development which are therapeutic in nature. Vaccines to treat a host of chronic diseases such as cancer, neurological disorders, autoimmune diseases and to address a number of lifestyle issues such as obesity, addictions and contraception have broad public health implications but do not fit the current model for vaccine evaluation in the context of public health immunization programs. These new tools will undergo the traditional Health Canada evaluation for Notice of Compliance (NOC) and will be classified as vaccines but the indications and use of these tools may be focussed on the health of the individual rather than the health of the population.

Purpose: The purpose of this paper is to consider and identify potential policy gaps in the current processes of evaluation, funding, procurement, distribution and administration of traditional public health vaccines as applied to these new therapeutic vaccines and to stimulate discussion before these new products receive regulatory approval.

Methods/Evidence: A review was undertaken of vaccines in development in order to identify vaccines that do not fit the traditional population based, public health disease prevention paradigm. An evaluation was undertaken to see how these vaccines might fit into the current processes involved in the introduction of vaccines in Canada and what challenges might develop.

Significance of Findings/Outcomes for immunization research and evaluation: These new vaccines do not necessarily fit well into either the CADTH review process for drugs or the current NACI review process for vaccines. Challenges and potential policy gaps were identified in several areas of the road to public access including not only the criteria for scientific and program evaluation but also price regulation, economic analysis, funding, procurement, distribution and administration. As the first of these new generation vaccines are in phase three trials, we can anticipate that they will start to appear on the doorstep of the regulatory authorities within the next 3 to 5 years. Now is the time to start a serious dialogue about how these products will make their way through all of the review stages so that the health care system and the public may have access to them.
6. Tracking immigrant immunizations using an mHealth app – Michelle Paradis
Co-authors: Charles Hui, Douglas Manuel, David Ponka, Katherine Atkinson, Kumanan Wilson

Introduction/Background:
In 2014, we released ImmunizeCA as a vaccine-tracking mobile app for the general Canadian public. The concept of ImmunizeCA was simple, to provide a mobile alternative to yellow immunization cards. The app was made freely available in both official languages to every province and territory.

Since its official release, ImmunizeCA has been downloaded over 140,000 times. As user feedback and media attention around the app grew, interest from the public health community sought its use for special populations, such as newcomers to Canada. In 2016, the Public Health Agency of Canada awarded additional funding to ImmunizeCA. One of the objectives was to explore use in special populations.

Methods:
Our primary objective is to evaluate the potential for ImmunizeCA to be customized for newcomers. Our findings have been informed by field research whereby we received feedback from users, public health practitioners and policymakers. Specifically, we have received feedback and been in consultation with a newcomer clinic in Ottawa and refugee programs, regarding the need for an adapted version of ImmunizeCA for these populations.

Results:
Feedback from stakeholders expressed interest in the use of ImmunizeCA to assist newcomers. Specifically, there was interest in ImmunizeCA incorporating the following functionalities to be of benefit to newcomers: (1) A translated portal within ImmunizeCA, (2) Provincial and Territorial vaccination catch-up schedules, (3) Curated information and tools on immunizations for newcomers and their children. The current information gaps in the healthcare system which could be addressed by ImmunizeCA include completeness of overseas vaccination records and tracking of vaccination status in Canada. Some of the potential barriers for newcomers using ImmunizeCA include: language, availability of smartphones usage and literacy levels.

Conclusion:
There is potential for ImmunizeCA to be of value to newcomers. A needs assessment is required to assess the feasibility and acceptability of the ImmunizeCA platform for newcomers.

7. 10 practical tips to increase early childhood immunization coverage rates - Karen Dickenson-Smith
Co-authors: Rachel Douglas, Shovita Padhi, Anup Samra

Introduction/Problem identification: Early childhood immunizations are a valuable opportunity to protect some of the most vulnerable members of the population while striving for herd immunity. Many
jurisdictions, however, struggle to increase coverage rates due to a variety of factors including resource constraints, challenges with information systems, barriers to client access, and conflicting client beliefs. Hear how Fraser Health, the largest health authority in BC, increased their regional 2-year old immunization coverage rate by 5% in less than one year, achieving 76.6% in Q4 of 2015/16.

**Purpose:** To increase immunization coverage rates in young children through implementation of a focused quality improvement strategy.

**Methods/Evidence:** Guided by LEAN management principles, during 2015/16 a multi-pronged regional strategy was implemented that included the following components: (i) operational improvements across 17 local public health units such as weekly monitoring of clinic access and activity data, establishment of targeted clinics and client reminders, and monthly monitoring of coverage rates; (ii) immunization promotion such as revamping the immunizations website to be more client-centred, and effective use of social media; (iii) physician engagement to increase immunization education; (iv) business process improvements such as quantifying adequate capacity required to meet immunization appointment needs in different communities, and standardizing clinics and data entry timelines, and (v) technological enhancements such as trialing remote access to the public health information system to enable offsite charting by nurses, and advocating provincially for system improvements such as self-serve client appointment booking and automatic reminders. From the above quality improvement activities we have distilled 10 practical tips. An interim evaluation was conducted in April 2016. The percentage of 2-year olds in Fraser Health who were up-to-date for their immunizations increased by 5% during 2015/16, from 68.4% year to date (YTD) to 73.5% YTD. The regional rate in Q4 of 2015/16 reached 76.6%, exceeding the health authority’s key performance indicator of 76%.

**Significance of Findings/Outcomes for immunization practice, research and evaluation:** Using LEAN management principles, Fraser Health has succeeded in increasing coverage rates in a context where other jurisdictions are stable or declining. The upward trend continues in Fraser Health, demonstrating that focused, practical quality improvement efforts can lead to increases despite multiple organizational and system barriers.

8. Community health aides (CHA): Augmenting the scope of nursing practice in northern Inuit communities — Tina Buckle

**Co-author:** Sylvia Doody

**Introduction/Problem identification:** Historically there have been challenges meeting the provincial public health mandate in the Labrador Inuit communities of Nunatsiavut. These challenges include the turnover of nurses, cultural understanding and knowledge, community trust, language barriers, and the difficulties associated with living in northern remote isolated communities. All of these challenges are multilayered and thus result in difficulties in providing a high standard of care across the continuum.

**Purpose:** In response to these unique challenges a new service delivery model was explored to respond to our needs. The model that was chosen, which was adapted from the Alaska Community Health Aide
Practitioner program, looked at the realities of nursing recruitment and retention in northern remote isolated communities. We also took into consideration the resources that currently existed in the communities and built on those strengths to enhance capacity. The CHA positions were introduced into our community health nursing programs to support and bridge some of the gaps and barriers in service delivery across community programs.

**Methods/Evidence:** Our community health aides are residents of the community, Inuit, and have a strong knowledge and understanding of Inuktitut. In addition, the CHA’s possess an innate cultural understanding which is specific to their home community. These qualities are the foundation for giving the programs longevity and continuity to respond to the transiency in nursing staff. The CHA’s engage families and support the nurses in program service delivery such as in the immunization program, provide health care services and facilitate linkages within the community.

**Significance of Findings/Outcomes for immunization research and evaluation:** The CHA program was implemented in the Nunatsiavut region in January of 2008. Since this time, feedback has been positive from various partner organizations, community health nurses and residents of the community. In addition, immunization coverage rates in all of the communities are greater than 95% and have been consecutively at that rate and higher for many years. Furthermore, the CHA’s have become such an integral part of our programs that even during periods when there is no nurse the community health programs continue.

9. **What causes changes in mothers’ vaccine hesitancy over time?** - Devon Greyson

**Co-authors:** Julie Bettinger, Gina Ogilvie, Simon Dobson

**Introduction/Background:** Some parents experience changes in vaccine hesitancy over time, leading to shifts in vaccination behaviour. A family may vaccinate previously unvaccinated children or, alternatively, cease vaccinating after previously following immunization recommendations. In order to effectively intervene to improve vaccine uptake, we must understand what causes these changes in parental vaccine hesitancy. This qualitative study retrospectively explored shifts in vaccine hesitancy over time among a group of mothers of school-aged children in Greater Vancouver, British Columbia.

**Methods:** Parents whose attitudes toward vaccination had changed since their school-aged (6-12 years) children were infants were recruited via primary schools in Greater Vancouver and via Facebook. Data was collected via semi-structured individual interviews in community settings, and analyzed using constructivist grounded theory.

**Results:** We interviewed 23 mothers, of whom 9 had become less vaccine hesitant over time, 9 had become more hesitant, and 5 had experienced multiple changes in vaccine attitudes since their children were born. Mothers who were initially hesitant described feeling fear, anxiety, and confusion when deciding about infant immunization. Key factors in decreasing hesitancy over time included positive immunization
experiences, positive trust relationships with healthcare providers, and consistent and verifiable vaccine safety and effectiveness information that was possible to triangulate among trusted sources. Key events occasionally caused a rapid change in attitudes, for example outbreaks of vaccine preventable disease. Mothers who were initially accepting yet became hesitant over time commonly experienced a lack of healthcare provider support or clear guidance following a child’s AEFI and/or diagnosis of a chronic health condition of unknown etiology (e.g., autism, autoimmune diseases). Peer group attitudes (online and offline) and media narratives sometimes encouraged hesitancy, and this was most salient for mothers who already felt that their concerns had not been adequately addressed by healthcare providers.

**Conclusions/Implications for immunization research and evaluation:** New mothers who are or might be vaccine hesitant need additional support and verifiable information regarding vaccination. Early identification and supportive intervention by healthcare providers may ameliorate hesitancy. In addition, adequate attention and time to address mother’s concerns regarding an AEFI or chronic health condition may be key to minimizing vaccine hesitancy in time for children to be fully vaccinated before adolescence.

10. **Vaccine Hesitancy in the Web 2.0 Era - Maryline Vivion**

**Introduction/Background:** Vaccination is considered to be one of the greatest achievements of public health. In Quebec, vaccination is not mandatory and relies on parent’s acceptance. Studies have shown an increase of negative attitude toward vaccination for parents and some of them are categorized as being *hesitant* regarding vaccination. Vaccine-hesitant parents may refuse some vaccines, but agree to others; they may delay vaccines or accept vaccines according to the recommended schedule, but be unsure in doing so. In Quebec, while less than 5% of parents have refused all vaccines for their children, one third could be categorized as being *hesitant* regarding vaccination. It is often argued that the omnipresence of anti-vaccination content on the Internet has contributed to the increase of vaccine hesitancy among parents. The aim of this doctoral project is to explore the link between Internet and vaccine hesitancy.

**Methods:** An online ethnography based on non-participant and participant observation has been conducted in 2015 on social media groups where discussion on vaccination occurred. (Facebook groups and Forums in websites for parents). In order to complete these observations, 18 interviews have been conducted with mothers from Quebec. Discussion threads from social media were downloaded and interviews were recorded and fully transcribed. Data collection has ended December 31\textsuperscript{st} 2015. A content analysis is conducted with N’vivo 10 software.

**Results:** The Internet is now part of everyday life of every parent and the most common tool used by parents who want information about health. It is increasingly apparent that the Internet contributes to vaccine hesitancy. Moreover, with social media, parents can now be exposed to information on vaccination without having looked for it. On Internet groups, vaccination is a recurrent topic that can be
sensitive. However, if some mothers take into consideration this information other mention that they cannot trust it.

**Conclusions/Implications for immunization research and evaluation:** This project will allow the development of appropriate communication strategies about vaccination that will correspond to Canadian parents’ needs and interests. The efficacy of vaccination promotion interventions online is based on our understanding of how parents use the Internet and its role in their decision.