

Immunizing Children: Current Canadian Health Professional Competencies

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Geraldine Jody Macdonald¹, Margaret A. McIntyre^{2,1},
and Maureen A. Barry¹

Abstract

This article addresses the complex contexts within which Canadian health professionals engage in immunizing children and focuses on the Canadian practice guidelines and current scientific evidence that direct Canadian health professional competencies. The article begins by presenting two current global vaccine initiatives and links these to immunization in Canada. A selected literature review identifies current best immunization practices. With the purpose of promoting quality improvement, three key Canadian immunization competencies for health professional are highlighted: communication with parents, including those who are experiencing vaccine hesitancy; administration of immunizing agents; and documentation of immunizations. Health professionals are encouraged to reflect on immunization competencies and ensure evidence-based practices underpin vaccine delivery in their primary care settings.

Keywords

health, children, immunization, vaccination, competencies, vaccine hesitancy, pain management, documentation

Immunizing children is a complex practice that requires health professionals to appreciate global contexts, local practice guidelines, and scholarly evidence. The article begins by introducing two global initiatives, the Decade of Vaccines (2011-2020) and the Global Vaccine Action Plan (GVAP; World Health Organization [WHO], 2012). The global initiatives invite countries around the world to collectively contribute to immunization solutions to protect child health. Next, the Canadian publicly funded immunization approach is reviewed, along with two key practice guidelines. Three key Canadian immunization competencies for health professionals are then highlighted: communication with parents, including those who are experiencing vaccine hesitancy; administration of immunizing agents; and documentation of immunizations. The selected literature review informs the analysis of the three immunization competencies. In conclusion, Canadian health professionals are encouraged to consider Canadian practice guidelines and scholarly evidence to ensure evidence-informed immunization competencies are developed that will protect child health in their home communities.

The selected literature review focuses on meta-analyses from the *Cochrane Database of Systematic Reviews*. Search terms included *communicating with parents about immunizations*, *vaccine hesitancy*, *administering child immunizations*, and *documenting immunizations*. Four meta-analyses were identified. Additional select literature is included. As is widespread in the literature, the terms *vaccination* and *immunization* are used interchangeably in this article, while

acknowledging there are subtle differences (Kaufman et al., 2013). According to the Centers for Disease Control and Prevention (CDC, 2012), vaccination refers to the injection of a weakened or killed disease organism to stimulate a protective response and prevent future disease. Immunization refers to a protective response process in a person that protects them from a specific disease with immunizing agents (CDC, 2012).

World Health: Decade of Vaccines and Global Vaccine Action Plan

The World Health Assembly endorsed the years 2011 to 2020 as the “Decade of Vaccines” with a target of saving the lives of two million children (WHO, United Nations International Children’s Emergency Fund [UNICEF], & World Bank, 2009). In 2010, the Bill & Melinda Gates Foundation announced their support for the Decade of Vaccines at the World Economic Forum (Rappuoli, Mandl, Black, & De Gregorio, 2011). Their US\$10 billion commitment supports the discovery, development, and delivery of vaccines to the

¹University of Toronto, Ontario, Canada

²Public Health Ontario, Ontario, Canada

Corresponding Author:

Geraldine Jody Macdonald, Senior Lecturer, Bloomberg Faculty of Nursing, University of Toronto, 155 College St. Rm 162, Toronto, Ontario, Canada M5T 1P8.
Email: g.macdonald@utoronto.ca



people in the poorest countries of the world (Ozawa et al., 2011). Other key collaborators included Global Alliance for Vaccines and Immunization Alliance, WHO, U.S. National Institute of Allergies and Infectious Diseases, UNICEF, and the African Leaders Malaria Alliance (WHO, 2012).

The GVAP (WHO, 2012) was subsequently adopted by the WHO as a strategy to promote global health through vaccinations. The GVAP builds on a prior global initiative that created ongoing collaborations between diverse arrays of stakeholders involved with immunizations (WHO, 2012). Collaborators include public and private sectors, manufacturers and academics, civil society, and the media (WHO, 2012). Key goals of the GVAP include meeting vaccine coverage targets worldwide, elimination of poliomyelitis, and reduction of child mortality (WHO, 2012; WHO, UNICEF, & World Bank, 2009).

Six core principles guide the GVAP beginning with country ownership (WHO, 2012). Each country must take full responsibility for developing and funding effective immunization programs for all citizens. This will guide their contribution to the global “Decade of Vaccines.” Five additional guiding principles include shared responsibility between all stakeholders, equitable access to immunizations, integration of the immunization programs within the primary health care system, guarantee of sustainability of the immunization program, and support for innovation that will ensure ongoing quality improvement (WHO, 2012). Detailed goals, measures of success, and objectives direct global/local implementation of the GVAP (WHO, 2012). In Canada, health professionals contribute to child health through administering publicly funded immunizations.

A Canadian Perspective: Publicly Funded Immunization

Canada has a publicly funded health care system, although health care is the responsibility of the 10 provinces and three territories. There are a few exceptions such as health care for First Nations and Inuit in Canada. First Nations and Inuit health care involves an intricate, inter-reliant health system that is managed by First Nations and Inuit, federal, provincial, and territorial jurisdictions (Health Canada, 2012).

Canada does not have a national immunization program. In 2003, Canada adopted a National Immunization Strategy (NIS; Public Health Agency of Canada [PHAC], 2009). The NIS promotes the effectiveness and efficiency of immunization programs in Canada. Collaboration with federal, provincial, territorial, and other partners is essential. Childhood immunization programs are publicly funded across Canada and delivered by a combination of public health professionals and primary care practitioners. The NIS also identifies “Immunization Competencies for Health Professionals” to ensure Canadians are optimally protected from vaccine-preventable diseases (PHAC, 2008).

Canada’s National Advisory Committee on Immunization [NACI], a committee of experts, produces evidence-based national immunization guidelines (Erickson, DeWals, & Farand, 2005). Individual provinces and territories decide which vaccine programs they will include in their publicly funded immunization schedules. Health professionals need to keep up-to-date with their current provincial/territorial immunization schedule.

In December 2012, “The Canadian Immunization Guide (CIG)–Evergreen Edition” (NACI & PHAC, 2012) was launched. The CIG–Evergreen Edition is an innovative, online, best practices resource that provides up-to-date information that is readily available. The CIG–Evergreen Edition is updated regularly by PHAC (2011) and, within it, specific provincial/territorial immunization schedules can be accessed by health care professionals and parents. Canada’s NACI reviews vaccine research on an ongoing basis to ensure the national immunization guidelines are based on the best available evidence.

Canadian children who receive their publicly funded vaccine series in infancy and childhood are protected from diphtheria, pertussis, tetanus, polio, *Haemophilus influenzae* Type b (Hib), pneumococcal disease (childhood immunization protects against 13 of the most common serotypes of pneumococcal disease), measles, mumps, rubella, and Hepatitis B. All provinces and territories offer vaccines to prevent meningococcal serogroup C. Many provinces and territories provide protection from four different meningococcal serogroups, via the quadrivalent vaccine ACYW-135, in late childhood or early adolescence (PHAC, 2014). All provinces and territories have single-dose varicella immunization programs and currently, eight provinces have added a second dose for better varicella protection. Since 2011, five provinces and two territories added rotavirus oral vaccine to the infant schedule (PHAC, 2014).

Human papilloma virus (HPV) vaccine was approved in 2007 and by 2010 was delivered to females across Canada through school-based programs. Males do not have access to publicly funded HPV vaccine in Canada, with two exceptions. Prince Edward Island expanded its HPV vaccine program to include males this past school year (PHAC, 2014). Alberta announced plans to include males in the upcoming school year, beginning September 2014 (Alberta Health, 2014). Advocating for access to publicly funded vaccines is an important role for Canadian health professionals.

Canadian Health Professional Competencies

Canadian health professionals who immunize children are guided by the Canadian immunization competencies for health professionals (PHAC, 2009). Developing and maintaining health professional immunization competencies link to the GVAP principle of promoting innovation and quality

improvement. Three immunization competencies are of particular interest to health professionals at this moment in time: communication with parents, including those who are experiencing vaccine hesitancy; administration of immunizing agents; and documentation of immunizations. The three competencies are addressed in this article by creating an analysis of best practices based on the Immunization Competencies for Health Professionals (PHAC, 2009), the Canadian Immunization Guide (NACI & PHAC, 2012), and four meta-analyses from the *Cochrane Database of Systematic Reviews*. Meta-analyses identify the best quality of scholarly evidence available. A number of additional articles are integrated into this analysis including systematic literature reviews, concepts/definitions, and emerging innovative approaches of particular value that were known to the authors.

Communication With Parents

Health professionals have an important role communicating with parents about their children's vaccinations. Health professionals are aligned with the GVAP when dialoguing with parents about vaccine-preventable diseases in prenatal settings, well child visits, hospital settings, schools, daycares, homes, workplaces, faith communities, and telephone hot lines. Ideally, parents are engaged partners in decisions regarding the health care of their children and they feel comfortable bringing questions and concerns about immunizations forward to health professionals (Austvoll-Dahlgren & Helseth, 2010).

Health professionals who are aware of the influences of the social determinants of health on parents' vaccine decision making will be in a position to offer supportive advice and to anticipate barriers to vaccination. Despite having a publicly funded health care system, barriers remain in Canada. Barriers may include the lack of funds for transportation to the clinics or an inability to take time off of work to bring their children to the clinic to receive publicly funded vaccinations. Advocating with decision makers for resources for parents such as bus tickets or evening clinics will support both vulnerable parents/families and the goals of the WHO's "Decade of Vaccines." Such interventions link to Primary Health Care [PHC] principles of health promotion, public participation, and appropriate technology and the PHC values of social justice and equity (Smith, Van Herk, & Rahaman, 2012; WHO, 2008).

However, health professionals have more to learn about how to be effective in their key role of communicating with parents about vaccinations. Kaufman et al. (2013) published a Cochrane meta-analysis as one part of a 2-year multi-stage, global research project called "communicate to vaccinate" (Kaufman et al., 2013). The "communicate to vaccinate" global research project focuses on improving vaccine coverage by systematically developing new knowledge and understanding about effective communication interventions in low and middle income countries (Kaufman et al., 2013).

Kaufman et al.'s (2013) meta-analysis is titled "Face to face interventions for informing or educating parents about early childhood vaccinations." Face to face offers parents/consumers an opportunity to talk with health care professionals in either one-to-one or group settings that facilitate questions and sharing of concerns and/or preferences (Kaufman et al., 2013).

The authors began their review with a thorough search strategy that yielded more than 9,000 articles (Kaufman et al., 2013). They ended up including just seven trials, six randomized control trials [RCTs], and one cluster RCT in their analysis (Kaufman et al., 2013). The combined seven trials included 2,976 participants (Kaufman et al., 2013). The studies had high heterogeneity, which restricted the authors' ability to consider them together. While several studies found limited positive responses to face to face interventions, collectively they did not.

As the authors state, "The limited evidence available is low quality and suggests that face to face interventions to inform or educate parents about childhood vaccination have little to no impact on immunization status, or knowledge or understanding of vaccination" (Kaufman et al., 2013, p.21). There was not enough evidence, however, to suggest a change in current face to face practices despite the lack of affirming data. Future research is recommended to determine effective face to face communication interventions (Kaufman et al., 2013).

A related study is underway, also part of the 2-year "communicate to vaccinate" global research project (Kaufman, 2013). This systematic review is titled, "Community-directed interventions informing and/or educating about early childhood vaccination" (Saeterdal, 2012, p. 1). Community interventions target populations or local community groups while face to face interventions target individuals. The meta-analysis is in protocol stage and the results are not yet available. The findings will contribute a valuable perspective on the effectiveness of community interventions in communicating about childhood immunizations, specifically linking knowledge and vaccination uptake.

Brunson's (2013) small study ($N = 196$) is innovative and provides vital insight into the potential significance of social networks in influencing first-time parental vaccine decisions. An imaginative social networking analysis was used to examine how conforming and nonconforming first-time parents used social networks, including the people and the sources they consult for guidance and information (Brunson, 2013). Social relationships, including "spouses/partners, family members, and friends" (Brunson, 2013, p. 1404), were found to have the most influence on first-time parent vaccine decision making. Brunson (2013) names these "people networks" (p. 1399) and found "people networks" also include peers at work, parenting educators, and health professionals.

The most predictive factor in Brunson's (2013) study was, paradoxically, identified as first-time parents whose people networks advocated for nonconformity. First-time parents

who were advised not to follow recommended vaccination schedules by trusted family, partners, and friends were most likely to be influenced by this advice, even if the advice challenged personal perceptions (Brunson, 2013). Brunson (2013) concluded that social networks, particularly people networks, play a key role in shaping vaccine decisions for first-time parents. People networks were found to be more influential than source networks including television, celebrity reports, and social media via online sources (Brunson, 2013). Future research is recommended to focus on community interventions that reach the diverse people whom parents are most likely to consult prior to vaccine decision making (Brunson, 2013).

Brunson's (2013) study highlights the importance of health professionals engaging with first-time parents, becoming part of their "people networks," taking time to listen to parents' concerns and preferences, and exploring what parents' "people networks" have advised them to do. Through forming trusting relationships with first-time parents, health professionals will have the opportunity to positively influence their decision making about child immunizations. Additional research about the influence of social and "people networks" on parents with multiple children would provide valuable guidance for health professionals who are hoping to influence experienced parents to make informed vaccine decisions. Community social network intervention research may offer an important approach as it has the potential to increase awareness of people networks within an entire community.

Communicating with parents who are vaccine hesitant. An emerging challenge for health professionals is communicating with parents who are reluctant to immunize their children. Although the concept is not new, *vaccine hesitancy* is a relatively recent term that identifies less than ideal vaccine acceptance in a population despite accessible vaccination programs (Larson, 2013). Another definition focuses on confidence, complacency, and convenience, as evidenced by the following quote:

Vaccine hesitancy is a behavior, influenced by a number of factors including issues of confidence (do not trust vaccine or provider), complacency (do not perceive a need for a vaccine, do not value the vaccine), and convenience (access). (WHO, 2013, p. 1)

Eisenstein (2014), a journalist, insightfully suggests that parents are expected to give their child injections with biological matter that most people do not understand and prevent diseases that they have never seen, which can create a sense of hesitancy. Parents may be worried about potential side effects of vaccines, including minor swelling and, rarely, seizures and anaphylaxis (Eisenstein, 2014). They may also have been scared by myths that are still circulating, such as the discredited claim of a link between autism and measles

mumps rubella vaccine known as MMR vaccination (Eisenstein, 2014). At the same time, parents may be unaware of the threat to their child's health from vaccine-preventable diseases. Threats may include living through a serious illness such as pertussis/whooping cough, lifelong complications such as amputations, and even death (Eisenstein, 2014; Geddes, 2014; Rainey et al., 2011).

Renowned photographer Anna Geddes (2014) released an e-book titled *Protecting Our Tomorrows: Portraits of Meningococcal Disease*, which includes haunting, posed photographs of physical losses related to meningococcal disease. The images are supplemented by distressing yet resilient stories shared by these survivors of meningococcal infections. To view the images, press control and click on the following link: <http://protectingourtomorrow.tumblr.com>

Geddes's (2014) e-book highlights tragic complications related to meningococcal infection. The impact of this book is uncertain, but it is powerful and memorable. Anna Geddes (2014) hopes that her art will help parents recognize the value of immunizing their children and avoiding the heartache that survivors and their families have endured. Research to study the impact of Geddes's (2014) approach would contribute to our understanding of the effectiveness of the arts in communicating with parents about the value of immunization.

Sadaf, Richards, Glanz, Salmon, and Omer (2013) completed a Cochrane meta-analysis of interventions to reduce vaccine refusal and hesitancy including parent education, vaccine exemption policies, and state laws. Thirty studies were reviewed. The authors concluded that there was a lack of strong evidence on effective interventions to reduce parental refusal or hesitancy and recommended future research (Sadaf et al., 2013). The lack of strong evidence on effective interventions to guide practice with hesitant parents is challenging for health professionals.

The Strategic Advisory Group of Experts (SAGE) is the principal advisory group to the WHO for vaccines and immunization. There is an earnestness to address vaccine hesitancy because the anticipated achievements of the "Decade of Vaccines" and the "GVAP" cannot be realized without the co-operation of the global community of parents, as well as professionals, and organizations (WHO, 2012; WHO, UNICEF, & World Bank, 2009). SAGE recently completed a literature review on vaccine hesitancy. This literature review associates vaccine hesitancy with a complex set of factors, relationships, and priorities (SAGE Working Group on Vaccine Hesitancy 2013). To connect to the review, press control and click on the following link: http://www.who.int/immunization/sage/meetings/2013/april/2_Systematic-lit_Review.pdf. This literature review offers insights into hesitant parents that are of value to health professionals.

Confidence in vaccines falls on a continuum from complete refusal to complete trust in the safety of vaccines and the vaccine delivery system (SAGE Working Group on Vaccine Hesitancy, 2013). Lack of confidence in vaccines

can result in total refusal, delay, or selective acceptance of childhood vaccinations (SAGE Working Group on Vaccine Hesitancy, 2013; WHO, 2013). In “Working With Vaccine Hesitant Parents,” Macdonald and Finlay (2013) suggest that motivational interviewing and directed evidence-based information are most helpful in developing a working relationship with hesitant parents. The NIS goals incorporate professional and public acceptance of vaccination programs as well as reassurance that optimal safety and effectiveness strengthen confidence resulting in vaccine acceptance.

Vaccine complacency happens when parents are unable to define or recognize the risk of their child contracting a vaccine-preventable disease (SAGE Working Group on Vaccine Hesitancy, 2013; WHO, 2013). Convenience reflects the parental vaccination experience as it relates to ease of access and comfort (WHO, 2013). Time, place, comfort, and affordability are all considerations for vaccine programs. The CIG–Evergreen Edition (NACI & PHAC, 2012) notes that pain and anxiety related to the injection are determinants of vaccine hesitancy. Health care providers have an important role in addressing parental and child concerns.

Parental concerns about vaccinations for healthy children are different from parental concerns related to health care for a child suffering from an illness or a condition (NACI & PHAC, 2012). Despite their overall positive uptake at a community level, 40% of Canadian parents surveyed express fears related to the safety of vaccines for their children (PHAC, 2011). Parents expect to understand the risks and benefits associated with vaccinations, prior to making an informed choice (Dube et al., 2013; Hagood & Herlithy, 2013; Larson, 2013). Educating parents about vaccine safety increases confidence and is an important role for all health care professionals, not just for health professionals who actually vaccinate children. It will take a collective effort to ensure Canadians continue to enjoy positive child health outcomes related to vaccination programs (Hagood & Herlithy, 2013).

Open and supportive communication between health professionals and parents is a key strategy to promote informed parental choices about childhood immunization (Austvoll-Dahlgren & Helseth, 2010). Health professionals need to develop an excellent knowledge base to be able to skillfully facilitate parents’ learning about the complexity of child immunizations, and they need to engage in a parent-centered approach (NACI & PHAC, 2012). This dialogue should include building on current client knowledge and referring to reputable websites for vaccine-preventable diseases (Austvoll-Dahlgren & Helseth, 2010; NACI & PHAC, 2012).

Accurate evidence presented within a client-centered relationship is currently identified as the most supportive approach to work with the vaccine-hesitant parent (Macdonald & Finlay, 2013; NACI & PHAC, 2012). For example, parents often worry about the total number of vaccines their children receive, through childhood immunizations. Taking the time to

listen to parents’ concerns and clarify the science underlying immunizations is an important health professional role. When parents learn that in the 1980s, 3 childhood immunizations exposed children to 3,044 antigens, while today, prevention against 16 diseases, via 14 vaccinations, exposes children to only 177 antigens (Smith & Marshall, 2010), they are able to make a more informed choice about vaccinating their children.

Parents today readily access the Internet and are able to locate research articles, without necessarily having the skills to critically appraise the value of the research. They also hear health news via television and social media, which may report on a new research study or a concerning experience related to vaccinations. Health professionals utilize communication skills to discuss parental concerns that arise from social media, media, and published research. For instance, if parents read about a new vaccine for pregnant women that reduces newborn infection, they may seek advice from trusted health professionals about its value. Health professionals can listen to parental concerns, educate parents about the complex process of expert review for new vaccines, and clarify whether the new immunization is on the approved public health vaccination schedule.

Health professionals are expected to review the scholarly literature and keep up-to-date with new developments so they are ready to respond to questions from parents such as those related to vaccinations in pregnancy. Two of the four retrieved Cochrane Collaboration meta-analyses examine the outcomes of immunizing pregnant women against vaccine-preventable diseases to prevent newborn infection. Chaithongwongwatthana et al. (2012) reviewed pneumococcal vaccination during pregnancy and concluded that there was inadequate evidence to assess the impact of maternal vaccination on infant infections. Currently, the CIG–Evergreen Edition states that pneumococcal vaccine is recommended for pregnant women with underlying conditions making them at risk of invasive disease (NACI & PHAC, 2012).

Chaithongwongwatthana et al. (2012) suggest that trials of neonatal pneumococcal immunization would be of value and might eliminate the need for further studies of pneumococcal vaccination on pregnant women. A second meta-analysis by Sangkomkarnhang, Lumbiganon, and Laopaiboon (2011) found insufficient evidence available to assess the impact of immunizing pregnant women, with Hepatitis B vaccine, on infant infection; future RCTs were recommended.

It is important that health professionals are up-to-date with both the current scholarship on vaccinations and the experts who guide care in their own health care contexts. Some country guidelines recommend pertussis vaccine during pregnancy. Currently in Canada, experts do not routinely recommend pertussis vaccine during pregnancy. Pertussis containing vaccine can be given post partum if the mother is not already vaccinated to help protect the newborn or in

particular situations when benefits outweigh the risks in late pregnancy (NACI & PHAC, 2012). Understandably, this can be confusing for parents. Health professionals who are prepared to respond to parental questions support the goals of the GVAP.

Administration of Immunizing Agents

Perhaps the biggest shift in immunization practice is the new urgency to reduce and manage immunization pain and anxiety in children and youth, including educating parents about pain management during injection (Taddio et al., 2012). By the time a Canadian child reaches the age of 19 years, depending on provincial/territorial programs, most will have received up to 26 immunization injections (Laroche & Diniz, 2012). Research has established that immunization injections are the most common reason for iatrogenic or procedure-induced pain in infants and children (Taddio et al., 2010). Pain from the shot or needle puncture has been noted as a common barrier to receiving vaccines and can lead to nonadherence to vaccine recommendations across the life span, needle avoidance, vaccine hesitancy, and increased vaccine-preventable diseases (Taddio et al., 2012).

An effective pain management approach improves the immunization experience of children, parents, and the immunizer, and promotes vaccine program acceptance (Taddio et al., 2010). One identified best practice for infants is combined analgesia, which produces approximately 10 minutes of analgesia. Combined anesthesia begins with establishing a good latch and breastfeeding an infant for 1 minute prior to injection, then continuing to breastfeed for several minutes following the needle (Taddio et al., 2010). Cuddling, promoting sucking, and a sweet taste work in combination to enhance the analgesic effect (Taddio et al., 2010). Other infant analgesic methods advocated by Taddio et al. (2010) include offering babies unable to breastfeed under 1 year between 2 and 10 mL of a sugar–water mixture (one packet of sugar dissolved in 10 mL of water) using a small cup, oral syringe, or pacifier.

Other physical approaches to pain management include keeping babies and children in an upright supported position and encouraging parents to cuddle during the injection, a cost-free approach to pain reduction (Taddio et al., 2010). For 3-year old children, child led distractions such as blowing bubbles or deep breathing are shown to be helpful. For a child above 4 years, stroking the skin near the injection site creates analgesia for injection (Taddio et al., 2010). Using topical anesthesia creams designed for immunizations and giving the more painful immunization injection last when administering more than one vaccine at a visit are also known to provide pain control (Taddio et al., 2010). Advocating for government procurement of vaccines, which cause less pain than alternatives, is an important health professional and public health policy role.

In the case of school-based childhood vaccination programs, one qualitative study found that participants, girls,

aged between 11 and 12 years, experience fear waiting to be vaccinated for HPV in the school (Cooper Robbins, Bernard, McCaffery, & Skinner, 2010). Pain management was more readily accepted when it followed education about the value of having the HPV vaccine (Cooper Robbins et al., 2010). Distraction methods of pain management such as listening to an iPod and peer support during immunization were used effectively in this age group (Cooper Robbins et al., 2010). Health professionals are encouraged to integrate client focused pain management techniques when vaccinating.

Studies on the use of oral analgesics such as acetaminophen, prior to vaccination, have shown no effect on pain at the time of injection (Taddio et al., 2012). In addition, advising children that the needle will not hurt is ineffective and may undermine a trusting relationship between the child and health care provider (NACI & PHAC, 2012; Taddio et al., 2010, pp. 1992-1993).

To administer immunizations safely, health professionals need to follow vaccine product delivery directions and up-to-date immunization guidelines. Aspiration is no longer considered a best practice for either subcutaneous or intramuscular injections of vaccines and immunization (Crawford & Johnson, 2012). There are no research data to support the use of aspiration, but there is evidence to show that aspiration and slow prolonged injection time cause an increase in pain in children (Crawford & Johnson, 2012; Taddio et al., 2010). Current best practices focus on injection technique, correct needle size, careful land-marking, and speed of injection (Crawford & Johnson, 2012; Ipp, Taddio, Sam, Goldbach, & Parkin, 2007).

Vaccination administration best practice techniques that health professionals need to incorporate with subcutaneous injections are use of a 1.6 cm (5/8 inch) 25-gauge needle, with a pinch of skin lifted from the muscle, and a 45° angle insertion (NACI & PHAC, 2012). Intramuscular injection best practices include use of a 22- to 25-gauge needle, use of a needle that is long enough to reach muscle, holding the skin taut and a 90° angle needle insertion, in addition to use of the vastus lateralis muscle (anterolateral thigh) in infants <1 year of age, and normally, using the deltoid muscle of anyone ≥1 year of age (NACI & PHAC, 2012). If two injections are being given, the use of two limbs is advised while for multiple injections, more than one injection can be given in a single limb, as long as there is at least one inch between injections and precise site documentation is completed (NACI & PHAC, 2012).

Documentation of Immunization

No meta-analyses were identified that review documentation of immunizations. Current best practices are based on Canadian practice guidelines. Best practices confirm the need for health professionals to record vaccines accurately and completely each time they give a vaccine (NACI & PHAC, 2012). The minimum data to be recorded in the client's record include the name of the vaccine, the date (day,

month, and year) and route of administration, the anatomical site, the name of the vaccine manufacturer, the lot number, and the name and title of the person administering the vaccine (NACI & PHAC, 2012). The completed document provides a reference point in the uncommon event of an adverse event following immunization (AEFI; NACI & PHAC, 2012).

In 2013, the CIG–Evergreen Edition vaccine safety section was updated to further support Canadian practitioners' understanding of vaccine pharmacovigilance including identification and reporting of AEFIs (NACI & PHAC, 2012). An AEFI report includes a detailed description of the event, its duration, health care utilization, treatment, and the final outcome (NACI & PHAC, 2012). AEFI reports are analyzed to monitor vaccine safety and to detect possible vaccine safety signals which may warrant further research, and might lead to an action, such as recalling a vaccine lot (NACI & PHAC, 2012). While we do not have mandatory reporting of AEFIs nationally, laws requiring health professionals to report AEFIs have been enacted in some Canadian provinces and territories (Gahunia, Bigham, Konrad, & Snow, 2013). Complete and accurate documentation by those vaccinating contributes to timely and thorough reporting of AEFIs and reassures the public about immunization safety.

Health professionals are encouraged to keep separate or easily retrievable summaries of vaccination records to expedite vaccine eligibility assessment when the client is in the office (NACI & PHAC, 2012). In addition, depending on your province/territory and the child's age, either the health care provider or parent is required to ensure the local public health system is updated with the recent vaccines received by the child (NACI & PHAC, 2012). This provides data for public health professionals to assess immunization coverage, plan and evaluate public health programs, as well as target vaccine promotion and programs for families in communities with lower vaccine coverage rates (NACI & PHAC, 2012).

Vaccine registries enable vaccine record keeping, and have wide-ranging benefits. These information software applications have the capacity to issue recall/reminders if overdue for a vaccine, record immunization events, and notify clients when immunizations are due (Laroche & Diniz, 2012). At a population level, comprehensive vaccine registries are the gold standard for the assessment of vaccine coverage, vaccine effectiveness, and vaccine safety (Laroche & Diniz, 2012). The registry can include barcoding of vaccines with a scan function to assist with data accuracy (Laroche & Diniz, 2012). An ongoing Canadian goal is to establish a compatible comprehensive national immunization registry similar to Australia's (Laroche & Diniz, 2012).

Following vaccine administration and recording, health professionals need to ensure that parents are prepared for their responsibilities. Health professionals provide each child's parents with a personal copy of their child's vaccination record card and remind parents to keep it in a safe place

and have it updated whenever their child receives a vaccine (NACI & PHAC, 2012). Parents need to know that they are responsible for providing a photocopy of the record when requested for school entrance, camp enrolment, and other registrations. Promoting safe keeping of and accurate child health records remains a challenge in Canada. Laroche and Diniz (2012) reported that 30% of parents misplace immunization records, 15% report incomplete records, and 24% of records contain data entry errors. Technology may offer an improved opportunity for parental record keeping.

Recently, the Ottawa Hospital Research Institute (2012) developed a smart phone application (app) for recording immunizations and reminding parents when the next vaccine is due. The iPhone app, "ImmunizeON," was introduced in Ontario for infants born after August, 2011. This new technology is a welcome alternative to the traditional yellow card, appealing to young parents who are technologically savvy and utilize smart phone apps in many aspects of their lives. Parents have access to timely, reliable vaccine information, they are advised when immunizations are due, and their child's immunization status is tracked onto an electronic yellow immunization card (Ottawa Hospital Research Institute, 2012). This app has recently been released by Immunize Canada and is available for parents to use across Canada. The ImmunizeCA app is free and can be downloaded from iTunes, GooglePlay, or BlackBerry World via <http://www.immunize.ca/en/app.aspx>

Completing an individual immunization record after each child vaccine is administered will produce a record of all the vaccines a person has in infancy, childhood, and adolescence. This documentation contributes to health care throughout the life span. For instance, a young adult presenting for medical care with symptoms of measles would be assessed based on his or her clinical, travel, and vaccination history. They would carry a lower index of suspicion if they had received the recommended schedule of measles vaccinations. The efficacy of vaccination with two doses of MMR vaccine after the first birthday approaches 100% protection from measles infection (NACI & PHAC, 2012). In addition to vaccination status, the client assessment would include epidemiological links to confirmed measles cases, travel to measles endemic areas, and presenting symptoms.

Another instance where the lifetime vaccine record is needed follows acceptance of employment in a health care setting. These data ensure the health worker is protected from vaccine-preventable diseases at work and prevent the need for costly reimmunizing or laboratory blood testing as proof of immunity for employment purposes.

Conclusion

Canadian health professionals are encouraged to reflect on immunization competencies and ensure evidence-based practices underpin vaccine delivery in their primary care settings. Vaccine hesitancy can be addressed through effective

communication, including evidence-based discussion about vaccinations. Health professionals who communicate about immunization using parent-centered approaches, provide children with adequate pain management when administering vaccinations, and rigorously document each vaccination, play a key role in protecting child health in their communities. New research on effective approaches to respond to parental concerns and reduce vaccine refusal and hesitancy is needed to increase vaccine acceptance in the future.

Canadian health professionals contribute to achieving the vision of the WHO's "Decade of Vaccines" and GVAP by immunizing Canadian children. Health professionals in other countries contribute to the WHO's "Decade of Vaccines" and GVAP by immunizing children in their home countries. Collectively, we are protecting the health of the world's children.

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Author Biographies

Geraldine Jody Macdonald RN EdD is a Senior Lecturer at the Bloomberg Faculty of Nursing, University of Toronto, Canada. She has been a nurse educator for thirty years, specializing in Primary Health Care/Community Health Nursing. She teaches prenatal care to expectant parents and infant care to expectant grandparents through the Family Care Office at the University of Toronto.

Margaret A. McIntyre RN MN is a nursing consultant with Public Health Ontario's Immunization and Vaccine Preventable Diseases team providing scientific and technical advice to front line public health practitioners in Ontario. She holds a Masters of Nursing (Community Health) degree from the University of Toronto, and an adjunct lecturer position at the Bloomberg, Faculty of Nursing, University of Toronto. She has been in public health nursing practice for the past eighteen years.

Maureen A Barry RN MScN is a Senior Lecturer at the Bloomberg Faculty of Nursing, University of Toronto. Her clinical background is adult medicine and surgery and critical care. She has been a nurse educator for over twenty years. She has been involved in teaching the theory and administration of injections to nursing students and pharmacists.