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RESEARCH PAPER

"*It takes time to build trust*": a survey Ontario's school-based HPV immunization program ten years post-implementation

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ABSTRACT

Objectives: Describe Ontario's school-based human papillomavirus (HPV) vaccination program from the perspective of local public health units (PHUs).

Methods: In 2018, Vaccine Preventable Diseases (VPD) managers at each of Ontario's 35 PHUs were invited to participate in an online survey regarding the organization and delivery of their HPV vaccination program. Questions were asked on the school-based program, training and support of vaccine providers, communication and promotion, assessing coverage rates and perceptions of the program's strengths and challenges. Descriptive statistics were generated for close-ended items. A thematic content analysis was performed for open-ended items.

Results: Eighteen PHUs (54%, n = 19/35) responded. All responding PHUs provided the HPV vaccine in publicly funded schools but only 6 reported being permitted to provide HPV vaccine in private schools. Fact sheets, Q&As or other written information locally developed by the PHUs were the main tools used to communicate with parents (n = 17), students (n = 13), school personnel (n = 13) and school board officials (n = 9). The most frequently reported barriers were: limited program resources, negative perceptions held by parents and/or school staff regarding the HPV vaccine, logistical issues (e.g., getting the consents forms returned, collaboration with schools for vaccine delivery) and the fact that HPV vaccination is not mandatory under Ontario legislation.

Conclusion: Local public health units that implement HPV vaccine programs in schools identified logistical barriers, public perceptions about the HPV vaccine and the voluntary nature of the program as the main barriers.

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Introduction

School-based immunization programs, or routine administration of publicly funded vaccines in schools, exist in all Canadian provinces and territories, but the immunizations included in these programs slightly vary from jurisdiction to jurisdiction. In Ontario, the school-based vaccination program includes meningococcal vaccine (Men-C-ACYW), the hepatitis B vaccine and the HPV vaccine. Informed consent packages for vaccines administered in schools are usually sent home with students in early September. Parents are requested to return the forms noting whether or not they provide their consent for vaccination. Of the three school-based vaccines, only the meningococcal vaccine is required for school attendance, unless a valid exemption is provided. Ontario's Immunization of School Pupils Act (ISPA) requires that all students be appropriately immunized, unless they have a valid medical or religious/philosophical exemption, against several vaccine-preventable diseases (diphtheria, tetanus, polio, measles, mumps and rubella, invasive meningococcal disease, pertussis and varicella).[1]

In Canada, vaccination against HPV has been recommended by the National Advisory Committee of Immunization (NACI) for females since 2007 and was extended to males in 2010.[2] All Canadian provinces and territories now have publicly funded, school-based vaccination programs that are gender neutral, albeit at different ages and with different dosing schedules.[3] HPV vaccination programs have faced many challenges since their introduction, including negative media coverage and, in some jurisdictions, opposition from publicly-funded Catholic schools boards.[4,5] The national coverage goal for HPV programs is 90%[6] but unfortunately, coverage has been well below public health goals in many provinces, with substantial variation between and within Canadian provinces and territories. A recent review reported coverage estimates ranging from 55% for females in the Northwest Territories to 89% for females in Newfoundland and Labrador.[7] In the 2017–18 school year, the most recent year where data are available in Ontario, coverage ranged from 43% to 71% when assessed at the public health unit (PHU) level.

Ontario's publicly-funded school-based HPV vaccination program was initiated in September 2007 with a three-dose schedule of HPV4 vaccine (Gardasil®) for grade 8 females. A number of changes have occurred over time including eligibility to receive the vaccine (Table 1). Since the 2016–2017 school year the program

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Table 1. Overview of program changes to Ontario's school-based HPV immunization program.

Year	Ontario's publicly funded HPV vaccine eligibility and program changes
September 2007	Program introduction to females in grade 8 (birth year 1993) using HPV4* vaccine with a three-dose schedule
2008 to 2011	Extended eligibility for all grade 8 females who received one dose of HPV vaccine in grade 8 to complete the series in their grade 9 school year
2012–13	One-time catch-up campaign for females born in 1993–1998 who did not start or complete the HPV vaccine series
2015–2016	Shift to a two-dose HPV4 vaccine schedule (if first dose aged 9 to 13 years old)
2016–2017	Changed HPV4 to grade 7 (to administer with meningococcal and hepatitis B vaccines in schools)Males now eligible for HPV 4 (birthyear 2005)HPV eligibility extended until the end of grade 12 (August 31st) to all students who were ever eligible for publicly funded vaccine.
2017–2018	HPV eligibility expanded to men who have sex with men 9 to 26 years of ageHPV4 product switch to HPV9** for grade 7 students (birth year 2006); 2 dose if first dose between 9 to 14 years of age (2017/18 school year)Students born before 2006 and still needing to start or complete the series eligible for HPV4
2019	HPV4 no longer available – switched to HPV9 for all eligible (2 doses if first dose between 9 to 14 years, 3 doses if first dose ages 15 or older)

*Quadrivalent HPV vaccine. **Nonavalent HPV vaccine.

has been offered to both males and females in grade 7. The program is locally administered by 35 PHUs and is one of three school-based immunization programs for grade 7 students, in addition to hepatitis B and meningococcal vaccines. HPV coverage is considerably lower than coverage for the other two school-based programs. In the 2017–18 school year, provincial coverage was 60% for HPV (2 doses), 69% for hepatitis B (2 doses) and 82% for the one dose meningococcal conjugate program.

As part of a multi-jurisdictional project on HPV vaccination in schools in Canada,[8] the objective of our study was to describe the HPV vaccination program in Ontario from the perspective of local PHU Vaccine Preventable Diseases (VPD) managers to help elucidate the drivers and barriers of HPV vaccine acceptance and uptake in the province.

Methods

Study population and data collection

In the fall of 2018, we invited the VPD managers of Ontario's 35 PHUs to participate in an online survey regarding the organization and delivery of their local HPV vaccine program via an e-mail invitation. The survey's content included close- and open-ended questions on the program, training and support of vaccine providers within the PHU, communication and promotion of the program, vaccine coverage assessment and perceptions of the program's strengths and challenges related to the most recent school year (2017–18). The survey was developed based on a previous study conducted in the province of Quebec and tools used in the multi-jurisdictional project on HPV vaccination in schools in Canada.[8,9] Three reminders were sent by e-mail to optimize the response rate of PHUs. The Ethics Review Boards of the CHU de Québec – Université Laval and Public Health Ontario approved this study.

Statistical analyzes

Descriptive statistics (frequencies and proportions) were generated for all survey items. Thematic content analysis was performed for qualitative responses using Microsoft Excel 2013.

Results

Nineteen PHUs (54%) responded to the survey. However, one PHU answered only 5 questions and was excluded from the analysis. Not all respondents completed all questions so the total number of respondents per question varied. As the survey was anonymous, it was not possible to identify which PHUs participated.

Description of the HPV vaccination program

The majority of respondents (15/18) reported that the delivery of the program occurred twice a year to provide both doses in local schools. The remaining three PHUs reported that nurses went into schools three times a year to deliver dose 1 and dose 2, with a final visit to immunize students who missed one of the clinics.

All PHUs (n = 18) indicated they provided the HPV vaccine program in public schools including publicly funded Catholic schools, while only 33% (n = 6/18) reported being permitted to provide HPV immunization clinics in all private schools. In 11 of 12 PHUs where school-based HPV immunization clinics are not provided in all private schools, private school students are invited to access HPV immunization services through the local PHU.

Most PHUs reported holding additional HPV vaccination clinics outside of the school-based program (n = 16/18). Parents usually needed to book appointments to have their children vaccinated in these clinics. There was diversity in the scheduling and organization of these "catch-up" clinics (i.e. evening clinics, monthly clinics, twice weekly clinics), which were generally not dedicated only to HPV vaccination.

> [Our PHU] holds community clinics monthly to catch up students who are missing school-based vaccines. We service elementary, secondary, private and home-schooled students. Information is given to students in the school system that are missing doses to call to book into the community clinic. A mail out is done annually to secondary students who are incomplete or have not started the series, to invite them to visit our community clinic to be immunized.

Some students also have the opportunity to access publicly funded HPV vaccine through their own health care provider (n = 16/18). In an open-ended question to comment on this process, some VPD managers reported they allowed health care providers to order HPV vaccine from the PHU to vaccinate students who have special circumstances such as disabilities, anxiety, allergies or behavioral issues. Typically, these requests were handled on a case-by-case basis. Two respondents noted that convenience was not considered a valid reason to provide the vaccine outside of the school-based program. When HPV vaccination is given outside of the school, healthcare providers must request a special order of HPV vaccine

from the local PHU and provide the name of the student following immunization.

All PHUs reported that teachers and other school staff typically assisted in consent form distribution and reminding students to return the consent forms in advance of the clinic. Some are also involved in coordination on the day of the clinic, including bringing the students to the clinic location within the school.

To obtain parental informed consent, the usual practice reported by 17 of the 18 VPD Managers was to ask students to deliver written documents about the HPV vaccine to their parent(s) or legal guardian(s) and to return completed consent forms prior to the clinic. In one PHU, the form that parents and guardians receive is called "parental awareness" and it informs the parents/guardians that the student will be offered the vaccine at a school clinic. On the day of the school clinic, the student signs the consent section on the form if they agree to be vaccinated (i.e., no parental consent is needed).

Training and support for nurses

For the 2017–18 school year, 12 of 18 PHUs offered specific training for nurses administering school-based immunization programs. The type of content covered by the training is presented in Table 2. Training was mostly carried out in person (reported by 11 of 12 respondents), but in one PHU training was one-on-one, by telephone or through a web presentation.

All PHUs reported offering support to their nurses during HPV immunization delivery. Support mainly included technical assistance by phone (15/18 PHUs) and practice support tools (paper or electronic) (15/18 PHUs).

Communication and promotional tools used

For the 2017–18 school year, fact sheets, "Q&As" or other written information locally developed by PHUs were the main tools used to communicate with parents (n = 17/18), students (n = 13/17), school personnel (n = 13/18) and school board officials (n = 9/15). Some reported using online resources (e.g. the PHU's website). Very few respondents reported using material developed provincially (e. g., Ontario Ministry of Health and Long-Term Care fact sheet on HPV), and none reported using written information developed by national organizations (e.g., Immunize Canada or Public Health Agency of Canada materials). For school personnel and school board officials, some PHUs reported (n = 9) sending communication about the program. Usually, the dissemination of these communication and promotion tools occurred during the fall of the school year (n = 14), or during the spring or the summer preceding the school year (n = 5). All 17 PHUs reported sending additional communications to students who were away on the day of the school-based clinic (i.e. letter, telephone call, information sheets, or written notification to the parent).

In light of Ontario's low HPV coverage of 60%, respondents were asked if any strategies or interventions have been implemented in their PHU to improve coverage. Among the 10 respondents who provided an answer, a large array of strategies or interventions had been implemented over time, mainly targeting parents and students, such as online information, calling parents, recalling students, sending information home, communicating directly with students and other communication campaigns. The majority of these strategies were implemented in response to changes in the HPV program (i.e. schedule, vaccine type, grade eligibility and gender(s)). Two PHU evaluated their strategies.

Table 2. Type of content covered in the 2017–2018 school year training offered to school-based HPV vaccine providers.

Type of content covered by the training (n = 12)	% including this content
HPV vaccine program and schedules (e.g., new vaccines, changes in program)	100% (n = 12)
Roles and responsibilities in school-based immunization programs	92% (n = 11)
HPV vaccine safety and management of adverse events following immunization (AEFI)	83% (n = 10)
HPV vaccine efficacy (e.g., duration of protection)	67% (n = 8)
Communication approaches (e.g., addressing common misperceptions about HPV, communicating with vaccine-hesitant parents, motivational interviewing)	58% (n = 7)
Immunology and vaccination in general (e.g., vaccine-preventable diseases, target groups, how vaccines work, herd immunity, etc.)	42% (n = 5)

HPV vaccine coverage assessment

Fifteen of 17 respondents indicated using the HPV coverage estimates centrally prepared by Public Health Ontario. Coverage estimates are frequently shared with senior leadership within their PHU (n = 16) and with the PHU's Board of Health (n = 9). Estimates were rarely shared with local health providers (n = 4), with the public (n = 3) or with local media outlets (n = 4). For the 2017–2018 school-year, 13 PHUs out of 17 who responded indicated they plan to analyze their PHU's HPV vaccine coverage information by series completion for all students attending a school within their PHU's jurisdiction. Other planned local coverage indicators included series completion by gender (n = 8), series completion by school (n = 8), and series initiation (n = 6).

Perceived strengths and challenges

PHU respondents were asked to identify the strengths and barriers of Ontario`s school-based HPV vaccination program. Thirteen respondents indicated one or many strengths and five did not responded to this question. The changes made to the HPV program over time were generally perceived as a strength (n = 2), in addition to having good partnerships and support from school boards (n = 5), having dedicated nursing staff to administer the program (n = 3), the perception that offering the vaccine in schools increased accessibility and convenience (n = 5), and the communication efforts made by local staff (e.g., reminders and recalls) (n = 3).

> School based immunizations decrease barriers to accessing vaccines (i.e. no appointment required, no HCP required)- they make vaccines "normalized" within a school environment ("everyone gets vaccines in Grade 7" peer acceptance) – they provide students with the opportunity to make independent health care decisions ("I can decide about my own health!") in a safe and positive

environment. They provide an opportunity to educate students/teachers about vaccines.

The main barriers cited included the lack of capacity and resources to provide education, promote the program, and address low vaccine uptake (n = 12 respondents). Other barriers included the negative perceptions held by parents and, or school staff regarding the HPV vaccine including concerns about HPV vaccine safety and effectiveness and the 'newness' of the vaccine. Logistical barriers were also identified including getting the consent forms returned, competing priorities within the school setting, and challenges implementing the program in some publicly funded Catholic and private schools.

Respondents felt that the following changes to the program had an impact on HPV vaccine coverage (Table 3): making the program gender-neutral (n = 9), providing the vaccine at school clinics at the same time as other school-based immunization programs (n = 11), changing the schedule from three to two doses (n = 9), and providing the vaccine in Grade 7 (students aged 12 years at the beginning of the school year) instead of Grade 8 (students aged 13 years at the beginning of the school year) (n = 4). Respondents were also asked to categorize impact as positive or negative and provide examples and additional comments in an opened-ended question (Table 3). Not all participants responded.

Finally, respondents were asked about the reasons why they felt that HPV vaccine coverage in Ontario is substantially lower than for the other school-based programs (i.e. hepatitis B and meningococcal vaccines). The main reasons cited were around parents' concerns (vaccine safety concerns, the perception that the HPV vaccine is newer than other vaccines offered in schools, concerns with the sexual health messaging associated with the vaccine), and the spread of HPV vaccine misinformation online including on social media sites. Some respondents commented that variation in coverage for Ontario's school-based immunization programs is also influenced by the fact that only one of the three vaccines offered is outlined under Ontario's school-entry immunization legislation, the *Immunization of School Pupils Act* (ISPA).

> HPV is relatively new and came with controversies that eroded public confidence. It takes time to build trust in larger authority bodies such as the government and the ministry. Educational messages about the benefits of HPV highlights to the public the importance of the vaccines. Sometimes celebrity illnesses that highlight the benefits of vaccination and specifically HPV has a positive impact for the public. Overall, parents want to know that the vaccine is safe for their children and that there are no permanent side effects to the vaccine. It is now 10–11 years since the vaccine was publicly funded, Hepatitis B and Meningococcal has been around for significantly longer. Making the vaccine gender neutral also will improve coverage over time. Voluntary vaccine coverage will always be in question about health promoting factors that reach out to parents/students, because they are not legislated, choice is just that choice, and some parents like to exercise their choice options.

> I believe some parents are still concerned about the safety and efficacy of the vaccine. I also think that there is some stigma attached to HPV being a sexually transmitted infection. Although some parents may support their child receiving the vaccine, they feel there is no urgency as their child is not yet sexually active in Grade 7.

> Meningococcal is required under ISPA so is likely higher due to that reason. If students don't want three vaccines in one visit HPV is often the one that is put off as the eligibility is longer. Parents don't see that their child needs the vaccine in Grade 7 and it can wait. There is still a misconception about vaccine safety for HPV.

> This vaccine is still getting a bad wrap for being unsafe and there are always new social media posts that terrify parents. People have

Table 3. Respondents' opinions regarding the impact of changes to the program since its implementation (n = 16).

Changes in the Ontario's school-based HPV vaccination program	Perceived impact on HPV vaccine uptake
Providing HPV vaccine at the same time as other vaccines (i.e. hepatitis B, quadrivalent meningococcal conjugate)	Positive or negative impact: 11 (69%) **Reported examples of positive impact on HPV vaccine uptake**: Less appointments, vaccine normalization (cancer prevention rather than sex related), convenience **Reported examples of negative impact on HPV vaccine uptake**: 3 vaccines administered at one visit (3 needles) No perceived impact: 4 (25%) Unsure/I do not know: 1 (6%)
Changing the program to be gender-neutral (i.e. expanding to include boys)	Positive or negative impact: 9 (56%) **Reported examples of positive impact on HPV vaccine uptake**: Eliminated the discussion about why females and not males, normalized vaccines to "all" not just "some. **Reported examples of negative impact on HPV vaccine uptake**: We have received numerous complaints on how this program remains inequitable with genders. No perceived impact: 4 (25%) Unsure/I do not know: 3 (19%)
Changing the schedule used in the program from a 3 to 2 doses	Positive or negative impact: 9 (56%) **Reported examples of positive impact on HPV vaccine uptake**: Better compliance (less needles), more easily able to complete series in school clinics (i.e. in the school year) **Reported examples of negative impact on HPV vaccine uptake**: None reported No perceived impact: 3 (19%) Unsure/I do not know: 4 (25%)
Changing the program's target from grade 8 to grade 7 students	Positive or negative impact: 4 (25%) **Reported examples of positive impact on HPV vaccine uptake**: More easily able to coordinate one class/grade rather than 2; younger students don't relate so much "sex" as they do "cancer prevention". **Reported examples of negative impact on HPV vaccine uptake**: Parents think children do not need it as they are not sexually active, parents think it is too soon to receive the vaccine No perceived impact: 5 (31%) Unsure/I do not know: 7 (44%)

normalized the hepatitis B vaccine as something you need for travel, meningococcal is now mandatory, so parents generally comply. But HPV in society has been tied to an sexually-transmitted disease and parents are uncomfortable with that subject matter. Once we have the opportunity to discuss that it is a cancer vaccine, they will consider it at least.

Discussion

Delivery of vaccination in school-based programs is recognized as an effective platform to achieve high vaccine uptake.[10] School-based programs decrease barriers to vaccination services (i.e, no appointment needed and no need for parents to take time off of work or incur other costs (i.e. transportation)) and in doing so, have the capacity to increase equity in vaccine coverage. Despite these tremendous advantages, in Ontario, HPV coverage is 60% and well below the national goal of 90% coverage.[6] Furthermore, HPV vaccine coverage lags behind that of other school-based vaccines given at the same time. Findings of this study indicate that low HPV vaccine uptake in Ontario's school-based program may be a result of many interrelated factors at the societal level (e.g., negative media coverage of the vaccine[11]), at the organizational level (e.g., limited resources for the program, frequent program changes, challenges in catching-up students missing one or more doses, etc.), at the policy level (e.g., only one of the three school-based vaccine programs are required for school attendance under the ISPA), and at the individual level (e.g., parents' negative perceptions and concerns regarding the HPV vaccine). Further research is needed to identify and understand how these social factors compare across jurisdictions in Canada.[7]

In a previous study, interviews were conducted with Ontario VPD managers as part of a process evaluation of the first two years of the school-based HPV immunization program.[12] At that time, the participants reported several challenges, including limited time between the program's announcement and the start of the school year, the program's limited eligibility (at the time of the study, grade 8 girls remained eligible until the end of grade 9, but only if they received at least one dose while in grade 8) and the refusal of two publicly-funded Catholic school boards to participate in the program at different points in time.[12] Interestingly, some of the challenges identified in the study conducted at the beginning of the program were also identified in the present study. Nine years later, issues with managing parental informed consent, collaboration with schools for delivery of vaccinations, and catch-up of missed doses were still noted as important barriers to the HPV program. For example, research has shown that providing opportunities to receive missed doses in schools through catch-up programs is important in optimizing coverage,[7] but not every PHU in our study reported this practice.

Other barriers cited including the negative perceptions held by parents and school staff regarding the HPV vaccine including concerns about HPV vaccine safety and efficacy need to be addressed in a comprehensive strategy pertaining to misinformation and vaccine hesitancy.

Another issue was around PHU practices in obtaining informed consent for immunization. The *Health Care Consent Act* provides the legislative basis for the requirements of informed consent to treatment in Ontario.[13] Although there is no minimum age for consent, traditionally schools request parental consent and parents expect to provide consent for childhood and adolescent immunizations. However, each PHU is responsible for developing the informed consent material for school-based programs and can adopt different practices. As shown in our study, this results in important practice variability (i.e., one PHUs reported accepting the students' consent while all the others require parental consent) which may impact coverage.[14]

Important issues with implementing the HPV program in some Catholic school boards were identified by PHUs in the previous study. However, all respondents in our study mentioned that HPV vaccines are delivered in all publicly funded Catholic schools in their PHU, which is reassuring. However, only one third of the PHUs reported being permitted to provide HPV immunization clinics in all private schools. Identifying why private schools are still not allowing local PHUs to provide HPV vaccination clinics is important to understand, especially if these same private schools are allowing the other school-based vaccinations (meningococcal and hepatitis B).

Providing vaccines in school-based vaccination programs is recognized as one of the strongest measures to increase vaccination coverage rates.[15] Even in school-based programs, it is still possible to implement interventions to enhance vaccine acceptance and uptake. In addition, to reminder and recall systems that are shown effective,[16] promising interventions are currently being tested in Canada. The CARD system (C-Comfort, A-Ask, R-Relax, D-Distract) has shown positive impact on student attitudes, knowledge, coping strategies used, and symptoms during school-based vaccinations.[17] The Kids Boost Immunity (KBI), a Canadian web platform designed to increase students' knowledge about immunization, can be an effective way to increase students' knowledge and motivation regarding vaccination.[18]

There are some limitations to this study. First, our response rate is high for a survey to health professionals (51%), but it is low compared to the response rates of the last two studies conducted with Ontario's PHUs where all PHUs responded.[12,19] A response bias is possible as respondents may be systematically different from non-respondents. We also used self-report by VPD managers to describe the program's drivers and barriers. Social desirability bias cannot be excluded although this risk should be mitigated by the fact that the survey was anonymous. Also, this survey considers only the views and opinions of VPD managers and did not survey students, parents or school administrators on their perspectives. Finally, surveying another Canadian province or territory with high vaccine uptake would have enabled us to compare our results and, by doing so, giving us an insight on practices that could help Ontario boosts its vaccination rates.

Conclusion

This study describes the implementation of Ontario's school-based HPV vaccine program, including perceived strengths and barriers, from the perspective of immunization managers responsible for local program delivery. The results suggest that there are many barriers to HPV vaccine acceptance and uptake

at the individual, organizational, policy and societal levels. Many of the challenges that were identified in surveys with VPD managers almost ten years ago still persist. Strategies to increase HPV vaccine uptake are urgently needed. The existing literature provides no strong evidence to recommend any specific intervention to enhance HPV vaccine acceptance for wide-spread implementation in school settings;[20] however, this study has identified several logistical barriers in the Ontario-context that could be acted upon. Given the wide variation in HPV vaccine coverage between PHUs, future studies should identify successful process elements adopted by PHUs with high HPV coverage with the aim of informing practices in PHUs with lower HPV coverage. Best practices for the logistics of organizing and delivering vaccines in school-based programs (e.g., standardized information and processes to obtain informed consent, reminders/recalls and the organization of catch-up clinics for students who have missed doses,) could potentially be identified and harmonized across PHUs.

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No potential conflicts of interest were disclosed.

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