Method of Administration Affects Adolescent Post-immunization Survey Response Rate: Phone, Paper, Internet

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ABSTRACT

The recent introduction of new vaccines into the school-based immunization program in British Columbia (BC) included monitoring of adverse events following immunization (AEFI) for these new vaccines. This commentary discusses different methods used to collect AEFIs in school immunization campaigns and the effects on response rate. The results of a study using an internet-based tool inspired this paper. The study examined adverse events following human papillomavirus (HPV) vaccine given to grades 6 and 9 students. The low response rate of the internet survey resulted in insufficient findings regarding adverse events. Consequent to the analysis of the study's data, a literature review was conducted to examine survey methodologies used to collect adverse event data following school-based immunization of adolescents. A PubMed search used various combinations of the following terms: vaccine, immunization, immunization programs, reactogenicity, adverse reactions, safety, adolescent, schoolchildren, and survey. Potentially relevant papers were identified based upon the titles and abstracts and subsequently reviewed. Only four studies were deemed appropriate for comparison purposes: all were done in Canada.

Key words: Immunization; adolescent; data collection; adverse effects

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The recent introduction of new vaccines into the school-based immunization program in BC included the monitoring of adverse events following immunization (AEFI). This was done to determine the rate and severity of adverse events for an individual vaccine, and to compare different combinations of vaccines administered in the same or different arms. Currently in BC, students are offered meningococcal C conjugate [MCC], hepatitis B virus (HBV), and varicella vaccines in grade 6 and diphtheria/tetanus/acellular pertussis vaccine (Tdap) in grade 9.¹ In addition, female students in both these grades are offered human papillomavirus (HPV) vaccine. With up to four vaccines being offered at one visit, it is important to determine the site and combination of administration that minimizes potential AEFI.

METHODS

A number of methods have been used to identify AEFI in the adolescent population. Physician records or electronic immunization registries can be searched. Information can be obtained from reporting systems collecting adverse event data from patients who see a health care provider or visit a hospital.^{2,3} However, these surveillance systems are subject to under-reporting and bias, are dependent on health care-seeking behaviours, and provide little information on the site of vaccine administration. School immunization programs provide an opportunity to survey a large number of adolescents directly after their receiving vaccines. The challenge is in administering an appropriate survey tool in a timely manner after vaccination.

Several studies in Canada have administered surveys to students or their parents following immunization of the former, with varying response rates.⁴⁻⁷ (See Table 1) This commentary describes an unpublished internet survey and other published studies. The low response rate of the internet survey resulted in insufficient find-

ings regarding adverse events. The review of these studies documents the importance of appropriate survey methodology in obtaining a representative sample.

In 2009, during the second year of the HPV vaccine program, researchers assessed the AEFI profile from concurrent vaccine administration in grades 6 and 9 girls in Delta and White Rock, BC.⁴ Participating schools were randomized into two groups. Grade 6 females were either given both HPV and MCC vaccines in their left arm and HBV vaccine in their right arm or HPV vaccine in their left arm and MCC and HBV vaccines in their right arm. Grade 9 girls either received both HPV and Tdap in their left arm or Tdap in the left arm and HPV in the right arm. Parental consents for the vaccines and for study participation were distributed in class. Students who returned the consent and assent forms were asked to complete an online survey 24 hours, 48 hours, and 7 days after immunization. Reminders were sent via text message, email, or telephone depending on what was indicated on the assent form. Participants were entered into a prize draw for an iPod Nano. Of the 644 grade 6 girls who received HPV vaccine, 99 (15%) returned the consent package; of those, 62 (63%) completed at least one survey. Of the 787 grade 9 girls who received HPV vaccine, 66 (8.4%) returned the consent package; of those, 22 (33%) completed at least one survey.

In 2004 in the Yukon, to counter an upward trend of pertussis among adolescents, the Grade 9 tetanus/diphtheria/inactivated polio (Td/IPV) vaccine was replaced by Tdap.⁵ Grade 12 students

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Table 1. Study Characteristics

	Survey Mode	Study Population	Location	Eligibility	Consent Process	Length of Time after Immunization	Sample Size	Response Rate
2009 internet survey ⁴	Internet survey	Grade 6 and 9 students	Delta and White Rock, BC	All students who received vaccination	Forms distributed by teachers	1, 2, 7 days	84	6% Grade 6 – 9.6% Grade 9 – 2.8%
David et al. 2006 ⁵	Paper-and-pencil (in class)	Grade 9	Yukon	All students who received vaccination	Forms distributed by teachers	7 days	580	77%
David et al. 2006 ⁵	Paper-and-pencil (own time)	Grade 12 students	Yukon	All students who received vaccination	Forms distributed by teachers	7 days	323	34%
Tremblay et al. 2006 ⁶	Paper-and-pencil (own time)	Grade 8 to 12 students	2 schools, Montreal, QC	All students who received vaccination	Forms distributed by teachers	1 month	465	55%
Pielak et al. 2008 ⁷	Telephone interview	Parents of Grade 6 students	Quesnel and Surrey, BC	All parents of students who received vaccination	Forms distributed by teachers	2, 4 days	390	51% Quesnel – 29% Surrey – 63%
Dobson et al. 1995 ⁸	Face-to-face interview	Grade 6 students	9 schools, Vancouver, BC	All students who received vaccination	Telephone contact from researchers	1 day	454	>60%

were also offered Tdap in a catch-up program. There was a need to monitor adverse events as Td/IPV had been received less than the recommended 5 years prior. Students were asked to complete an adverse event questionnaire during class time seven days after immunization. As it was examination time, many grade 12 students were no longer in class, so they were asked to complete the questionnaire on their own time. The resulting response rate was 34% (110/323 immunized) for grade 12 students and 77% (444/580) for grade 9 students.

Following an outbreak of pertussis in Montreal high schools in 2004, Tdap was offered to students in two schools.⁶ A questionnaire was distributed to students during an exam period one month after immunization. Students were asked to drop off completed questionnaires at the school nurse's office. Of the 839 students vaccinated, 465 (55%) returned the questionnaire.

When MCC was introduced in BC in 2003, a study investigated the administration of MCC and HBV vaccines in grade 6 students in different arms or the same arm.⁷ Parents or guardians were interviewed via telephone 48 to 96 hours following the immunization. They were asked to describe any reactions experienced by their child. Of the parents of the 767 students immunized, 390 (51%) participated in the study.

With the implementation of the HBV vaccination program in BC in 1992, a study assessed series completion rates and adverse events.⁸ Nine Vancouver schools were selected and sent out information sheets to the parents about the study. The research team contacted parents using phone numbers provided by the school. The children of consenting parents were visited by members of the research team 24 hours after each HBV vaccine dose. In total, 454 grade 6 students participated in the study, representing a >60% response rate (S. Dobson, personal communication, August 13, 2010).

DISCUSSION

Response rates of adolescent studies can be affected by many factors, including mode of survey administration, questionnaire length, setting, reminders, and incentives. Both parental consent and minor assent are needed for studies involving adolescents. Using a passive consent process, the internet survey study received

11.5% consents returned from parents. In contrast, actively contacting parents for consent resulted in a response rate of over 60% (S. Dobson, personal communication, August 13, 2010). The methods used in the latter study could not be duplicated now because of privacy concerns regarding the communication of personal contact information to the research team. It is not clear from the other studies the percentage of those vaccinated who consented.⁵⁻⁷

For the internet study, only half the students who returned their consents completed the online survey, despite follow-up reminders. This highlights an important limitation of self-administered surveys. It has been shown in meta-analysis that surveys administered over the internet have significantly lower response rates than mail-out surveys.^{9,10} In addition, follow-up reminders were found to be less effective for web-based surveys.¹⁰ The survey conducted by David et al. (2006) had a high response rate from the grade 9s who completed the survey in class and a much lower response rate from the grade 12s who completed the survey on their own time.⁵ To maximize response rate in the latter population, attempts should be made to capture responses in a class setting.

The response rate of parents in a telephone survey⁷ was similar to the response rate of students who completed a paper survey in class⁵ and on their own time.⁶ Using parental responses avoids the assent process; however it is unclear whether the parent's knowledge of their child's reaction is an accurate proxy to adverse events following immunization.

The lottery-based incentive⁴ did not appear to motivate students to complete the survey. The issue may have been the low value of the prize, already owning an iPod Nano, or the perceived chance of winning the prize.

There are limitations when comparing results across different studies. The study participants differed in age, sex and ethnic diversity; the studies were conducted in different geographic regions and at different times; and the studies were related to different vaccines. Methods such as sending an introductory letter prior to the consent, posters in schools, information regarding the study in school newsletters, or verbal reminders from teachers may also affect the response rate.

An important consideration when determining the mode of data collection is data quality. The five reviewed studies used different

methods of data collection and each method has inherent bias. Ideally, one would compare results across studies to assess data quality, but with each vaccine addition and changes in vaccine dosage and brand, comparing findings over time becomes less meaningful. In deciding which method to use to maximize data quality, researchers should weigh the pros and cons of each method with the purpose of the study and the associated costs.¹¹

CONCLUSION

This commentary outlines the different methods used to collect AEFI data in school immunization campaigns and the resultant response rate. As students do not display a willingness to participate in research, an in-class survey would likely maximize response rate. Interviewing parents rather than students may improve the response rate but it is unclear how this would affect data quality. The internet-based survey did not capture sufficient responses from the student population. Although a recent study found that over 99% of students used the internet during high school,¹² students are more likely to complete paper surveys, especially when distributed in class. With the popularity of social networking applications such as Facebook and Twitter, perhaps a different approach to engaging students is needed. More research needs to be conducted with the adolescent population to determine their reasons for not completing surveys. While response rates may be low, it remains important to monitor the AEFI profile of newly introduced adolescent vaccines in terms of safety, timing of booster doses, and reactogenicity of multiple vaccines administered concurrently as these may provide direction for the recommended site of administration.

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RÉSUMÉ

L'introduction récente de nouveaux vaccins dans le programme de vaccination en milieu scolaire de la Colombie-Britannique a compris la surveillance de leurs effets secondaires suivant l'immunisation (ESSI). Nous expliquons les différentes méthodes employées pour recueillir les données sur les ESSI lors des campagnes de vaccination à l'école et leurs effets sur le taux de réponse. Notre commentaire s'inspire des résultats d'une étude ayant utilisé un outil Internet. L'étude portait sur les effets secondaires de l'administration du vaccin contre le virus du papillome humain (VPH) à des élèves de la 6^e à la 9^e année. En raison d'un faible taux de réponse au sondage en ligne, on a obtenu des résultats insuffisants sur les effets secondaires. Après l'analyse des données de l'étude, nous avons mené une enquête bibliographique afin d'examiner les méthodes de sondage utilisées pour recueillir des données sur les effets secondaires de vaccins administrés en milieu scolaire à des adolescents. Nous avons fait une recherche dans PubMed en utilisant diverses combinaisons des termes vaccin, immunisation, programmes d'immunisation, réactogénicité, réactions indésirables, sécurité, adolescent, élèves et sondage. Les articles potentiellement pertinents ont été identifiés à partir de leurs titres et de leurs résumés, puis examinés. Seules quatre études ont été jugées utiles à des fins de comparaison; les quatre avaient été menées au Canada.

Mots clés : immunisation; adolescent; collecte de données; effets indésirables