Exploring the acceptability of the available pneumococcal conjugate vaccines in Canadian health care professionals and immunization experts

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ABSTRACT

Background: In children, the 13 and 10-valent pneumoccocal conjugate vaccines (PCV13/10) are currently approved for the prevention of invasive pneumococcal disease (IPD). Acceptability is a key consideration in the implementation of a vaccine program and it is recognized that health professional's attitudes and opinions towards vaccines are independent predictors of the success of an immunization program. We aimed to survey the beliefs and attitudes for the two available PCVs in health care professionals and immunization experts.

Findings: We interviewed 21 members of Canadian immunization committees and/or participants working in frontline healthcare delivery. Overall, participants predominantly preferred PCV-13 over PCV10. For most, AOM should not be taken into considerations in decisions for pneumococcal vaccination programs implementation. AOM was considered an important endpoint of the program but an ineffective measure of program success due to the lack of surveillance for the condition. Recent evidence pertaining to PCV10 cross-protection against 19A did not affect preference but had an impact on perceptions regarding pricing.

Conclusion: To consider implementing any changes to the current program, most participants would require more evidence regarding PCV10 cross-protection and effectiveness against OM. Decreasing vaccine price was cited as a positive outcome of funding both vaccines.

1. Introduction

Streptococcus pneumoniae is a bacterial pathogen that can cause invasive pneumococcal disease (IPD) such as meningitis, bacteremia and sepsis, as well as less severe non-invasive diseases, such as pneumonia and acute otitis media (AOM) [1]. *Non-typeable Haemophilus influenzae* (NTHi) strains are recognized as causal pathogens in non-invasive mucosal diseases, such as AOM and sinusitis. In Quebec, it has been estimated that otitis media in children younger than 10 years of age accounts for approximately 11% of physicians' billings claims [2].

PCV7 was licenced in Canada in 2001 and, as of 2006, used in infant vaccination programs across all provinces and territories

[3]. However, within a few years of the program's implementation, serotype replacement threatened to offset the benefits afforded by the vaccine [4]. Consequently, higher valent vaccines were introduced. The PCV10 vaccine became available in 2009 and implemented in some provinces, employing a novel carrier protein derived from NTHi and offering protection for all serotypes included in PCV7 plus an additional three serotypes: 1, 5A and 7F [5]. It has been argued that the NTHi-derived carrier protein would afford additional protection against AOM and other diseases caused by NTHis [5,6]. PCV13 was introduced in 2010, offering protection for all serotypes included in PCV10 and three additional serotypes: 3, 6A and 19A [7]. The inclusion of 19A, a serotype with high invasive potential and associated burden of disease, led most provinces and territories to preferentially choose PCV13 over PCV10 for their infant immunization programs [8]. However, emerging findings suggest a level of cross-protection against 19A from the 19F serotype contained in PCV10 [9–11]. In light of these

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findings, Health Canada has amended their indications for PCV10, acknowledging the cross-protection against 19A in an updated product monograph [12]. This evidence, in addition to the suggested increased protection against NTHi-related diseases afforded by PCV10, will have considerable implications for upcoming assessments of how these vaccine options compare in terms of benefits per amount of dollars spent.

In Erickson, De Wals and Farand's (2011) analytical framework for making decisions concerning immunization programs in Canada [13], acceptability is identified as a marker of desirability concerning a given product and a powerful driver of program implementation. Health professionals are often the most trusted source of information concerning vaccines and as such play a pivotal role in recommending and enhancing vaccine uptake [14]. To date, information is lacking on frontline healthcare workers and immunization experts' perceptions of the higher valent pneumococcal vaccines. We aimed to assess the perceptions of frontline healthcare workers and immunization experts on whether PCV10 is considered an acceptable alternative to PCV13, as well as factors offered in support of their opinions. This information will aid in recognizing knowledge gaps pertaining to the evidence in support for each vaccine, and in putting forth national guidelines that are acceptable and endorsed by healthcare workers, therefore achieving nationwide uptake and optimal immunization results.

2. Methods

2.1. Qualitative survey method

In exploring complex phenomena such as perceptions and attitudes that influence decision making, qualitative methods are instrumental in advancing our understanding of "why?", "how?" and "under what circumstances?" [15].

After consulting with a medical anthropologist, we developed a questionnaire to investigate the preference for PCVs in the prevention of IPD and AOM in frontline healthcare workers and key policy drivers of immunization within Canada (Table 1, Demographics). We sought to examine the reasons behind their stated preferences as well as the importance assigned to various objectives of the infant immunization program. Additionally, we wished to share evidence in support of Health Canada's monograph amendment for PCV10 [12], aiming to explore whether this evidence was considered sufficient to revisit the current recommendations concerning PCVs for the infant immunization schedule. Questions were directed at members of the: (i) National Advisory Committee on Immunization (NACI), (ii) Quebec Immunization Committee (Comité sur l'immunisation du Québec, CIQ), (iii) Canadian Immunization Committee (CIC) as well as front line healthcare providers, which included pediatricians and family physicians.

2.2. Sampling frame

In order to have a meaningful and representative sample, we employed a stratified purposeful sampling technique. Purposeful sampling is widely used in qualitative research for identifying and selecting cases who are likely to have experience and knowledge of interest to the study's objective [16]. We stratified our selection by committee (CIQ, NACI or CIC) and by province, ensuring to include professionals working at the frontline of healthcare delivery so as to capture variations in opinions across these attributes.

2.3. Recruitment

Enrollment and data collection were carried throughout the summer of 2016. Lists of participants were obtained through one of the primary investigator's professional network. Members belonging to immunization committees were initially contacted through email by the committee's secretariat and informed of the study's purpose. The research team then reached out to participants who met one or more criteria of interest (i.e. public health professional and/or frontline healthcare worker with expertise in immunization). We endeavored to enroll at least one participant that met these characteristics from each Canadian province and to have a higher representation for the more populated provinces (Quebec and Ontario).

Information was collected through semi-structured interviews conducted in person, whenever possible, or over the phone. Participants who chose to participate were asked open-ended questions that allowed them to elaborate on their responses. The interviewer ensured to probe for the reasoning behind stated responses and answers were read back to participants to confirm that they accurately represented their views. We set out to stop data collection once no new information was gathered from 3 consecutive interviews, or when a total of 20 participants were enrolled, whichever occurred first. The study received approval from the McGill University Health Centre Research Ethics Board. Interviews were recorded and transcribed verbatim by the interviewer and the recordings were erased immediately after transcription. Each participant was assigned a number and any identifying details were removed from the transcription.

2.4. Analysis

All transcribed interviews were imported into NVivo 11 for qualitative analysis (QSR International©). The data were evaluated through a thematic analysis, a method for identifying and reporting patterns within the data [17]. A researcher identified and coded the theme addressed in each question into a parent-node. Relevant sub-themes or daughter-nodes in an answer were then identified and coded within parental nodes (Table 2, Thematic Coding). Across participants, segments of text expressing similar ideas were grouped within the same daughter-node. Attributes were then assigned for each participants and responses were crossed in a matrix by nodes and attributes.

3. Results

A total of 21 of the 33 (64%) participants invited to take part in the study agreed to be surveyed: 9 from NACI (43%), 3 from CIQ (14%), 5 from CIC (24%) and 4 representing frontline healthcare providers (19%) who did not belong to immunization committees. With the exception of Saskatchewan, we achieved representation for all of the Canadian provinces (Table 1, Demographics).

3.1. Expectation concerning publicly funded vaccine against Streptococcus pneumoniae

When asked what they hoped to obtain from a publicly funded vaccine against Streptococcus pneumoniae, safety, effectiveness, cost-effectiveness and a reduction in the incidence of IPD were the most often cited expectations:

"That it should be efficacious, safe and that there is a sufficient disease burden to prevent. These are certainly the three first items that I would look at. The fourth one being how affordable is this".

Only one participant acknowledged reducing reliance on antibiotics as a key prospect of the program.