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New vaccines offering a larger spectrum of protection against acute otitis media: Will parents be willing to have their children immunized?

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ABSTRACT

Objectives: To examine parents' knowledge, attitudes and beliefs regarding acute otitis media (AOM) and parents' willingness to vaccinate their children with new vaccine offering larger spectrum of protection against AOM.
Methods: Telephone survey conducted in a stratified sample of household in 10 Canadian provinces using random-digit dialling methodology. Parents of children aged 6 months to 5 years were reached.
Results: 502 parents participated. Mean age of the child was 3 years and 32% have had at least one AOM episode during the last 12 months. The great majority of parents agreed that recommended vaccines are important (94%) and useful (94%) for children's health. Parents felt that their knowledge on AOM was very (27%) or somewhat (54%) sufficient. Most parents (73%) thought that antibiotics use was always useful to treat an AOM and 54% estimated that vaccination is an effective mean of preventing AOM. Sixty-four percent (64%) of the surveyed parents were willing to vaccinate their child with a new vaccine offering larger spectrum of protection against AOM. A higher proportion of parents whose child had experienced an AOM were willing to have their children vaccinated. The strongest predictor of parental willingness to vaccinate was subjective norm, or the perception that the other parent of the child and the doctor will approve/recommend the vaccination behaviour.
Conclusions: When new vaccines are available, a key issue is the willingness of parents to adopt it. Health providers should be aware of their important role to inform parents and promote immunization.

1. Introduction

Acute otitis media (AOM) is one of the most common bacterial infectious diseases among children and is a leading cause of children healthcare visits [1]. In the first 3 years of life, 60–70% of children will experience at least one episode of AOM [2] and recurrent episodes of AOM are common [3]. It is believed that one-third of AOM episodes are caused by *S. pneumoniae* [4]. The use of antibiotics for the treatment of AOM has been responsible for the alarming increase in antibiotic resistance to the bacteria that can cause otitis media, diminishing treatment performance and increasing costs [5,6]. Primary prevention of AOM through immunization is an emerging issue [7].

In Canada, a pneumococcal conjugate vaccine (PCV-7) was licensed in 2001 and has been shown to have an important impact on the incidence of pneumococcal invasive diseases. In a randomized trial, the effectiveness of PCV-7 was around 6% against any AOM episode and 57% against episodes due to the serotypes included in the vaccine [8,9]. A new 10-valent pneumococcal conjugate vaccine using the *H. influenzae*-derived protein D as a carrier protein is under development and an 11-valent version of that vaccine showed high level of protection (34%) against any AOM episode in a clinical trial [10].

In recent years, several new vaccines have been introduced to the childhood vaccination schedule and it has been repeatedly stressed that their acceptance by both parents and health professionals should not be taken for granted [11,12]. Several factors, like attitudes toward immunization in general, knowledge about the vaccine and the disease as well as beliefs regarding vaccine safety, have been shown to be associated with the willingness to accept a new vaccine [13,14]. Receiving a recommendation from a health provider is also among the most influential factors in the decision of parents regarding vaccination

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of their child [15–18]. A good understanding of current knowledge, attitudes and beliefs (KAB) of parents about AOM and its prevention is crucial for preventive intervention success [19]. The main objectives of this study were to examine Canadian parents' KAB toward AOM prevention and treatment and to assess factors associated with parents' willingness to vaccinate their children with a new vaccine that shows better protection against AOM. Other objectives were to estimate the social burden of AOM in young children and the associated loss of quality of life in affected children and their parents (results are reported elsewhere [20]).

2. Materials and methods

2.1. Study design

This study was based on a telephone survey conducted with parents or main caregivers[1]. The participants were recruited using random-digit dialling methodology. Eligibility criteria were: (1) to have at least one child aged between 6 months and 5 years and (2) being able to respond to an English or French questionnaire. The target was to have a stratified random sample of 500 parents from all Canadian regions, except for northern territories where less than 5% of the Canadian population lives [21]. The study protocol was approved by the Ethics Board of the Laval University Hospital Center.

2.2. Survey instrument

Parents' KAB regarding AOM management and prevention and their willingness to accept a new vaccine was measured using the *Systems Model of Clinical Preventive Care* [22]. This model was used as a theoretical base because it allows the evaluation of multiple factors which interact to influence the likelihood of the performance of a preventive activity. Close-ended questions were developed to measure parents' predisposing factors (such as health beliefs and attitudes toward immunization), enabling factors (such as knowledge and resources), and reinforcing factors (such as subjective norm or social support). For each participant, the following demographic characteristics were collected: age and sex; region of residence, education, number of persons in the household by age group and other household characteristics.

2.3. Analysis

For all KAB questions, answers were given on a 5-point Likert scale. Descriptive statistics of the survey sample were generated for all variables.

Missing values were excluded from the analyses. Comparisons of categorical responses were evaluated using Chi-square or Fisher's exact test. Multivariate logistic regression modelling was performed to further examine the relationship between predisposing, enabling and reinforcing factors and parental willingness to have their children vaccinated with a new PCV vaccine. The dependant variable was dichotomized, the responses "very likely" and "somewhat likely" versus "somewhat unlikely", "very unlikely" and "don't know". Factors associated with willingness to have one's child vaccinated on univariate analysis at $p \leq 0.20$ were candidates as independent variables for multivariate analysis. Others variables were reevaluated in the final model to check for confounding and better adjustment. A probability level of $p < 0.05$ based on two-sided tests was considered statistically significant. The collinearity was checked and adequacy of the model was evaluated by Hosmer and Lemeshow's test. The Statistical Analysis Systems (SAS) software (version 9.1) was used for data statistical analysis.

[1] Hereafter, the term parents refers to both parents and main caregivers of young children.

3. Results

The telephone survey was administered in May–June 2008. Of the 28,374 telephone numbers randomly generated, 26,385 were reached: 12,269 were non-residential or not in service and 8769 were non-eligible households. In 4796 cases, the respondent refused to participate in the survey or to answer any questions. Five hundred and fifty-one parents agreed to participate and 502 completed the survey.

3.1. Participants' characteristics

Most respondents were mothers (80%), were aged 25–34 years (55%), and had college or university degrees (67%). In most households there were one (31%) or two (41%) children aged ≤18 years. Number of respondents from each region of Canada was proportional to the relative weight of each region's population. Mean age of the children was 3 years and 39% of them lived in shared custody. Fifty percent of children were female and 97% were born in Canada. Almost all parents (96%) reported that their child had received at least one vaccine and 59% recalled that their child had been vaccinated against pneumococcal diseases. Almost one-third (32%) of the children aged 6 months to 5 years had experienced at least one AOM episode during the last 12 months.

3.2. KAB toward immunization in general

The great majority of parents (94%) agreed to both statements regarding the importance and usefulness of recommended vaccines in protecting children's health. Twenty parents (4%) reported that their children had not received any vaccine since birth.

3.3. KAB toward AOM and its prevention by immunization

Most parents thought that their knowledge about AOM was very (27%) or somewhat (54%) sufficient. Half of the participants would like to have more information on prevention and treatment for AOM. A higher proportion of parents whose child had experienced an AOM episode in the past 12 months would like to have more information on AOM (58% versus 46%, $p = 0.009$) (Table 1).

Parents' perceptions were mixed about the threat of AOM; 45% believed that it was likely that their child would have an AOM in the next 12 months and 49% agreed that AOM could cause serious health problems for their child. Perceived AOM-susceptibility was higher among parents of children who had a recent episode of AOM, with 35% versus 6% of respondents thinking it was very likely that their child would have an AOM in the next 12 months ($p < 0.0001$). Most parents (73%) thought that antibiotics use was always useful in treating an AOM and 54% estimated that vaccination is an effective means of preventing AOM. A majority of respondents (62%) agreed that regular attendance at a daycare increases the risk of having an AOM.

A higher proportion of parents whose child had experienced an AOM in the past 12 months agreed that a vaccine that prevents AOM would be useful for their child (78% versus 66%, $p = 0.009$) (Table 1).

3.4. Willingness to vaccinate

Sixty-four percent (322/502) of respondents were willing to vaccinate their children with a new vaccine that prevents at least twice as many cases of AOM than the vaccine currently used in