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Childhood immunizations
First-time expectant mothers' knowledge, beliefs, intentions, and behaviors

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ABSTRACT

Introduction: This study focused on how first-time mothers decide or intend to decide with respect to the recommended childhood immunization schedule.
Methods: This was the baseline survey of a larger longitudinal survey. Data were collected between June and September 2014 from 200 first-time mothers in their second trimester of pregnancy to examine vaccine-related knowledge, perceptions, intentions, and information-seeking behavior.
Results: Data were analyzed between January and June 2015. Seventy-five percent planned to have their child receive all the vaccinations consistent with the recommended childhood immunization schedule. Although participants expressed interest in childhood vaccine information, most had not received information directly from a primary care provider. One third reported receiving such information from their obstetrician/gynecologist but only about half of those were "very satisfied" with the information they received. About 70% indicated they were not familiar with the recommended vaccination schedule and number of routinely recommended vaccines. Familiarity with common vaccine education messages varied widely. Women who indicated they were planning to delay one or more recommended vaccinations were most likely to rely on Internet searches for childhood vaccine information.
Conclusions: Overall, respondents had relatively positive beliefs and perceptions regarding childhood vaccines, which were associated with intentions to get their newborn vaccinated as recommended. However, most who were planning to delay recommended vaccinations or were undecided relied primarily on socially available sources of vaccine information, rather than information provided by a healthcare professional. Improved access to vaccine information from healthcare professionals could foster better vaccine-related knowledge and favorably impact vaccination decisions.

1. Introduction

The transition to parenthood is an exciting yet stressful time for new parents [1]. New parents have much to learn during pregnancy through the birth of an infant and in the early postpartum period. This is particularly true in the health domain, where new parents often need to acquire and assess information on a broad number of topics regarding the health and safety of their soon-to-arrive newborn, including vaccines and vaccinations.

Although recommended childhood vaccinations have led to 96%–100% declines in mortality in the U.S. for several once-common diseases, there have been recent outbreaks of vaccine-preventable diseases in the U.S. linked to unvaccinated children[2–4] (e.g., measles and *Haemophilus influenzae* Type b) and there is evidence that a number of parents are hesitant when it comes to routinely recommended vaccinations [5–8].

A number of studies have examined the vaccine- and vaccination-related confidence, knowledge, attitudes, and beliefs of parents of young children[9–11]; however, relatively few U.S. studies have focused on new or expectant mothers, who are a group that will soon be making vaccine-related decisions [12–17].

As few efforts have examined how pregnant women, particularly those who are pregnant for the first time, are acting or planning to act with respect to recommended childhood vaccines, that group was the focus of this research. This study, which focused on first-time expectant mothers in the U.S., built off the qualitative and quantitative research previously noted by examining:

1 self-reported immunization plans of expectant mothers for their offspring;
2 interest, familiarity, and knowledge of vaccines and the recommended childhood immunization schedule

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3 vaccine-related information seeking and exposure, including primary sources to date;
4 confidence in the safety, value, and benefits of recommended childhood vaccines;
5 perceptions regarding the value and importance of routine childhood vaccines; and
6 familiarity with commonly used or provided vaccination-related messages (e.g., messages provided on websites and vaccine education materials), and whether they found the messages believable and persuasive.

2. Methods

Findings reported here are from the initial survey in an ongoing longitudinal study of U.S. women, with the overall study designed to assess whether and how vaccine-related knowledge, beliefs, intentions, and behaviors evolve from the second trimester of pregnancy through their child's 19th month of life. The initial survey took place when women were in the second trimester of pregnancy (i.e., Weeks 13–27) and assessed immunization-related intentions, knowledge, information seeking, and beliefs.

2.1. Procedure and design

A commercial market research firm used its national database of 70,000 panelists to identify first-time mothers with due dates between September and December 2014. The database included representation from every state, with the representation reflecting population density. The overall panel consisted of people who expressed interest in participating in research opportunities and who had e-mail addresses and Internet access. Pregnant panel members were ineligible if they were aged <18 years, were expecting more than one baby, reported an educational level of less than high school, did not have access to a computer or mobile device, or could not easily read, speak, or understand English. As one of the main purposes of the study was to look at the evolution of vaccine-related information-seeking behaviors over time among women who are accepting vaccination, mothers were excluded if they had already decided that their child would not receive any vaccines.

The goal for the overall longitudinal study was to have at least 100 women complete all seven surveys, and it was assumed that achieving that would require 200 participants for the first survey (i.e., this would accommodate a 50% attrition rate). The recruitment involved contacting eligible women and inviting them to participate in the overall study until the desired sample size was achieved. Achieving a sample of 200 women required contacting 242 eligible women. Participants received an introductory letter and a web link to the first survey. Three reminders were sent using e-mail and telephone. Written informed consent was not required because the study presented minimal risk; instead, consent was obtained through participation in the survey. Respondents could opt out of the survey at any time as well as opt out of future surveys. Respondents received $30 for completing the survey. Data for Survey 1 were collected between June and September 2014. The IRB of the Oak Ridge Associated Universities approved the study; CDC and the National Vaccine Program Office deferred to the Oak Ridge Associated Universities IRB.

2.2. Survey instrument

The survey instrument was developed using or adapting existing questions whenever possible. Along with demographic information, respondents were asked about: knowledge and familiarity with the recommended childhood immunization schedule; vaccination intentions for their child; confidence in the safety, effectiveness, and benefits of recommended childhood vaccines (using 1–5 scales, where 1 was *not at all confident* and 5 was *very confident*); vaccine-related communication with their prenatal healthcare professional; and vaccination information interest and seeking (including whether they had selected a pediatrician and whether immunization intentions factored into pediatrician selection). Respondents also were asked a series of agree–disagree statements related to the importance of recommended vaccines and following the recommended immunization schedule, followed by a three-part series of questions involving 12 commonly used or provided vaccine-related educational messages or statements (Table 1). This part of the study was designed to assess whether expectant mothers had heard or read commonly provided vaccine-related messages, whether they believed the messages, and whether the message would influence their vaccination intentions.

2.3. Statistical analysis

Data were analyzed between January and June 2015. Descriptive statistics were calculated using SPSS, version 21. When sample sizes allowed, comparisons were made among mothers who intended to vaccinate as recommended, mothers who planned to delay or forego one or more recommended vaccinations, and mothers who were uncertain regarding their child's vaccination.

3. Results

The first-time expectant mothers ranged in age from 19 to 44 years (mean = 28 years, SD = 5.2 years). Twenty-two participants (11%) reported at least one older child in their household, but all indicated this was their first pregnancy. As Table 2 illustrates, most were non-Hispanic white, married, and employed full time. About 41% graduated from college (including 19% with an advanced degree). Respondents reflected a range of household incomes, with about 36.5% reporting incomes of ≥75,000 a year. The vast majority reported having private health insurance. Most respondents (71.5%) indicated decisions about healthcare for their child would be made jointly with their spouse or partner. At this stage of their pregnancy, 37.5% said they had identified a pediatrician or family doctor for their child.

Seventy-five percent of expectant mothers planned to have their child receive all of the vaccinations recommended by their child's doctor or nurse as scheduled, whereas 10.5% planned to have their children receive all but with some being delayed or spaced out. Another 4% indicated they planned to have their child receive some but not all of the recommended vaccinations and 10.5% had not yet decided their vaccination plans (Table 3). Consistent with the inclusion criteria, no mother indicated that her child would receive none of the recommended childhood vaccinations. When asked how important a doctor's willingness to be *flexible regarding which vaccines their child receives* was or would be a factor in selecting a pediatrician or family doctor for their child, over half indicated it would be *important* (23.0%) or *very important* (36.5%). The mothers gave similar responses when asked how important a doctor's willingness to be *flexible regarding the vaccine schedule* would be in selecting a pediatrician or family doctor for their child; about 60% said it would be *important* (25.0%) or *very important* (34.5%).

Based on their vaccination intentions, respondents were divided into three groups (i.e., *Acceptors* said their child would *receive all as recommended*, *Delayers/Decliners* would *space out or delay* or *get some but not all*, and *Undecideds* were unsure about their vaccination plans). There were no demographic differences across the three groups. Delayers/Decliners, however, had the highest average importance rating with respect to a doctor's willingness to be flexible regarding vaccines when selecting a pediatrician or physician