



Review

Determinants of uptake of influenza vaccination among pregnant women – A systematic review



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ABSTRACT

Background: Pregnant women have the highest priority for seasonal influenza vaccine. However, suboptimal coverage has been repeatedly noted in this population. To improve vaccine uptake, reviewing the determinants of vaccination is of increasing importance.

Methods: A detailed literature search was performed up to November 30, 2013 to retrieve articles related to uptake of influenza vaccination during pregnancy.

Results: Forty-five research papers were included in the review. Twenty-one studies assessed the coverage of seasonal influenza vaccination, 13 studies assessed coverage of A/H1N1 pandemic vaccination and 11 studies assessed both. Vaccination uptake ranged from 1.7% to 88.4% for seasonal influenza, and from 6.2% to 85.7% for A/H1N1 pandemic influenza. Many pregnant women were unaware that they were at high risk for influenza and its complications during pregnancy. They were also more likely to underestimate the threat of influenza to themselves and their fetus. Moreover, they had substantial concerns about the safety and efficacy of the influenza vaccine during pregnancy. Negative media reports contributed to the perception that influenza vaccination during pregnancy was risky and could result in adverse pregnancy outcomes. Although health care providers' (HCPs) recommendations were consistently associated with vaccine uptake, most did not recommend the vaccine to their pregnant clients.

Conclusions: Influenza vaccination uptake among pregnant women is suboptimal and HCPs rarely recommend it. Positive vaccination recommendations from HCPs as well as direct access to the vaccine would likely substantially improve vaccination acceptance.

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1. Introduction

Historical data and recent research evidence suggest that influenza infection during pregnancy can cause significant morbidity in pregnant women [1–3]. Pregnancy puts women at a higher risk of complications due to influenza infection when compared with their non-pregnant peers [4,5] and as gestational age increases, the risk of more serious morbidity also increases. Pregnant women with underlying medical conditions are especially vulnerable [6,7]. Women contracting infectious diseases during pregnancy also put their fetus at risk as studies have found that babies born to mothers who contracted fever-related diseases or influenza during pregnancy were more likely to have congenital abnormalities [8,9]. Furthermore, children less than 6 months of age have the highest mortality rates from influenza-related illnesses of any age group [10].

Influenza vaccination is one of the most important strategies to prevent influenza infection and its severe complications, and to mitigate the impact of influenza epidemics [11]. Influenza vaccination is recommended for pregnant women regardless of their stage of pregnancy and the World Health Organization (WHO) recently identified them as the highest priority group to receive the seasonal influenza vaccine [11]. In addition, maternal influenza vaccination also protects against influenza infection in infants up to 6 months old, when they are most vulnerable [12,13]. Although, maternal influenza vaccination is safe and effective [14,15], uptake has generally been suboptimal. Many pregnant women are reluctant to receive the influenza vaccine because they underestimate their susceptibility to influenza infection and have misconceptions about the safety of the vaccine [16,17]. In addition, obstetric health care providers (HCPs) often do not recommend that their patients get vaccinated [18,19].

Prevention of influenza by vaccination has long been a public health priority. Over the past few years, an increasing number of studies have examined the knowledge and attitudes of pregnant women toward influenza vaccination and the factors associated

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with vaccine uptake. To our knowledge, however, a review of these factors has not been conducted. To improve vaccination uptake among this group, reviewing the determinants of maternal influenza vaccine uptake is important to inform and guide strategies to promote uptake.

2. Methods

The focus of this review was to provide an overview of the current knowledge, attitudes and practices of pregnant women toward influenza infection and influenza vaccination and to identify the predictors of vaccine uptake. To facilitate the analysis, the health belief model (HBM) was chosen as the conceptual framework [20,21]. The HBM was developed by Rosenstock as a psychosocial model that could be used to understand and predict people's decisions about health-enhancing or preventive health behaviors. It has been used extensively in different population groups to understand uptake of different vaccines [22–25]. The HBM comprises four beliefs: 'perceived susceptibility' or one's risk of contracting a disease; 'perceived severity' or the seriousness of the disease; 'perceived benefits' or the benefit of taking the health promoting action; and 'perceived barriers' or impediments to taking a proposed action [26]. Thus, if a pregnant woman perceives that she is susceptible to influenza infection and the benefits of being vaccinated outweigh the barriers to vaccination, theoretically the individual is motivated to be vaccinated. Another component of the HBM is the concept of cues to action. While health beliefs provide the motivation for action, behavior does not always occur unless certain cues are present. The cue may be internal (e.g., bodily symptoms) or external (e.g., reminders, information from health professionals, or advice from family and friends) [27].

2.1. Literature search strategy

A detailed literature search was performed up to November 2013 to retrieve articles related to influenza and influenza vaccination during pregnancy in five databases: the OvidSP search engine for Ovid MEDLINE(R) 1946 to November Week 4 2013, EMBASE 1974 to 2013 November 30 and Global Health 1910 to 2013 Week 48; EBSCOhost search engine for CINANL Plus, and the Google Scholar search engine. A further manual search was also performed by reviewing the reference lists of all included articles for additional studies. Primary studies reporting on influenza vaccination uptake and identifying predictors for influenza vaccination among pregnant women were included in the review. The following keywords were used: influenza, vaccin*, influenza vaccin*, pregnancy, pregnant women, pregnant, women, health knowledge, knowledge, attitudes, practice, behavior, factor*, predictor*, and reason*.

2.2. Inclusion criteria

Inclusion criteria were both primary cross-sectional studies and intervention studies reporting the knowledge, attitudes and uptake of influenza vaccine among pregnant women. Only English-language studies using human subjects were included [28].

2.3. Data extraction

Data were extracted into predetermined data extraction forms by the first author (CY) and were checked and verified by the second author (MT). The following data were extracted from all studies: study period, sample size, country and study setting, data collection methods, response rate, the vaccine coverage rate (both seasonal and A/H1N1), factors significantly associated with vaccination uptake, identified reasons for both accepting and refusing

the vaccination, and recommended strategies to increase vaccine uptake.

3. Results

3.1. Overview of included studies

A total of 1239 papers were identified from the initial search in the databases and were included for primary review. The titles and abstracts were screened for eligibility according to the inclusion criteria. A total of 1136 papers were excluded. One hundred and three papers remained, of which 54 studies were excluded because they reported on the same study population. The remaining 49 studies were included for review and the reference lists from these papers yielded four additional studies. Subsequently, four qualitative studies were excluded. Four quantitative studies were further excluded because the studies only measured pregnant women's intention to be vaccinated, leaving a total of 45 studies included in the final review (Fig. 1).

Table 1 summarizes the main study characteristics. The earliest study was conducted between November 1997 and March 1998 and the latest between November and December 2012. Thirty-one studies were conducted in the United States (US) or Canada, four in Australia, three in Hong Kong, two in France, one each in the United Kingdom (UK), the Netherlands, Switzerland, Turkey and India. The majority of the studies were small-scale, cross-sectional studies using questionnaires and convenience sampling methods to recruit participants during prenatal visits or on postpartum wards, health clinics or medical centers immediately after delivery. Four studies were large-scale studies that analyzed pooled data from the Pregnancy Risk Assessment and Monitoring System (PRAMS) [16,29–31], one study analyzed data from the UK General Practice Research Database (GPRD) [32], one study included a large national sample in France [33] and eight studies were non-randomized intervention studies [34–41]. The number of participants in the larger studies was as high as 30,000 for one PRAMS study [31] and more than 50,000 from the GPRD [32]. Two smaller studies had as few as 100 participants [42,43]. Nearly one-half of the studies had response rates over 70% with some studies exceeding 90%. Two studies reported response rates of just over 20% [44,45]. Of the 45 included studies, seven of them explicitly used health belief model as conceptual framework [46–52].

3.2. Summary of the study findings

3.2.1. Vaccination uptake

In 41 studies, pregnant women were recruited exclusively as the target population. In the other four studies, HCPs' beliefs toward maternal influenza vaccination and vaccination status were also reported [18,34,37,45]. Twenty-one studies assessed the coverage of seasonal influenza vaccination, 13 studies assessed coverage of A/H1N1 pandemic vaccination and 11 studies assessed both. The estimated vaccination uptake rate varied between and within countries. Seasonal influenza vaccination coverage ranged from 1.7% [51,53] to 88.4% [48] whereas A/H1N1 vaccination coverage ranged from 6.2% [19] to 85.7% [54]. Only 12 out of the 45 studies reported vaccine uptake rates of $\geq 60\%$ [35,41,43,44,46,48,53–58] and only three studies reported rates of $\geq 80\%$ [48,54,57]. To measure actual vaccination status during pregnancy, 18 studies recruited new mothers in the immediate postpartum period [18,19,33,34,36,38,42,45,47,51,55–62] while some other studies recruited participants during pregnancy.

3.2.2. Determinants of vaccination

In studies that provided the characteristics of participants, non-Hispanic Whites [16,56,61], non-smokers [16,32,33,42],

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