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Knowledge, attitudes and beliefs related to seasonal influenza vaccine among pregnant women in Thailand

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ABSTRACT

Background: In 2009, Thailand recommended pregnant women be prioritized for influenza vaccination. Vaccine uptake among Thai pregnant women is lower than other high-risk groups.
Methods: During December 2012–April 2013, we conducted a cross-sectional survey of a convenience sample of Thai pregnant women aged ≥15 years attending antenatal clinics at public hospitals in 8 of 77 provinces. A self-administered questionnaire covered knowledge, attitudes, and beliefs related to influenza vaccination using the Health Belief Model. We examined factors associated with willingness to be vaccinated using log-binomial regression models.
Results: The survey was completed by 1031 (96%) of 1072 pregnant women approached. A total of 627 (61%) women had heard about influenza vaccine and were included in the analysis, of whom 262 (42%) were willing to be vaccinated, 155 (25%) had received a healthcare provider recommendation for influenza vaccination and 25 (4%) had received the influenza vaccine during the current pregnancy. In unadjusted models, high levels of perceptions of susceptibility (prevalence ratio [PR] 1.5, 95% CI 1.2–2.0), high levels of belief in the benefits of vaccination (PR 2.3, 95% CI 1.7–3.1), moderate (PR 1.7, 95% CI 1.2–2.3) and high (PR 3.4, 95% CI 2.6–4.5) levels of encouragement by others to be vaccinated (i.e., cues to action) were positively associated with willingness to be vaccinated. Moderate (PR 0.5, 95% CI 0.4–0.7) and high levels of (PR 0.5, 95% CI 0.4–0.8) perceived barriers were negatively associated with willingness to be vaccinated. In the final adjusted model, only moderate (PR 1.5, 95% CI 1.1–2.0) and high levels of cues to action (PR 2.7, 95% CI 2.0–3.6) were statistically associated with willingness to be vaccinated.
Conclusion: Cues to action were associated with willingness to be vaccinated and can be used to inform communication strategies during the vaccine campaign to increase influenza vaccination among Thai pregnant women.

1. Introduction

Influenza is an important cause of morbidity and mortality worldwide, and pregnant women are at increased risk of severe complications compared with the non-pregnant population [1,2]. During the 2009 influenza A(H1N1) pandemic, hospitalized and intubated patients with influenza were significantly more likely to be pregnant women compared to community controls [3]. The mortality rate among pregnant women from influenza and pneumonia during the 2009 pandemic was 2- to 3- fold higher than among non-pregnant women [4–6], and women who died were more likely to be pregnant than those who did not [6].

Influenza vaccination is the most effective strategy for preventing illness associated with influenza infection and reducing influenza-related complications [7,8]. Vaccination during pregnancy provides benefits to both mother and newborn [9,10]. A randomized controlled trial and a prospective cohort study both found that maternal influenza vaccination was effective at preventing laboratory-confirmed influenza in infants up to six months of age, who are not yet eligible for influenza vaccination

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[10,11]. Maternal vaccination is also associated with a reduced risk of influenza-associated hospitalizations in infants less than six months old [12,13].

In 2009, the Thai Advisory Committee on Immunization Practices recommended seasonal influenza vaccine for pregnant women in the second and third trimester of pregnancy as a high priority group, after which the vaccine was made available free of charge through the Universal Coverage Scheme (a national health insurance available to all Thais) [14,15]. The amount of vaccine available is far less than needed for all recommended high risk groups, and between 2010 and 2012, coverage of seasonal influenza vaccine in pregnant women was less than 1% and far lower than other high risk groups [14]. The reasons for the low uptake of influenza vaccine among pregnant women in Thailand are not known, and the knowledge, attitudes and health beliefs of pregnant women in Thailand about seasonal influenza vaccination have not been investigated extensively. Understanding how these factors affect influenza vaccination would improve communication campaigns directed at pregnant women's awareness of the benefits of influenza vaccination and concerns regarding vaccine safety. In this evaluation, we identified factors among pregnant women that were associated with willingness to receive the seasonal influenza vaccine.

2. Methods

During December 2012–April 2013, we conducted a cross-sectional survey among a convenience sample of pregnant Thai women who attended antenatal clinics (ANCs) at public hospitals. In Thailand, the largest influenza virus activity peaks between June and October [16] and therefore the influenza vaccine campaign runs between May and September each year [14]. We purposively selected seven provinces plus the Bangkok Metropolitan Area to draw from the four regions of Thailand (central, northern, southern and northeastern). We selected the provincial hospital and three district hospitals from each province, and the only government maternity hospital plus three health centers from the Bangkok Metropolitan area. We allocated a target number of women for enrolment to each hospital and health center in advance with an overall enrolment goal of 1072 women. The ANC clinics are usually open one to two days per week, and surveys were only administered on days during which ANC clinics were open. Study staff approached pregnant women who visited ANC clinics and obtained verbal consent from all pregnant women before administering the survey. Surveys were conducted on multiple days in order to reach the sample size for each hospital. Women were eligible for participation if they were of Thai nationality, aged $\geq$15 years, could read and write Thai and provided verbal consent. As the survey was evaluating a national public health program, it was considered program evaluation and exempted from ethical review by the Thai Ministry of Public Health (Nonthaburi, Thailand) and the U.S. Centers for Disease Control and Prevention (Atlanta, GA).

The questionnaire requested demographic information, history of previous influenza vaccination and knowledge of influenza virus infection and vaccination. Questions related to attitudes towards influenza vaccination were based on the Health Belief Model (HBM)which includes five constructs that influence health behaviors, namely perceptions of susceptibility, severity, barriers, benefits, and cues to action [17]. The HBM posits that people are likely to exhibit disease prevention behaviors (such as vaccination) if they perceive that they are susceptible to the disease, the disease is severe, the behavior is beneficial, and barriers are minimal [18]. In addition, cues to action, such as recommendations of health care providers or health messages, can affect behaviors. We adapted and modified questions from previous published literature [18,19] and translated them into the Thai language. Two statements in the questionnaire focused on perceived susceptibility to getting influenza for both mother and infant; two on perceived severity of influenza infection for mother and infant; three on perceived barriers of influenza vaccine; three on perceived benefits of the vaccine; and five on cues to action (i.e., encouragement by others to be vaccinated).

Participants who had never heard of the influenza vaccine were excluded from analysis of factors affecting vaccination since our study was designed to assess pre-existing attitudes towards influenza vaccination. Among the women who had heard of the influenza vaccine, those who reported having received an influenza vaccine or reported that they wanted to get the influenza vaccine during their current pregnancy were considered willing to be vaccinated. We grouped response answer for HBM individual items into two groups: (1) agree, or (2) disagree or don't know/not sure. Participants' level of concern about their personal susceptibility to influenza during this pregnancy and their unborn child's susceptibility were categorized as (1) moderate or very concerned, or (2) little or not concerned or don't know. We compared the proportion of women who agreed with the statements or were moderately or very concerned between women willing and unwilling to be vaccinated using a Chi-square test.

Individual HBM items were re-coded to three levels (Supplemental Table 1) such that higher values corresponded to a greater degree of agreement or importance as: 1 = unlikely, low or disagree; 2 = uncertain or moderate, and 3 = likely, high or agree [20]. The individual HBM items were combined based on conceptual similarity into HBM constructs and then summed to create scores for each component of the HBM framework. In order to facilitate interpretation, participants were divided into tertiles by their summed score to create three (low/moderate/high) categories for each HBM construct, with the exception of perceived severity which was scored dichotomously (low/high) given the high kurtosis (peakedness) of the distribution [20].

The associations between demographic characteristics and HBM constructs with willingness to be vaccinated were analyzed using a log-binomial model with a generalized estimating equations approach. Standard errors were adjusted for data clustered by hospital using a robust sandwich estimator with an exchangeable correlation structure; prevalence ratios (PR) and 95% confidence intervals (CI) were calculated. All HBM constructs plus any patient characteristic variables statistically associated with willingness to be vaccinated ($P < 0.05$) were included in the multivariable modeling process, although variables highly correlated with the outcome (such as previous history of vaccination) were excluded. Model selection proceeded by backward step selection to identify the set of parameters that minimized the quasi-likelihood information criterion [21]. All statistical analyses were performed with SPSS (IBM SPSS Statistic 20).

3. Results

3.1. Demographic characteristics of pregnant women and willingness to be vaccinated

Of 1072 pregnant women approached from 32 facilities, 1031 (96%) completed the questionnaire. Of these 1031 women, 627 (61%) had heard about the influenza vaccine and were considered the analytical sample (Fig. 1). Women who had heard about the influenza vaccine were more likely to be educated (PR 1.7, 95% CI 1.4–2.0), aged 25–34 years (PR 1.4, 95% CI 1.3–1.6), aged 35–45 years (PR 1.4, 95% CI 1.2–1.6), have universal health insurance (PR 1.8, 95% CI 1.2–2.7), have received influenza vaccine during a previous pregnancy (PR 1.3, 95% CI 1.2–2.7), and have received influenza

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