RESEARCH PAPER

Beyond the verbal: Pregnant women's preferences for receiving influenza and Tdap vaccine information from their obstetric care providers

Mallory Ellingson^a and Allison T. Chamberlain^b

^aHubert Department of Global Health, Rollins School of Public Health, Emory University, Atlanta, GA, USA; ^bDepartment of Epidemiology, Rollins School of Public Health, Emory University, Atlanta, GA, USA

ABSTRACT

Objective: Prenatal providers are pregnant women's most trusted sources of health information, and a provider's recommendation is a strong predictor of maternal vaccine receipt. However, other ways women prefer receiving vaccine-related information from prenatal providers, aside from face-to-face conversations, is unclear. This study explores what secondary communication methods are preferred for receiving maternal vaccine-related information. **Study design:** Obstetric patients at four prenatal clinics around Atlanta, Georgia received a 27-item survey between May 5th, 2016 and June 15th, 2016. Participants were asked about sources they currently use to obtain prenatal health information and their preferences for receiving vaccine-related information from providers. Descriptive statistics were calculated and chi-square tests were used to evaluate associations between participant characteristics and outcomes. **Results:** Women primarily reported using the CDC website (57.7%) and pregnancy-related websites (53.0%) to obtain vaccine information. Apart from clinical conversations, educational brochures (64.9%) and e-mails (54.7%) were the preferred methods of receiving vaccine information from providers, followed by their provider's practice website (42.1%). Communication preferences and interest in maternal immunization varied by race/ethnicity, age and education; white women were twice as likely to want information on a provider's practice website compared to African-American women (OR = 2.06; 95% CI: 1.31, 3.25). **Conclusions:** Pregnant women use the Internet for information about vaccines, but they still value input from their providers. While e-mails and brochures were the preferred secondary modes of receiving information, a provider's existing practice website offers a potential communications medium that capitalizes on women's information seeking behaviors and preferences while limiting burden on providers.

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Introduction

Pregnant women and their infants are at a higher risk of developing complications from influenza and pertussis (whooping cough).^{1–4} Because of this, the Centers for Disease Control and Prevention (CDC) and the American Congress of Obstetricians and Gynecologists (ACOG) recommend that pregnant women receive the influenza and the tetanus, reduced diphtheria toxoid, and acellular pertussis (Tdap) vaccines during pregnancy.⁵ Many of the guidelines and recommendations issued by the CDC have been endorsed and promoted by ACOG. Pregnant women have been the focus of communicating the benefits of immunization and disease risks in order to address the higher risk of complications that pregnant women and their infants face.⁶

Despite recommendations from CDC and ACOG, maternal immunization rates still remain low. From most recent estimates, approximately 36% of pregnant women receive the flu shot during pregnancy and 48.8% receive the Tdap vaccine.^{7,8} Barriers to vaccination include a lack of knowledge about the safety of the vaccines or severity of the diseases during or after pregnancy.^{9–15} Lack of an explicit provider recommendation to receive a vaccine and limited access to the vaccine in obstetric provider offices are also cited as barriers.^{9,10,12,14–16}

It is well documented and widely accepted that prenatal care providers play an essential role in vaccine promotion; one of the most significant predictors of vaccine receipt is provider recommendation of the vaccine.^{15–20} While we know provider-to-patient communication is important, exactly how providers should communicate with their patients has received less attention. Ideally, providers would have in-depth in-person discussions with each patient about relevant health topics, but ample clinic time with each patient is often cited as a limitation to conveying all relevant information.^{21–26} Also, the frequency of prenatal care visits is weighted towards the end of pregnancy, when the window of opportunity may have passed for education about time-sensitive topics like seasonal influenza vaccination.

Since there may be inadequate time to discuss vaccinations with every patient, knowing other ways women prefer to receive information from their prenatal care providers may be helpful for managing and preempting information requests. Through a survey of over 400 pregnant women, this study aimed to assess pregnant women's preferences for receiving information on routine maternal vaccinations, aside from verbal exchanges with their providers. The study also sought to

understand women's current information seeking habits regarding maternal vaccination as compared to other prenatal care topics, like Zika virus disease and safe medication use during pregnancy.

Results

Of the 600 blank surveys delivered to the clinics, 408 surveys were returned, all of which were completed in English.²⁷ The demographic characteristics of the study population have been previously published.²⁷ Nearly two-thirds of respondents indicated that they were interested or very interested in information about maternal vaccination (64.4%). Interest in information about vaccines was associated with age, race and higher levels of education (Table 1). Women over 35 years old were nearly two times more likely than younger women to be interested in vaccine information, and white women were over twice as likely to be interested in vaccine information than African American women (women over 35 years old (67.9%), women under 30 years old (53%); OR = 1.87, 95% CI: 1.11, 3.16; white women (73.9%), African American women (55.0%); OR = 2.26, 95% CI: 1.40, 3.63). Interest among Hispanic women was not significantly higher than interest among African American women (Hispanic women (75.0%), African American women (55.0%); OR = 2.38, 95% CI: 0.82, 6.90). Compared to women without a college degree, women with at least a Bachelor's degree were over three times more likely to be interested in vaccine-related information (women with at least a Bachelor's degree (71.9%), women without a degree (44.1%); OR = 3.25, 95% CI: 2.08, 5.08). Although age, race/ethnicity and education level varied between the four study sites, adjusting for study site did not alter the relationship between age, race/ethnicity or education and interest.

Provider type was also associated with interest in information about maternal vaccines; women who saw an obstetrician/

gynecologist (ob/gyn), either alone or in combination with a midwife, were two to four times more likely to be interested in information about vaccines than women who only reported seeing a midwife (ob/gyn only (65.9%): OR = 2.60, 95% CI: 1.40, 4.85; ob/gyn & midwife (76.9%): OR = 4.50, 95% CI: 1.09, 18.50; midwife only (42.6%)).

Only about half of women surveyed recalled discussing maternal vaccination with their providers (53.8%), compared to 82.0% of women who recalled discussing safe medications. However, compared to women in their first or second trimesters, a higher proportion of women in their third trimester recalled discussing maternal vaccination with their provider (first trimester: 30.2%, second trimester: 29.3%, third trimester: 76.0%, p-value < 0.0001). Although women who saw an ob/gyn for their prenatal care were more interested in information about vaccination, there was no meaningful difference by provider type in the proportions of women who reported having discussed the topic with their provider. (ob/gyn: 54.3%; midwife: 58.7%; p = 0.9709).

Aside from verbal communications with their prenatal providers, the top resources that women reported currently using to obtain information about maternal vaccines were the CDC website (57.7%), other pregnancy-related websites (53.0%) and their obstetric provider's own practice website (35.4%) (Fig. 1). Currently used sources did not vary meaningfully by age; however, women with at least a Bachelor's degree were nearly 3.5 times more likely to use the CDC website to obtain vaccine information than were women without a Bachelor's degree (women with at least a Bachelor's degree (66.8%), women without a Bachelor's degree (36.8%); OR = 3.46; 95% CI: 2.21, 5.43). White women were over 4 times as likely to use the CDC website than were African American women (white women (73.2%), African American women (39.3%); OR = 4.21; 95% CI: 2.61, 6.77), who tended to prefer other pregnancy websites (56.6%) to the CDC website (39.3%). Practice and age were considered as confounders for the relationship between education and information preferences, however, adjusting for practice or age did not alter the relationship between the selected demographic characteristics and information preferences.

When asked how they would like to receive information about maternal vaccination from their prenatal care providers,

Table 1. Interest in information about maternal vaccinations by selected patient characteristics.

Patient Characteristic	Interested ¹ (N = 259) N (%)	OR ²	95% CI ³
Age (in years)			
18–29	70 (53.0%)	REF ⁴	REF
30–34	111 (69.8%)	2.05	1.27, 3.31
35+	76 (67.9%)	1.87	1.11, 3.16
Education			
High school education or less	52 (44.1%)	REF	REF
College or graduate degree	205 (71.9%)	3.25	2.08, 5.08
Race/Ethnicity			
African American/Black	83 (55.0%)	REF	REF
Hispano/Latino/Chicano	15 (75.0%)	2.38	0.82, 6.90
Caucasian/White	122 (73.9%)	2.26	1.40, 3.63
Asian	30 (62.5%)	1.40	0.71, 2.76
Other	7 (41.2%)	0.62	0.22, 1.75
Provider Type			
Midwife	20 (42.6%)	REF	REF
Ob-Gyn	214 (65.9%)	2.60	1.40, 4.85
Both	10 (76.9%)	4.50	1.09, 18.50

¹Interested = indicated 'interested' or 'very interested' in information on maternal vaccines on a five-point Likert scale.

²OR = odds ratio, calculated using an unadjusted logistic regression model.

³95% CI = 95% Confidence Interval.

⁴REF = referent category.

Figure 1. Currently used secondary communication modes for maternal vaccine information.

Figure 2. Preferred secondary communication modes for maternal vaccine information.

women were most interested in educational brochures (64.9%), e-mails (54.7%), and a vaccine-related section on their provider's own website (42.1%) (Fig. 2). Although these findings were similar by race/ethnicity, white women were twice as likely as African American women to be interested in a vaccine section on their provider's practice website (OR = 2.06; 95% CI: 1.31, 3.25). There was little desire in being able to obtain vaccine information via a practice-sponsored Facebook page (7.7%) or Twitter feed (1.2%). Similar communications preferences were observed for the topics of Zika virus and safe medications during pregnancy.²⁷

Discussion

In recent years, it has become apparent that the amount of clinic time providers spend with patients is dwindling. The Medscape 2016 Physicians Compensation Report, a survey of approximately 20,000 physicians of all specialties, found that approximately half of physicians reported spending 16 minutes or less with patients, and the duration of clinical encounters can be reduced even further when a clinic falls behind schedule.²⁸ Unfortunately, while it is true pregnant women are seen multiple times during their pregnancy – a schedule that may allow for repeatedly bringing up a given topic – the reality is that these increasingly short in-person encounters do not bode well for adequately discussing topics like maternal influenza and Tdap vaccination. Both topics are important from a disease prevention perspective, but can be riddled with misinformation on the Internet and elsewhere.^{29,30} Additionally, as evidenced by the substantial proportion of women in our study who reported not discussing maternal vaccines with their providers, providers may not be relaying enough information about maternal vaccination to their patients. Alternatively, they may not be promoting the vaccines early enough in pregnancy or in ways the women are internalizing. With vaccination now a routine part of obstetric care, it is imperative that providers look to expand and refine the way they communicate with patients about vaccines and perhaps tailor their vaccine communication strategies according to the preferences of their own patient populations.

In this study, we found that aside from talking directly with their prenatal care provider about vaccines, the majority of women wanted to receive vaccine related information in brochures and emails from their prenatal care providers. Although

this preference for educational brochures and e-mails did not vary meaningfully by race/ethnicity, we did find white women to be twice as likely as African American women to be interested in finding vaccine information in a section on their prenatal provider's practice website. This difference reveals that communication preferences may in fact differ by key patient characteristics or demographics, and providers may want to be cognizant of these differences before investing time and energy into certain secondary communication avenues. While it is certainly not feasible to perfectly tailor educational content to every patient's unique communication preferences, it may be worthwhile to get at least a general understanding of the preferences of the majority of the patients a practice serves.

Although brochures and e-mails were the most preferred secondary modes for receiving vaccine information from providers, it is worth noting that both brochures and emails either require a clinical encounter or put substantial burden on providers. While e-mails can deliver health information directly from the provider to the patient, maintaining an up-to-date database of patient emails can be burdensome on providers and their staff. Brochures can be convenient, and while organizations like CDC and ACOG have produced excellent brochure-type resources for obstetric care providers to use, they still require a physical encounter for distribution and do not necessarily align with women's current electronic information seeking habits. In congruence with other studies that have explored pregnant women's health information seeking behaviors, women in this study also turned primarily to the Internet for vaccine-related information.^{22,31,32} Most women accessed the CDC website or other pregnancy-related websites, while social media outlets like Twitter and Facebook were substantially less popular.

After the CDC website and other pregnancy-related websites, the third most popular source for obtaining vaccine-related information was their prenatal care provider's own website. It is this platform that may offer the most practical and useful solution to bolstering providers' educational reach to their patients. This is because provider websites marry two important patient preferences into one modality: a desire to access evidence-based information online and having that information be endorsed by their own provider. Upon analyzing our survey results for Zika-related communication preferences, we found that the most important characteristics of educational content received from their providers were being evidence-based and endorsed by their own prenatal care provider.²⁷ These findings align with the numerous other studies that have also revealed that women value vaccine information or recommendations most when they come from their own provider.^{14-20,33} Providers' own practice websites allow providers to share reputable, evidence-based information *and* put their own stamp of approval on that information. This capability is particularly important for vaccine information, as anti-vaccine activists are known for using a variety of tricks and tactics to deliberately spread misinformation about vaccines to individuals who may be turning to the Internet for vaccine information.^{29,30} With more than 85% of obstetric providers in the U.S. already hosting websites, this should be a particularly appealing avenue for patient education about vaccines.³⁴

Unfortunately, provider practice websites are not being utilized to their fullest potential. In this study, we found that approximately 35% of women are already looking to their

provider's website as a source of information on maternal vaccination and safe medications, but that information on both topics may not be readily available. From a 2014 national cross-sectional survey of 1,000 prenatal care websites, only 22.8% of the websites examined had any information available on antenatal vaccination.³⁴ Thirty-six percent had information on safe medications during pregnancy. While the greater prevalence of information on safe medications aligns with a greater interest in the topic as compared to vaccines (for example, 83.7% of women in our survey indicated an interest in information about safe medications versus 64.4% indicating interest in information on maternal vaccines), the discrepancies between interest and availability of the information on practice websites – for either topic – is substantial and may be important to rectify.

The study has some important limitations. In addition to having been based on responses from a highly educated, literate patient population, our respondents were older (most over the age of 30), and our sample was almost exclusively white and African American. Only 4.0% of those surveyed were Hispanic.²⁷ According to a survey conducted by the Pew Research Center in 2008, approximately one quarter of pregnant women surveyed at the time identified as Hispanic while only 15% identified as black.³⁵ These characteristics from our sample could have biased the results towards individuals more likely to turn to the Internet for health information. Additionally, since all practices included in the study were located in the greater Atlanta area, the proportion of women aware of the CDC as a reputable resource for information on prenatal care topics like vaccines may have been greater than a similar sample recruited elsewhere. Despite this fact, previous studies have not found substantial differences in the information-seeking preferences of pregnant women by region or country.^{26,36} The four practices included in the study were all specifically prenatal care locations with obstetricians and midwives as the sources of antenatal care. In other locations, there may be other sources of prenatal care. Additionally, given the high prevalence of the outcomes in this study the prevalence odds ratios calculated do not approximate the prevalence ratio. However, although the prevalence odds ratio may overestimate the magnitude of the association in cases where there is a high prevalence, the direction of the association remains the same.³⁷

In conclusion, while we confirmed that many pregnant women use the Internet as a primary source of information about maternal vaccines during pregnancy, they still place value on their own provider's endorsement of vaccine information. Aside from verbal discussions with their providers about vaccines, women prefer receiving information in the form of e-mails, brochures or a vaccine-related section on their provider's practice website. While all three of these modalities can be useful, existing practice websites potentially offer the most promise in so far as they provide an appealing balance between aligning with pre-existing health seeking-behaviors, patient preferences, and provider burden.

Materials and methods

The survey methods employed in this study have been previously described.²⁷ In short, we distributed 100 hard-copy surveys (available in both English and Spanish) to each of 4

obstetric care practices in Atlanta, GA that volunteered to participate in this study. Because the primary purpose of our survey was to rapidly ascertain women's communication preferences about Zika virus disease, surveys were distributed between May 5th, 2016 and June 20th, 2016. All obstetric patients visiting the clinics during this timeframe were offered the survey by front-desk staff upon check-in and instructed to return the survey back to the front desk upon completion. No data was collected on how many women checked in at the clinics between the two dates or on any non-responders. Because the survey collected no identifying information, the study was granted exempt status by the Emory University Institutional Review Board.

All data analyses were conducted using SAS 9.3 (Cary, NC). Women's preferences for receiving information about maternal vaccines were analyzed by age, race, education, provider type and trimester. In addition to women's communication preferences, we also ascertained women's current sources for obtaining vaccine information, level of interest in obtaining information about vaccines, and experiences discussing vaccines with their obstetric care provider. Unadjusted and adjusted logistic regression models were used to calculate odds ratios and 95% confidence intervals for multi-level covariates. Chi-squared tests and Fisher's exact tests were used to calculate the statistical significance of associations of interest. Statistical significance was defined as a p-value <0.05 or a 95% confidence interval that does not include 1.0. Frequency procedures in SAS were used to calculate odds ratios and 95% confidence intervals for dichotomous covariates. For our analyses, interest in maternal vaccines was dichotomized; women were considered 'interested' if they indicated that they were 'very interested' or 'interested' in information about maternal vaccines. They were categorized as 'not interested' if they indicated being 'not interested at all', 'a little interested' or 'neutral.' Similarly, education was dichotomized with women having received a Bachelor's degree or higher-level degree categorized as 'Women with at least a Bachelor's degree' and all other women as 'Women without a Bachelor's degree'. Age was divided into three categories, one including women aged 35 years or older, one for women between the ages of 30 and 34 and one for women younger than 30.

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