Research Article

An Email Survey of Physician and Licensed Midwife Vaccination Practices in Washington State in 2011

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Despite proven benefit to mothers and infants, influenza and Tdap vaccination for pregnant women remain suboptimal. We conducted an email survey for physicians (MDs) and licensed midwives (LMs) in Washington to assess vaccination practices. The Washington State Department of Health and University of Washington, Department of Obstetrics and Gynecology, created an electronic survey and sent it to 644 providers. We used chi-square statistic for comparisons, with Fisher's exact test for cell size smaller than 5. We received responses from 121 (19%), 106 of whom provided prenatal or obstetric care: 81 MDs and 25 LMs. MDs were more likely than LMs to ask whether pregnant patients are current on vaccinations for influenza and pertussis (96% versus 56% and 84% versus 40%, resp., $P < 0.001$) and to recommend influenza and pertussis vaccine during pregnancy (100% versus 20% and 86% versus 24%, resp., $P < 0.001$). Significantly more MDs received influenza vaccine in the most recent season than did LMs (99% versus 20%, $P < 0.001$). In this study, LMs were less likely to inquire about immunization status, recommend influenza and pertussis vaccines, or be vaccinated against influenza than MDs. Enhancing educational communication with LMs deserves further study and may provide an opportunity to improve immunization rates in pregnant women.

1. Introduction

Both influenza and pertussis pose significant risks to infants. Pregnant and postpartum women and their infants are at increased risk of complications from influenza [1–4]. Multiple studies have shown that influenza immunization of women before or during pregnancy can protect both mothers and infants from influenza [5–8]. The Advisory Committee on Immunization Practices (ACIP) has recommended influenza vaccine for pregnant women in the second or the third trimester since 1997 [9] and for those in any trimester since 2004 [10]. Despite these recommendations, the proportion of pregnant women vaccinated for influenza was 15% before 2009. After the focused attention on influenza in the 2009 H1N1 influenza pandemic, the influenza immunization rate among pregnant women increased to 51% in 2010 [11] but remains suboptimal.

Infants younger than 1 year are at high risk of severe illness and death from pertussis [12, 13] and a majority of infant

pertussis cases are infected by a family member [14, 15]. Tdap vaccination of mothers before delivery may prevent maternal infection, thus protecting the infant from exposure, and provides transplacental maternal pertussis antibodies to the infant, thereby providing some protection [16–19]. In 2012, the ACIP recommended that women receive a dose of Tdap with each pregnancy and the optimal timing for this dose is between 27 and 36 weeks of gestation [20]. The proportion of pregnant women vaccinated for pertussis is unknown, but for the general US population it is approximately 8% [21].

In the United States, healthcare providers (HCP) attending pregnant women fall into four main provider types: physicians, such as obstetricians and family practitioners, and midwives including nurse midwives and licensed midwives. Healthcare providers' (HCP) recommendations are given considerable weight by patients, and a pregnant woman who is offered an influenza vaccine by her healthcare provider is more likely to be vaccinated [11, 22], but no research has been done on patient compliance with vaccine recommendations

TABLE 1: Vaccination practices of prenatal care providers.

	All MDs (N = 81) n (%)	OBs (N = 61) n (%)	FPs (N = 19) n (%)	LMs (N = 25) n (%)	P value*
Influenza vaccine					
Ask if pregnant patient is up to date	78 (96)	59 (97)	18 (95)	14 (56)	<0.001
Recommend in pregnancy	81 (100)	61 (100)	19 (100)	5 (20)	<0.001
Recommend postpartum	74 (91)	56 (92)	17 (89)	3 (12)	<0.001
Pertussis vaccine					
Ask if pregnant patient is up to date	68 (84)	51 (84)	16 (84)	10 (40)	<0.001
Recommend in pregnancy	70 (86)	53 (87)	17 (89)	6 (24)	<0.001
Recommend postpartum	75 (93)	57 (93)	17 (89)	9 (36)	<0.001
Will follow ACIP recommendation					
Yes/already do	79 (98)	59 (97)	19 (100)	7 (28)	<0.001
No	0 (0)	0 (0)	0 (0)	4 (16)	<0.001
Maybe	2 (2)	2 (3)	0 (0)	14 (56)	<0.001
Received influenza vaccine in most recent flu season					
Yes	80 (99)	60 (98)	19 (100)	5 (25)	<0.001

* P value is chi-square for differences.

based on the type of prenatal provider. We hypothesized that some types of prenatal care providers may immunize at a higher rate than others. Hence, the objectives of this email survey were to compare prenatal care providers' attitudes and practices on influenza and Tdap vaccination in pregnant women.

2. Materials and Methods

An email survey was created by staff at the Washington State Department of Health (DOH) and the University of Washington, Department of Obstetrics and Gynecology (UWDOG), using Opinio (Opinio, version 6, Object Planet, Oslo, Norway). Expert survey writers within DOH reviewed and edited the survey. The survey was pilot tested with obstetricians from the UWDOG.

Potential subjects for the survey were identified from membership lists of the Washington Chapter of the American College of Obstetrics and Gynecology (WA-ACOG) and Washington Obstetrics Association (WOA) and licensing records from the Washington State Department of Licensing (WA-DOL). Overall, 2822 potential respondents were identified in membership and licensure lists: 438 obstetrician (OB) members of WA-ACOG; 154 family practice (FP) physician and midwife members of WOA; 107 licensed midwives (LM) in the WA-DOL records; and 2123 advanced registered nurse practitioners (ARNP) in the WA-DOL records. WA-DOL records do not indicate which ARNPs provide prenatal care. Email addresses were missing for a large proportion of the LMs and ARNPs licensed through the Washington State Department of Health (68% and 77% missing, resp.). Because the absolute number of missing emails for LMs was small ($n = 73$), missing emails were searched via the internet and a majority were identified. Due to limited resources, we were unable to search for the missing ARNP emails and so ARNPs,

and thus nurse midwives (NM), were excluded from the sample population.

In December 2011, the surveys were successfully emailed to 644 persons: 433 OBs from WA-ACOG list, 120 FPs and midwives from WOA list, and 91 LMs from WA-DOL licensing list. Three email reminders were sent out in the two weeks the survey was open to receive responses. Respondents submitted survey responses online. Inclusion criteria required that the respondent provided prenatal care and was not an NM. The survey was deemed "program evaluation" by Washington Institutional Review Board so was exempt from review. Analysis was performed using Stata 11.0, with chi-square statistic used for comparisons, and Fisher's exact test for cell size <5.

3. Results

Responses were received from 121 (19%) of 644 potential respondents, of whom 110 provided prenatal care. Four respondents were NMs and were excluded from analysis, resulting in a final sample size of 106.

Of 106 respondents, 73 (69%) were female, 61 (58%) completed an obstetrics and gynecology residency, 19 (18%) completed a family practice residency, 1 (<1%) had "50-year experience" in medical practice, and 25 (24%) were LMs. By practice type, 81 (76%) were physicians (MDs) and 25 (24%) were LMs. Sixty-nine (85%) of 81 MDs had been licensed for >10 years compared to 8 of 25 (32%) LMs ($P < 0.001$). Thirty-seven (61%) of 61 OBs provided care to 20 or more pregnant women per week compared to 3 (16%) of 19 of FPs and 8 (32%) of 25 of LMs ($P < 0.001$).

MDs were more likely to report asking whether pregnant patients were up to date on influenza and Tdap vaccines and to recommend both influenza vaccine and Tdap to pregnant and postpartum women than were LMs ($P < 0.001$) (Table 1). MDs were more likely than LMs to report following the new

TABLE 2: Capability of prenatal care practices to administer vaccines.

	All MDs (N = 81) n (%)	OBs (N = 61) n (%)	FPs (N = 19) n (%)	LMs (N = 25) n (%)	P value*
Practice administers any vaccines					
Yes	76 (94)	56 (92)	19 (100)	6 (24)	<0.001
Practice administers specific vaccine					
Influenza	74 (97)	54 (96)	19 (100)	1 (17)	<0.001
Tdap	66 (87)	47 (84)	18 (95)	3 (50)	0.02
Practice administers vaccines to partners					
Yes	35 (46)	18 (32)	16 (84)	3 (50)	0.001

* P value is chi-square for differences.

ACIP recommendation for Tdap during pregnancy ($P < 0.001$). MDs were more likely to report having been immunized against influenza in the most recent influenza season than were LMs ($P < 0.001$).

Seventy-six (94%) of 81 MD practices administered some vaccines to patients compared to only 6 (24%) of 25 LM practices ($P < 0.001$) (Table 2). Of the 82 MD and LM practices that administered any vaccines, 74 (97%) of 76 MD practices offered influenza vaccine and 66 (87%) offered Tdap, compared to only 1 (17%) of 6 LM practices that offered influenza vaccine and 3 (50%) that offered Tdap. FP practices were more likely to report administering vaccines to partners of pregnant women than were OB or LM practices ($P = 0.001$).

Of the 74 practices that employed staff, 53 (80%) of 66 MD practices reported requiring office staff to be vaccinated against influenza compared to 0 of 8 LM practices that employed staff ($P < 0.001$). Thirty (45%) MD practices reported requiring office staff to be vaccinated against Tdap compared to 0 of 8 LM practices ($P = 0.013$). Of providers who did not administer vaccines to their patients, reasons given were varied, with the most common being, "Vaccine is out of scope of practice" (Table 3).

4. Discussion

A single vaccination of a pregnant woman can provide immune protection to two people: mother and infant. However, despite the focused attention on influenza during the 2009 H1N1 pandemic, with several studies that showed a benefit to infants and mothers from the influenza vaccine, a significant proportion of pregnant women and their infants remain unprotected. In 2003, only 36% of OBs offered influenza vaccine to pregnant women in their office [23]. A new recommendation by ACIP for Tdap with each pregnancy was announced in 2012. Prenatal care providers are an important and trusted source for medical information to pregnant women [11, 22], and the frequent scheduled visits over the course of a pregnancy provide an opportunity for education and interventions to optimize the health of the mother and infant. This email survey of Washington prenatal care providers suggests that physician prenatal care providers are more likely to report recommending, providing, and receiving influenza vaccine than are LM providers. The findings were similar though less pronounced for Tdap. MDs in this study reported having a high rate of immunization against

TABLE 3: Provider reasons for not giving vaccine.

Reason	N = 17 ¹ n (%) ²
Vaccine is out of scope of practice	5 (29)
Insurance does not pay	4 (24)
Do not know how to bill	2 (12)
Do not have enough staff	2 (12)
Concerns about vaccine safety	2 (12)
Too busy	1 (6)
Do not know how to order vaccine	1 (6)
Do not know how to set up vaccination program	0
Concerns about liability	0
Do not think vaccines necessary	0

¹ Of respondents, 17 did not offer one or both vaccines.

² Multiple responses were allowed.

influenza and of offering vaccines in the office. FP practices appear more able than OB or LM practices to provide vaccines to partners of pregnant women.

This study had several limitations. Results may not be generalizable for several reasons; lists of email addresses were incomplete, unequal searches for email addresses may have introduced some bias, and the response rate was low. As with any survey, answers provided by responders may not be completely representative of nonresponders. Regional differences in vaccination practices may be present in the United States and this study only addressed practices in a single state. Adequate data do not exist defining the proportion of MD and different types of midwives providing prenatal care, so we cannot determine whether the proportions in the study population are representative of provider types attending pregnant women in Washington. Data from the Centers for Disease Control and Prevention suggest that approximately 7.6% of births in the US were attended by nurse midwives [24] but do not address LMs who tend to have fewer training requirements. Given that only about half of all pregnant women receive an influenza vaccine, whereas virtually all MD survey respondents were strong proponents of influenza vaccine for pregnant women, our results suggest that the MD study population may not be representative of all MDs providing prenatal care. However, these results suggest that differences may exist in promotion of vaccines by different types of prenatal

care providers and that LMs may be less likely to recommend vaccines to pregnant women. This preliminary study does not adequately sample all provider populations nor differentially assess patient feelings about vaccine based on provider type; however, the difference in provider attitudes toward vaccination deserves further study in a larger sample.

Solid evidence exists that influenza vaccination of pregnant women can prevent complications of influenza in mothers and infants and a focus on timely vaccination of pregnant women is recommended. Uptake of the pertussis vaccine by pregnant women since the most recent ACIP recommendation remains to be determined. Optimizing adherence to the standard of care recommendations for pregnant women will improve outcomes for a healthy start in life for infants. The results of our study provide a starting point for educational communication with the LM community to assess the validity of our results and to identify opportunities for improving education about current vaccine recommendations for pregnant women.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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