

Attitudes and Practices of Obstetrician–Gynecologists Regarding Influenza Vaccination in Pregnancy

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OBJECTIVE: To assess knowledge, attitudes, and practices of obstetrician–gynecologists (ob-gyns) regarding vaccination of pregnant women during the 2009 H1N1 pandemic.

METHODS: From February to July 2010, a self-administered mail survey was conducted among a random sample of American College of Obstetricians and Gynecologists (the College) members involved in obstetric care. To assess predictors of routinely offering influenza vaccination, adjusted prevalence ratios and 95% confidence intervals (CIs) were calculated from survey data.

RESULTS: Among 3,096 survey recipients, 1,310 (42.3%) responded to the survey, of whom 873 were eligible for participation. The majority of ob-gyns reported routinely offering both seasonal and 2009 H1N1 influenza vaccination to their pregnant patients (77.6% and 85.6%, respectively) during the 2009–2010 season; 21.1% and 13.3% referred patients to other specialists. Reported reasons for not offering vaccination included inadequate reim-

bursement, storage limitations, or belief that vaccine should be administered by another provider. Seasonal and 2009 H1N1 influenza vaccination during the first trimester was not recommended by 10.6% and 9.6% of ob-gyns, respectively. Predictors of routinely offering 2009 H1N1 influenza vaccine included: considering primary care and preventive medicine a very important part of practice (adjusted prevalence ratio 1.2, CI 1.01–1.4); observing serious conditions attributed to influenza-like illness (adjusted prevalence ratio 1.1, CI 1.02–1.1); personally receiving 2009 H1N1 influenza vaccination (adjusted prevalence ratio 1.2, CI 1.1–1.4); and practicing in multispecialty group (adjusted prevalence ratio 1.1, CI 1.1–1.2). Physicians in solo practice were less likely to routinely offer influenza vaccine (adjusted prevalence ratio 0.8, CI 0.7–0.9).

CONCLUSION: Although most ob-gyns routinely offered influenza vaccination to pregnant patients, vaccination coverage rates may be improved by addressing logistic and financial challenges of vaccine providers.

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Pregnant women are at increased risk for influenza-related morbidity, adverse pregnancy outcomes, and mortality, especially during pandemics.^{1–9} During the 2009 H1N1 pandemic, pregnant women accounted for approximately 5% of influenza-associated deaths in the United States, although they represent only approximately 1% of the population.⁶

Influenza vaccination during pregnancy is the most effective way to prevent influenza virus infection among pregnant women¹⁰ and their infants younger than 6 months of age.^{11,12} Although administration of inactivated influenza vaccine is recommended to all women who are pregnant during the influenza season,

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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regardless of pregnancy trimester,^{10,13} the vaccination coverage among pregnant women has been historically low, rarely exceeding 15% during nonpandemic years.^{10,14} The reasons for low uptake of vaccination during pregnancy include factors related to the lack of vaccine acceptance by pregnant women, as well as barriers among health care providers, including absence of financial incentives, liability concerns, logistic obstacles, and lack of confidence about vaccine safety and benefits.^{15–22}

Obstetrician–gynecologists (ob-gyns), who are often the only providers of health care during pregnancy, play a critical role in preventing influenza in their patients through vaccination and implementing recommended diagnostic, treatment, and infection control practices. Understanding the barriers that prevent ob-gyns from administering influenza vaccination is critical for attaining high vaccination rates among pregnant women. In February 2010, just after the peak of the 2009 H1N1 pandemic, we conducted a survey among the national sample of U.S. ob-gyns to assess their knowledge, attitudes, and practices regarding influenza vaccination during pregnancy, and the barriers and facilitators to influenza vaccination.

MATERIALS AND METHODS

A self-administered survey was mailed to a U.S. nationally representative random sample of 3,116 ob-gyns using the American College of Obstetricians and Gynecologists database. Only ob-gyns currently involved in obstetric patient care were eligible to participate; those not eligible were instructed to return the uncompleted survey. The sampling frame consisted of 33,685 practicing ob-gyns who were College fellows or junior fellows. The survey was accompanied by a cover letter and prepaid envelope; no incentives were offered to the participants. The initial mailing was sent in February 2010. Second, third, and fourth mailings were sent to all nonrespondents at 4- to 5-week intervals. The survey included questions about the basic demographic information of respondents and their patients, respondents' experiences with serious conditions attributed to influenza-like illness among pregnant women in their practice (during both 2008–2009 influenza season and 2009 H1N1 pandemic), and respondents' attitudes and practices regarding influenza vaccination of pregnant women (with both seasonal and 2009 H1N1 influenza vaccines) during the 2009 H1N1 pandemic. Five weeks after the fourth mailing, a short questionnaire was sent to all nonrespondents to gather data for an assessment of possible nonresponse bias in which

their responses were compared with those of study participants.

Analyses were performed using SAS 9.1 and SPSS 16.0. We calculated frequency distributions of responses to each question in the survey, excluding nonresponses from the denominators. For multilevel responses, we performed multiple tests using SAS “MULTTEST” procedure. Two-sided Cochran-Armitage linear trend tests²³ and a significance level of $P < .05$ were used to compare differences in responses for the 2008–2009 and 2009–2010 influenza seasons, and for seasonal and 2009 H1N1 influenza vaccines.

To assess the association between selected characteristics and routinely offering 2009 H1N1 influenza vaccine by ob-gyns, we conducted log-binomial regression analyses, which included variables on the basis of their univariable association with the outcome (routinely offering 2009 H1N1 influenza vaccine); adjusted prevalence ratios and 95% confidence intervals (CIs) were calculated using SAS “GENMOD” log-binomial regression capability.²⁴ Using this approach, log-probability link function is used, and the adjusted estimates of coefficients of the examined factors represent logarithms of the adjusted prevalence ratios. Because of multicollinearity between three variables (practice type, considers primary care or preventive medicine an important part of practice, and received 2009 H1N1 influenza vaccination themselves), three separate models were constructed. The project was reviewed for human subject concerns by the Centers for Disease Control and Prevention and the College and was determined to qualify for exempt status.

RESULTS

Of the 3,116 surveys mailed, 20 were returned as undeliverable. Among the ob-gyns who received the survey, 1,784 did not respond, 2 refused participation, and 1,310 returned the survey for a response rate of 42.3% (1,310 of 3,096). Of 1,310 providers who returned the surveys, 873 (66.6%) were providing obstetric care during the 2009–2010 influenza season and therefore were eligible to participate in the study, and their responses were included in the analyses.

The respondents had a mean age of 49 years, approximately half were female, and their average duration of clinical practice was 17 years (Table 1). The majority of respondents were practicing in a group obstetrics-gynecology practice (48.1%), followed by solo practice (16.4%), multispecialty group practice (12.4%), university full-time faculty and practice (11.2%), and other (11.9%, including Health Maintenance Organization, military, and combina-



Table 1. Characteristics of Obstetrician–Gynecologists Participating in the Survey (n=873)*

Characteristics	Percentage or Mean (Range)
Sex	
Female	51.1
Male	48.9
Average age (y)	49 (30–85)
Average years in practice	17 (0.5–52)
Type of practice	
Group obstetrics-gynecology	48.1
Solo	16.4
Multispecialty group	12.4
University full-time faculty and practice	11.2
Other	11.9
Consider primary care, preventive medicine an important part of practice	
Very important	45.8
Important	49.4
Not important	3.8
Average estimated % of patients eligible for Medicaid	33.4
Average estimated % of patients by race or ethnicity†	
Non-Hispanic white	54.9
Non-Hispanic African American	15.2
Hispanic	17.8
Asian or Pacific Islander	5.3
Native American	1.3
Multiracial	2.6
Other	1.0

* Sample size reduced owing to missing values.

† Numbers might not add to 100% because of rounding.

tion of these). Almost all respondents considered primary care or preventive medicine an important part of their clinical practice. Among the patient population of the respondents, a third were eligible for Medicaid, and race or ethnicity distribution was as follows: 54.9% were non-Hispanic white, 15.2% were non-Hispanic African American, 17.8% were Hispanic, 5.3% were Asian or Pacific Islander, and 1.3% were Native American.

In response to the question “During last year’s (2008–2009) and this year’s (2009–2010) influenza seasons, have you seen the following conditions in your practice that you attribute to influenza-like illness,” the proportion of ob-gyns who reported observing at least one of the serious conditions (maternal death, pneumonia requiring intensive care, spontaneous abortion or stillbirth, or preterm birth) doubled from 14.6% during the 2008–2009 influenza season to 31.1% during the 2009–2010 influenza season ($P<.001$). During the 2009 H1N1 pandemic, survey results indicated a threefold increase in the proportion

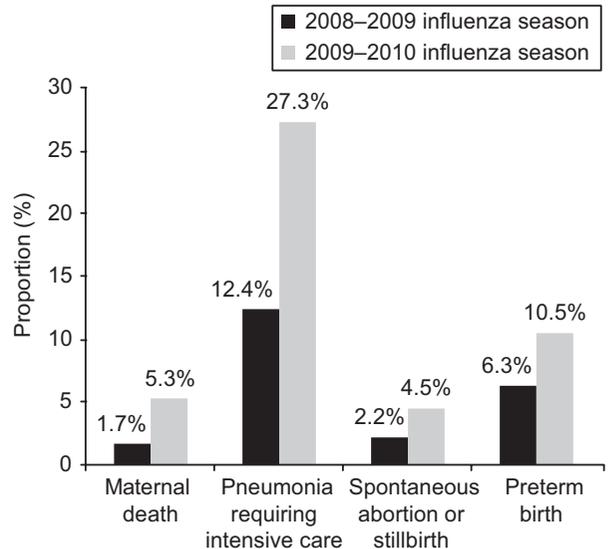


Fig. 1. Proportion of U.S. obstetrician–gynecologists who reported observing at least one of the serious conditions (maternal death, pneumonia requiring intensive care, spontaneous abortion or stillbirth, or preterm birth) in their practices that they attributed to influenza-like illness among pregnant women during the 2008–2009 influenza season (black bars) and 2009–2010 influenza seasons (gray bars). Kissin. *Influenza Vaccination During Pregnancy. Obstet Gynecol* 2011.

of ob-gyns who reported observing maternal deaths, twofold increase in the proportion observing pneumonias requiring intensive care, twofold increase in the proportion observing spontaneous abortions or stillbirths, and 50% increase in the proportion observing preterm births attributed to influenza-like illness (based on their clinical judgment) compared with the previous influenza season (Fig. 1).

During the 2009 H1N1 pandemic (2009–2010 influenza season), the majority of ob-gyns reported routinely offering influenza vaccination, both seasonal (77.6%) and 2009 H1N1 (85.6%), to their pregnant patients; most of the remaining providers reported referring their patients to other providers for seasonal (21.1%) and 2009 H1N1 (13.3%) vaccines. Only approximately 1% of providers neither offered nor referred their pregnant patients for influenza vaccination (Table 2). Pregnant patients with underlying chronic conditions were offered vaccine at approximately the same rate as low-risk patients; however, providers were slightly less likely to offer both seasonal and 2009 H1N1 influenza vaccines for pregnant patients with prepregnancy obesity. The following reasons for not offering vaccinations were reported by ob-gyns (percentages for seasonal and 2009 H1N1 influenza vaccines, respectively): not



Table 2. Attitudes and Practices of U.S. Obstetrician–Gynecologists Regarding Influenza Vaccination of Pregnant Women, 2009–2010 Influenza Season

Attitudes and Practices	Seasonal Influenza Vaccine	2009 H1N1 Influenza Vaccine	P
Offering influenza vaccination to pregnant patients			
Routinely offered	77.6	85.6	<.001
Not offered, but referred	21.1	13.3	<.001
Neither offered or referred	1.1	1.2	.98
Offering influenza vaccination to specific groups of pregnant patients			
Healthy low-risk pregnant patients	75.3	83.4	<.001
High-risk pregnant patients with underlying chronic conditions	75.3	82.4	<.001
Pregnant patients with prepregnancy obesity	71.0	77.5	<.01
Recommending influenza vaccination to pregnant patients			
Do not recommend	0.5	0.5	.92
Recommend during any trimester	88.9	89.9	.85
Recommend during second or third trimester only	10.6	9.6	.97
Requirements for medical staff to receive influenza vaccination			
Required	33.8	33.9	.99
Strongly encouraged (but not required)	63.2	62.4	.95
Not required (and not strongly encouraged)	2.9	3.3	.92
Received influenza vaccination themselves			
Yes	91.7	89.8	.23
No	8.3	10.2	.29

Data are % unless otherwise specified.

adequately reimbursed by insurance (34.9% and 31.7%); no adequate storage and handling facilities for vaccines (28.0% and 35.8%); vaccine offered by closely affiliated clinic (21.7% and 28.5%); managed care contract does not cover the cost of vaccines and vaccine administration (20.1% and 17.1%); and belief that vaccines should be administered by another provider, such as an internist or family practitioner (15.3% and 14.6%). Although the percentage of respondents offering influenza vaccination to pregnant women was significantly greater for the 2009 H1N1 influenza vaccine as compared with seasonal influenza vaccine, recommendations to use influenza vaccine did not differ by vaccine type (seasonal or 2009 H1N1). The majority of respondents recommended influenza vaccination at any trimester of pregnancy; however, 10–11% recommended influenza vaccination only during the second or third trimester of pregnancy (Table 2). Almost all respondents reported that their medical practice either required (approximately 34%) or strongly encouraged (62–63%) them to receive an influenza vaccination, and almost all (90–92%) reported having actually received an influenza vaccination during the previous influenza season. Unvaccinated respondents provided the following reasons for not getting vaccination: unable to find the vaccine; had allergic reaction to influenza vaccines in the past; had influenza before vaccine became available; had no time for vaccination; or stated

that there was no particular reason. These reasons did not differ by vaccine type.

The most commonly cited sources of guidance regarding influenza vaccinations were the College and the Centers for Disease Control and Prevention, cited by 60.8% and 54.1% respondents, respectively. Other sources of information included local public health departments (18.8%), their own practice (11.9%), scientific literature (5.6%), and media (3.9%). Fewer than half (46.6%) of respondents stated that they report suspected adverse events after administering influenza vaccine; when asked how adverse events should be reported, only 13.1% specified the Vaccine Adverse Event Reporting System or Centers for Disease Control and Prevention (which cosponsors Vaccine Adverse Event Reporting System).

Among ob-gyns, predictors of routinely offering the 2009 H1N1 vaccination to pregnant women included considering primary care or preventive medicine to be a very important part of practice (adjusted prevalence ratio 1.2, CI 1.01–1.4), observing serious conditions attributed to influenza-like illness in their practice (adjusted prevalence ratio 1.1, CI 1.02–1.1), and personally receiving 2009 H1N1 influenza vaccination (adjusted prevalence ratio 1.2, CI 1.1–1.4; Table 3). In addition, practice type was an independent predictor of routinely offering 2009 H1N1 vaccine; compared with providers in group obstetrics-gynecology practice, providers in solo practice were



Table 3. Predictors of Routinely Offering 2009 H1N1 Influenza Vaccine to Pregnant Women by U.S. Obstetrician–Gynecologists, 2009–2010 Influenza Season

Characteristics	n*	Routinely Offered Vaccine (%)	Adjusted Prevalence Ratio† (95% CI)
All	858	85.6	-
Practice type‡			
Group obstetrics-gynecology	410	86.6	1.0 (Ref)
Solo	142	66.9	0.8 (0.7–0.9)
Multispecialty group	107	98.1	1.1 (1.1–1.2)
University full-time faculty and practice	98	91.8	1.1 (0.99–1.1)
Other	100	88.0	1.0 (0.9–1.1)
Considers primary care, preventive medicine an important part of practice§			
Very important	389	88.4	1.2 (1.01–1.4)
Important	422	84.6	1.1 (0.96–1.4)
Not important	41	73.2	1.0 (Ref)
Observed serious conditions attributed to influenza-like illness among pregnant women¶			
Yes (at least one)	269	91.1	1.1 (1.02–1.1)
No	588	83.0	1.0 (Ref)
Received the 2009 H1N1 influenza vaccination themselves			
Yes	768	87.2	1.2 (1.1–1.4)
No	79	69.6	1.0 (Ref)

CI, confidence interval; Ref, reference.

* Sample size reduced because of missing values.

† Routinely offered 2009 H1N1 influenza vaccine to pregnant patients compared with not offered but referred or neither offered or referred.

‡ Adjusted estimates derived from model that included the following variables: practice type and sex.

§ Adjusted estimates derived from model that included the following variables: considers primary care or preventive medicine an important part of practice, age, and sex.

|| Adjusted estimates derived from model that included the following variables: observed serious conditions attributed to influenza-like illness among pregnant women, received 2009 H1N1 influenza vaccination themselves, age, and sex.

¶ Conditions include maternal death, pneumonia requiring intensive care, spontaneous abortion or stillbirth, or preterm birth.

less likely (adjusted prevalence ratio 0.8, CI 0.7–0.9) and providers in multispecialty group were more likely (adjusted prevalence ratio 1.1, CI 1.1–1.2) to offer 2009 H1N1 influenza vaccine. The 202 nonrespondents who returned the short follow-up letter survey did not differ from the full survey respondents in years of clinical practice, proportion of patients eligible for Medicaid, or the likelihood of routinely offering influenza vaccinations to pregnant women.

DISCUSSION

During the 2009 H1N1 pandemic, ob-gyns were critical to the public health response for preventing severe complications of influenza virus among pregnant women. Although most ob-gyns participating in this survey routinely offered influenza vaccinations to their patients, a considerable proportion of respondents did not offer vaccination or did not recommend vaccination in the first trimester of pregnancy, which represents a missed opportunity for preventing influenza virus infection and its serious consequences.

We found that ob-gyns routinely offered seasonal and 2009 H1N1 influenza vaccines to their pregnant

patients during the 2009–2010 influenza season at a higher rate than reported from surveys of U.S. ob-gyns in previous influenza seasons,^{15,18–22,25} which could be attributable to increased awareness regarding influenza in pregnancy during the pandemic season and increased demand for vaccination among pregnant women. Our study showed that providers who observed at least one of the serious conditions attributed to influenza-like illness were more likely to offer 2009 H1N1 influenza vaccine to their pregnant patients. In addition, during the 2009 H1N1 pandemic, ob-gyns were frequently reminded about the importance of influenza vaccination during pregnancy by media, publications in scientific journals, and letters from professional associations and governmental agencies.²⁶ Provision of 2009 H1N1 vaccine at no cost to vaccination providers could also have motivated ob-gyns to become vaccinators and may explain why more providers offered 2009 H1N1 than seasonal influenza vaccine. Recently published influenza vaccination coverage rates among pregnant women support our finding of the significant increase in providing vaccination among ob-gyns; in the



2009–2010 influenza season, approximately 50% of pregnant women received influenza vaccination,²⁷ which is the highest coverage level ever reported in the United States, getting closer to the Healthy People 2020 goal of 80% coverage.²⁸

Barriers to recommending and administering influenza vaccination among ob-gyns in our sample included inadequate reimbursement and absence of storage and handling facilities for vaccines (which require refrigeration and protection from light). These financial and logistic concerns are not unique for influenza vaccines and have been consistently reported in previous surveys of obstetric providers.^{15–19,21,22} However, concerns about the safety of influenza vaccines reported in previous studies^{19,22} were uncommon in our survey, which occurred toward the end of the 2009–2010 influenza season, when speculations about safety of influenza vaccination had been mitigated. Solo practice providers, which represented 16.4% of ob-gyns in our sample, were less likely to offer influenza vaccination, but more likely (compared with other practice types) to consider primary care or preventive medicine a very important part of their clinical practice (analysis not shown). This suggests that barriers to vaccination among solo practice providers are more difficult to overcome than among those who practice in partnerships and groups.

One of the limitations of the study is the relatively low response rate, which is, however, slightly higher than reported in previous random surveys of general College members (averaged 40%).²⁹ It is also possible that characteristics of respondents are different from that of nonrespondents, although nonresponse bias analysis did not reveal statistically significant differences for comparison variables. Importantly, the characteristics of respondents in our sample are similar to those of U.S. ob-gyns in general,³⁰ and the characteristics of their patients are similar to those of U.S. women giving birth.³¹ As with most surveys, our study has inherent limitations of self-reported data, which can be subject to response bias. Because we collected our data immediately after the 2009 H1N1 pandemic season, our findings may not be generalizable to a nonpandemic influenza season, when fewer patients experience serious consequences of influenza, demand for vaccination is decreased, vaccine is no longer free, and pressure from professional associations is lower. Preliminary data from the 2010–2011 influenza season suggest that observed improvement of influenza vaccination coverage rates among pregnant women could be sustainable.³²

Improving vaccination coverage rates during pregnancy is one of the main public health goals

during both influenza pandemics and nonpandemic influenza seasons, because of its role in decreasing influenza-related morbidity and mortality among pregnant women and their young infants. For many women, ob-gyns are the only providers of health care.³³ By not offering influenza vaccination to such women, providers miss a unique opportunity for prevention. Although demand for influenza vaccination from pregnant women plays an important role, research shows that when women are offered vaccination, most tend to accept it.^{15,20,27,34,35} Given that influenza vaccination reduces health care, societal, and individual costs, as well as productivity losses and absenteeism associated with influenza,¹⁰ policy improvements to allow more reliable reimbursement for vaccine providers, especially those in solo practice, might be beneficial for the society. A number of strategies (eg, patient reminder systems) have been successful in improving the role of obstetric providers as vaccinators and need to be used more widely,^{36–38} which can become even more feasible when electronic health records are widely implemented. Ob-gyns played a crucial role in increasing the national influenza vaccination coverage rates among pregnant women during the 2009 H1N1 pandemic and need to sustain their role as vaccinators during coming influenza seasons.

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