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Immunization Practices of US Obstetrician-Gynecologists for Pregnant Patients

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Abstract

Introduction—US obstetrician/gynecologists (ob-gyns) play a critical role as vaccinators of pregnant women. However, little is known about their current immunization practices. Thus, study objectives were to determine: 1) practices related to assessment of vaccination status and vaccine delivery for pregnant patients; 2) barriers to stocking and administering vaccines; and 3) factors associated with administering both influenza and tetanus, diphtheria, and acellular pertussis (Tdap) vaccines.

Methods—An e-mail and mail survey among a national sample of ob-gyns conducted July-October 2015 (analysis August 2016-August 2017).

Results—The response rate was 73.2% (353/482). Among ob-gyn’s caring for pregnant women (n=324), vaccination status was most commonly assessed for influenza (97%), Tdap (92%), and measles, mumps, and rubella (MMR) vaccines (88%). Vaccines most commonly administered included influenza (85%) and Tdap (76%). Few respondents reported administering other vaccines to pregnant patients. More physicians reported using standing orders for influenza (66%) than

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Tdap (39%). Other evidence-based strategies for increasing vaccine uptake were less frequently used (electronic decision support, 42%; immunization information system (IIS) to record (13%) or assess vaccination status (11%); reminder/recall, 7%). Barriers most commonly reported were provider financial barriers; provider attitudinal barriers were rare. Providers who administered both influenza and Tdap vaccines were more likely to be female, perceive fewer financial and practice barriers and less likely to be in private practice and perceive more patient barriers.

Conclusion—While most ob-gyns administer some vaccines to pregnant women, the focus remains on influenza and Tdap. Financial barriers and infrequent use of evidence-based strategies for increasing vaccination uptake may be hindering delivery of a broader complement of adult vaccines in ob-gyn offices.

INTRODUCTION

Pregnant women are at increased risk for severe disease from influenza,¹⁻⁵ and their newborns are at increased risk of morbidity and mortality from both influenza⁶⁻⁸ and pertussis.^{9,10} Influenza and pertussis vaccination are therefore now routinely recommended for all pregnant women,^{11,12} with influenza vaccination recommendations in place since 2004. The initial recommendation for tetanus, diphtheria, and acellular pertussis (Tdap) vaccination in 2011 was for pregnant women with no history of prior Tdap, but, in 2012, was extended to all pregnant women during each pregnancy. Both vaccines are safe and effective.¹³⁻²⁷

However, despite the benefits of these vaccines for pregnant women and their newborns, uptake remains low: according to the most recent national data, only 50% of pregnant women received influenza vaccine before or during pregnancy and only 41% of pregnant women received Tdap during pregnancy.²⁸⁻³¹ While some of the barriers to increased uptake are related to patient concerns about vaccine safety in pregnancy,³² there are also provider barriers. In a recent national survey, a substantial proportion of pregnant women reported receiving neither a recommendation nor an offer for an influenza vaccine from a provider. These women were far less likely to receive an influenza vaccine (20%) than those who received both a recommendation and an offer (65%).²⁸

There are other vaccines recommended for pregnant women in certain circumstances, such as hepatitis A and B vaccines, pneumococcal vaccines, and meningococcal vaccines.³³ Pregnancy represents an opportunity for adult vaccination given the high number of contacts with the obstetrician/gynecologist's (ob-gyn) office during a routine pregnancy. Little is known about ob-gyn current practices regarding use of all indicated vaccines in pregnancy, as there has been no recent national assessment. This study sought to address this gap in the literature by assessing among a national sample of ob-gyns: 1) current practices related to assessment of vaccination status and vaccine delivery for pregnant patients; 2) barriers to stocking and administering vaccines in ob-gyn practices; and 3) factors associated with administering both influenza and Tdap vaccines to pregnant patients.

METHODS

Between 7/2015 and 10/2015, an Internet and mail survey was administered to a national network of ob-gyns representative of American College of Obstetricians and Gynecologists (ACOG) membership. The IRB at the University of Colorado Denver deemed this study exempt research not requiring informed consent.

Study Population

The Vaccine Policy Collaborative Initiative conducted this study.³⁴ The Initiative is a program designed collaboratively with CDC to perform rapid turnaround surveys assessing physician practices and attitudes about vaccine-related issues. A national network of ob-gyns was developed for this program by recruiting from ACOG. Quota sampling was conducted to ensure that network physicians were similar to ACOG membership with respect to region, urban versus rural location, and practice setting. In prior work, survey responses from network physicians compared to those of physicians randomly sampled from American Medical Association physician databases were similar in regard to demographic characteristics, practice attributes, and attitudes about a range of vaccination issues.³⁴ Physicians who reported that they only cared for non-pregnant patients were excluded from this study.

Survey Design

The survey was jointly developed with CDC with input from experts in vaccination and obstetrics and gynecology. Survey questions followed formats previously used in published surveys.^{35–37} The survey was pre-tested with a panel of 6 ob-gyns and then piloted among 38 ob-gyns from different regions of the country. Questions regarding assessing and administering vaccines and use of evidence-based practices were asked using a series of yes/no questions. Questions regarding frequency of a given practice were assessed using a 4-point Likert scale (never/rarely, sometimes, often, always). Barriers questions also used a 4-point Likert scale from 'not a barrier' to 'major barrier.' Other responses to information questions were either yes/no, answers that were not mutually exclusive, or selections from a list of possible options.

Survey Administration

Physicians were surveyed via Internet or mail according to their preference. A Web-based program (Verint®, Melville, New York, www.verint.com) was used to administer Internet surveys, and we sent mail surveys by U.S. Postal Service. The Internet group was sent an initial e-mail with up to 8 e-mail reminders, and the mail group was sent an initial mailing and up to 2 reminders. Internet survey non-respondents were sent a cross-over mail-based survey in case of problems with e-mail correspondence. The mail protocol was patterned on Dillman's tailored design method.³⁸

Statistical Analysis

Internet and mail surveys were pooled for analyses because other studies have found that physician attitudes are similar with either method.³⁹ Respondents were compared with non-respondents on all available characteristics using Wilcoxon and chi-square analyses.

Physicians who responded 'yes' to the query "Do you give the vaccine in your practice?" for both influenza and Tdap vaccines were compared to those who responded 'no' for either or both vaccines. Independent variables included sex, age, practice setting, practice location, practice region, and perceived barriers. Perceived barriers were evaluated and grouped using a Principal Component Analysis with varimax rotation. Factors were retained if their eigenvalue was ≥ 1 . A cut-off of $p < 0.25$ was used for inclusion of independent variables in the model. The multivariable model used a backwards elimination procedure in which the least significant predictor in the model was eliminated sequentially. At each step, estimates were checked to make sure other variables were not affected by dropping the least significant variable. This resulted in retention of only those factors that were significant at $p < 0.05$ in the final model. Analyses were performed using SAS software, version 9.4 (SAS Institute, Cary, North Carolina) August 2016 to August 2017.

RESULTS

The response rate was 73.2% (353/482). Respondents were more likely than non-respondents to be female, work in a hospital-associated clinic, and have a higher median and mean number of providers in their office (Table 1). Overall, 90% reported stocking and administering at least one vaccine.

Assessment of Vaccination Status

Ob-gyn physicians were the provider most frequently reported as primarily responsible for assessing vaccination status (72%), followed by medical assistants (MA)/licensed professional nurses (LPN) (12%), registered nurses (9%), and advanced care providers (nurse midwife, nurse practitioner, physician assistant) (6%). Two percent reported no routine assessment. Respondents reported multiple methods for assessing vaccination status, including checking their own medical records (87%), ob-gyn (85%) and staff (66%) asking patients verbally, physician reviewing outside records (61%), asking in a standard questionnaire (60%), staff reviewing outside records (32%), and using an immunization information system (IIS) (11%). Respondents reported routinely assessing vaccination status (other than influenza) most often at initial visits (93%), followed by third trimester (64%), first trimester (45%), and second trimester (40%), with 16% reporting they routinely assess vaccination status at every visit.

Respondents most commonly reported assessing vaccination status of pregnant women for influenza (97%) and Tdap (92%) vaccines (Figure 1). Other vaccines frequently assessed during pregnancy included MMR (88%), hepatitis B (77%), and varicella (50%). Ninety-eight percent of physicians reported assessing serology for rubella and 44% for varicella.

Few respondents reported recording information regarding vaccines received either in the office (13%) or outside the office (10%) in an IIS. For vaccines received outside the office, the most common method of recording information was in a progress note in an electronic medical or electronic health record (EMR/EHR) (69%), followed by a summary sheet in the EMR/EHR (61%), a progress note in a paper-based record (19%), and a summary sheet in a paper-based record (11%). Ten percent of respondents reported not recording this information anywhere.

Vaccine Administration

Vaccines most commonly administered in the office to pregnant patients included influenza (85%) and Tdap (76%) (Figure 1). Vaccines less commonly administered, in descending order, included hepatitis B (22%), tetanus and diphtheria (Td) (17%), hepatitis A (10%), pneumococcal polysaccharide (10%), pneumococcal conjugate (9%), and meningococcal conjugate (7%) vaccines. In cases where a patient was identified as eligible for a vaccine that the practice did not stock, the majority of physicians always or often (56%) referred them to their primary care provider to receive the vaccine, with fewer referring to a public health department (32%) or pharmacy (25%).

Use of Evidence-based Strategies and Vaccination-Related Resources

Most respondents (66%) reported using standing orders for influenza vaccine although only 39% reported doing so for Tdap. The only other strategy commonly used was electronic clinical decision support systems for determining vaccination need (42%) with fewer reporting use of paper-based clinical decision support (16%) or reminder/recall (7%). The most commonly used resources were primarily CDC materials such as Tdap materials on maternal immunization, printed immunization schedules, and the CDC immunization website, although relatively high proportions of physicians reported rarely or never using any of the materials. Few physicians frequently used ACOG-developed materials. CDC and ACOG scheduling 'apps' were the least used resources.

Barriers to Stocking and Administering Vaccines

The most commonly cited barriers to stocking and administering vaccines were financial (Figure 2). Fifty-three percent of respondents reported lack of adequate reimbursement for vaccine purchase and 45% reported lack of adequate reimbursement for vaccine administration as major or moderate barriers. There were also logistical barriers such as other preventive services taking precedence (47% major or moderate barrier) and the burden of ordering and tracking (45% major or moderate barrier) or storing (41% major or moderate barrier) vaccines. Patient attitudinal barriers were also commonly reported, with 52% reporting patients refusing vaccines because of safety concerns as a major or moderate barrier and 40% reporting patients refusing because they don't believe they are at risk for a vaccine-preventable disease. In contrast, attitudinal barriers regarding vaccines among ob-gyns themselves were quite rare, with few or no respondents reporting as major or moderate barriers their concerns about vaccine effectiveness or safety, or personal concerns that their patients were not at risk of serious disease from vaccine-preventable illness.

Factors Associated with Giving Both Influenza and Tdap Vaccines

In bivariate analysis, female gender, decreasing age, non-private practice setting, not being in the South, lower scores on financial and practice barriers, and higher scores on patient barriers were associated with giving both Tdap and influenza vaccines (Table 2). In multivariable analysis, however, the age effect and South region fell out of the model, so that after adjustment, factors associated with giving both influenza and Tdap vaccines included female gender (prevalence ratio [PR], 0.78 male referent to female, 95% CI, 0.66–0.93), not

being in private practice (1.23 [1.08–1.39]), lower perceived financial (0.86 [0.77–0.96]) and practice (0.87 [0.78–0.97]) barriers, and higher perceived patient barriers (1.16 [1.07–1.26]).

DISCUSSION

In this national survey of US ob-gyns, almost all report assessing vaccination status for influenza and Tdap vaccine among their pregnant patients, and most report stocking and administering these vaccines in their practice as well. This study represents the first data regarding the use of Tdap vaccine by ob-gyns since the changes in recommendations that occurred in 2011 and 2012. Three-quarters of ob-gyns now report administering the vaccine. However, relatively fewer ob-gyns assess vaccination status for other vaccines potentially recommended during a pregnancy, and even fewer administer other vaccines that pregnant women may need in certain circumstances, such as hepatitis A or B vaccines. Also, few obstetricians participate in an IIS.

This study offers a current benchmark for obstetricians' practices regarding assessment and administration of vaccines to pregnant women. The last national surveys on this topic were performed in 2007⁴⁰ and 2009,⁴¹ although the latter had a very low response rate. In the 2007 study, Power et al reported that 79% stock and administer at least some vaccines, and among those, 61% of providers stocked and administered influenza vaccine to pregnant women, which translates to about 48% of obstetricians administering influenza vaccine to pregnant women. The 2009 study, performed during the H1N1 pandemic season, reported 71% administered influenza vaccine, although that survey was more prone to response bias given a response rate of 15%. This study suggests that there has been substantial progress, with 85% of ob-gyns who care for pregnant women now administering influenza vaccine to their pregnant patients. Stocking the vaccine matters, as previous work has shown that women who received both a recommendation and an offer of vaccination were about twice as likely to receive influenza vaccine as those who received a recommendation alone.²⁸ It is noteworthy that while approximately half of providers in 2007 stocked and administered influenza vaccine to pregnant women, vaccination coverage for influenza vaccine in the 2007–2008 season among pregnant women was only 27%⁴² compared to 50% in the 2014–2015 season. There is no evidence that pregnant women's attitudes regarding acceptance of influenza vaccination have improved in the intervening years, and some evidence that safety concerns have actually increased.⁴³ It may be that the important increases in uptake of influenza vaccination among pregnant women can primarily be attributed to improved vaccine delivery by obstetricians.

Barriers to stocking and administering vaccines to pregnant women by obstetricians continue to be primarily financial, particularly for inadequate reimbursement for vaccine purchase and vaccine administration. Although the questions were asked differently, these findings are similar to the findings of Power et al from 2007, where roughly half of physicians endorsed statements regarding financial barriers. These findings are discouraging given the extensive efforts to increase access to adult vaccination among vaccine advocates and the stipulations of the Affordable Care Act that all Advisory Committee on Immunization Practices (ACIP) recommended vaccines be covered by non-grandfathered insurance companies with no copay (first dollar coverage). In contrast to the Powers study, though, attitudinal barriers

among obstetricians themselves have essentially disappeared. The most direct comparison between the two studies is regarding safety: in 2007, 32% of respondents agreed that “we still don’t know enough about the effects of vaccines on the fetus to administer them safely in pregnancy.” In this study, obstetricians’ concern about the safety of vaccines in pregnancy was reported as ‘not a barrier’ by 88% of respondents. On the other hand, *patient* attitudinal concerns regarding vaccination in pregnancy was a significant perceived barrier for many ob-gyns, suggesting the need for ongoing efforts to improve pregnant women’s acceptance of vaccination.

The findings of the multivariable analysis offer some insight into reasons some physicians are not following the recommendation to administer influenza and Tdap vaccines to pregnant women, and may provide a better understanding of some of the barriers. The finding that more women than men administer these vaccines is consistent with prior literature showing that female physicians are more likely to adhere to clinical guidelines⁴⁴⁻⁴⁶ and provide preventive care more often.⁴⁷⁻⁵⁴ The finding that those administering both vaccines perceive more patient barriers may be related to the fact that because they are administering both vaccines, they are experiencing more patient resistance than those physicians who do not. Physicians who are in private practice were also less likely to administer these vaccines. This may be because hospitals and larger systems are better equipped to overcome the financial and logistical barriers to vaccine delivery. Such organizations likely already stock these vaccines for use in other settings, and they also often have the infrastructure necessary to implement system-level changes that strongly promote guideline adherence. One explanation for why physicians who do not stock both vaccines report greater financial barriers is because these may be perceived barriers more than they are true barriers. Ob-gyns who stock and administer these vaccines report fewer financial barriers; this fact should offer some encouragement to those currently not stocking these vaccines. Providers may also benefit from increased use of available resources. For example, more than half of ob-gyns rarely or never use the ACOG immunization toolkits. These toolkits have extensive information on vaccine financing and coding that could address some of the perceived financial barriers.⁵⁵

Ob-gyns reported infrequent use of several evidence-based strategies for increasing vaccination uptake. While a sizable proportion reported use of standing orders, more for influenza vaccine than for Tdap, few reported using reminder/recall or an IIS. An IIS is a confidential, population-based, computerized database that records all immunization doses administered by participating providers to persons residing within a given geopolitical area.^{56,57} Infrequent use of IISs by ob-gyns is not surprising given the infrequent use by other specialties delivering primary care primarily to adult patients, such as internists,⁵⁸ and the lack of infrastructure for supporting adult vaccination recording in IISs in many states.⁵⁷ More frequent use of IIS by ob-gyns is a worthy goal, but there are many systemic barriers that will need to be resolved prior to widespread adoption. It may also be that for the routine vaccines of pregnancy, influenza and Tdap, ob-gyns do not perceive a need to use an IIS. Similarly, reminder/recall for these routine vaccines may be perceived as unnecessary since patients are seen so frequently during a pregnancy. However, for other vaccines indicated for some pregnant women, systematic reminder/recall may be a well-suited strategy as it could take the need for determining eligibility for infrequently delivered vaccines out of the busy

provider's hands. Because there does not appear to be a common systematic way for determining eligibility for these other vaccines, though, frequent use of reminder/recall by ob-gyns – similar to adoption of IIS – is unlikely to happen anytime soon.

This study has several strengths and limitations. It was from a nationally representative sample of ob-gyns, and there was a high response rate. However, respondents' attitudes and practices may have differed from non-respondents, and network physicians may differ from physicians overall, although prior work suggests not.³⁴ Also, this survey assessed practices of only ob-gyns, so other prenatal care providers such as family physicians and nurse midwives are not represented. Future work should examine maternal vaccination practices among these providers, as their professional organizations strongly endorse vaccination of pregnant women, yet there have been no recent national surveys assessing their practices and attitudes. Finally, this study assessed reported practices; actual practices were not observed.

Ob-gyns have made great strides in the delivery of influenza and Tdap vaccines in pregnancy in recent years. However, significant gaps remain: A quarter of ob-gyns are still not stocking Tdap vaccine leaving many infants vulnerable to pertussis, and for vaccines other than influenza and Tdap that may be indicated in pregnancy, most ob-gyns are not assessing eligibility and even fewer are stocking these vaccines. To address these gaps, novel approaches may be needed, such as a program for pregnant women similar to the Vaccines for Children (VFC) program, which has been instrumental in increasing uptake of childhood vaccines. Future work should address the feasibility of more complete vaccine delivery in ob-gyn settings, exploring and addressing potential barriers, and offering sustainable solutions.

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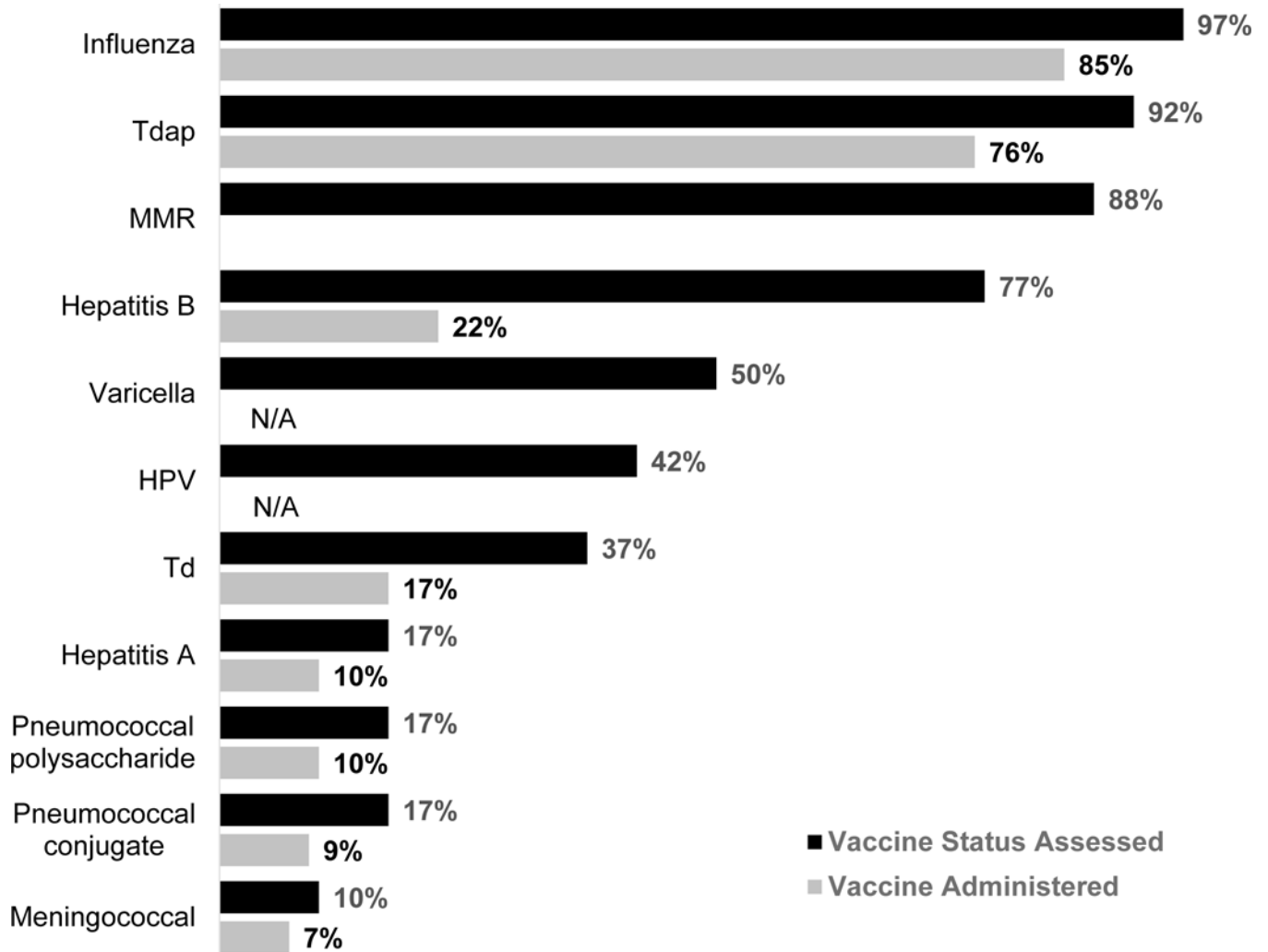


Figure 1. Assessment of Vaccination Status and Vaccines Administered to Pregnant Patients by US Obstetrician-Gynecologists, 2015 (n=324)

Tdap, tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine; MMR, measles, mumps and rubella vaccine; HPV, human papillomavirus vaccine; Td=tetanus and diphtheria toxoid vaccine; assessment for pneumococcal vaccination status was generic and not specific to either vaccine.

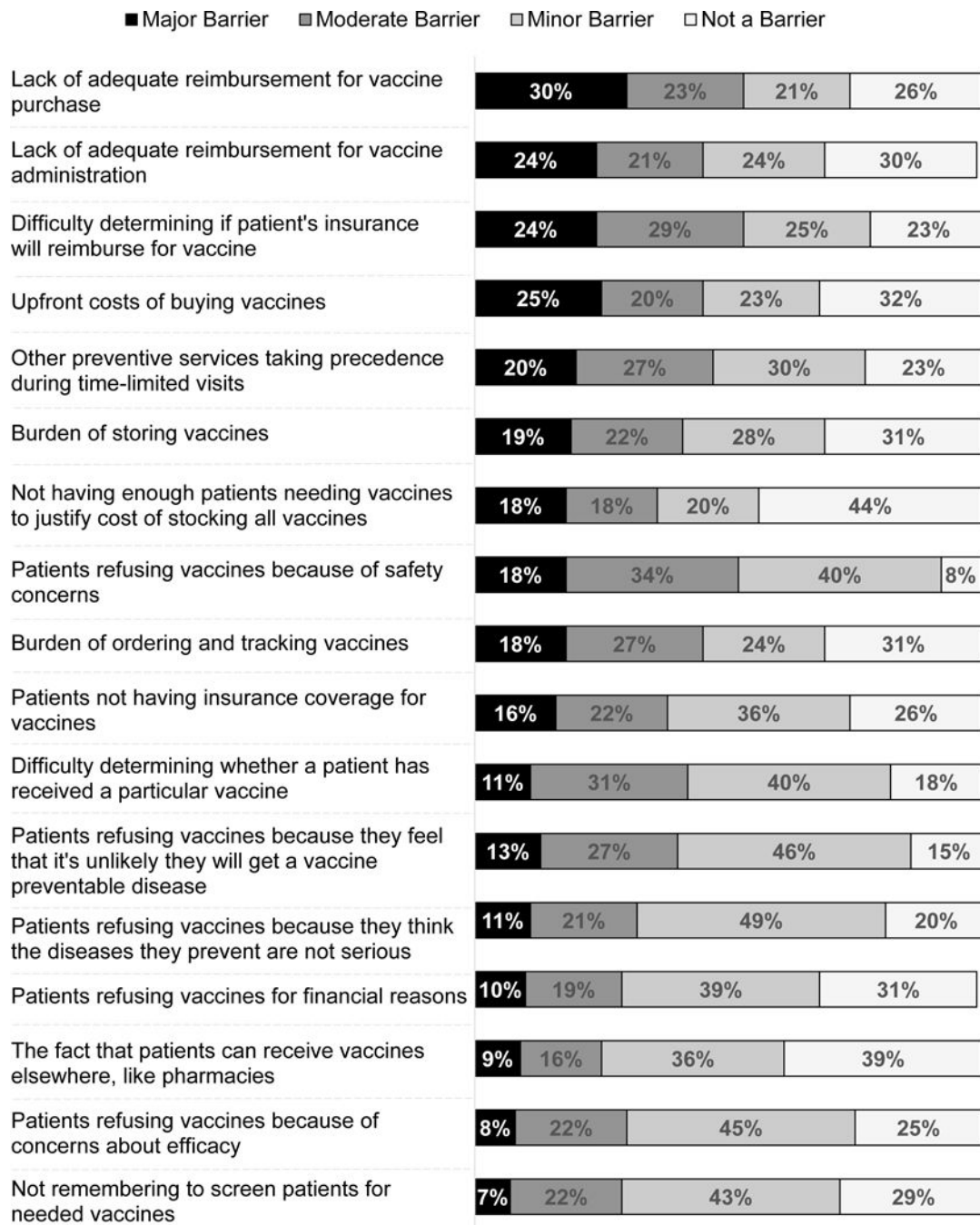


Figure 2. Barriers to Stocking and Administering Vaccines among US Obstetrician-Gynecologists, 2015 (n=324)

Some percentages do not add up to 100% due to rounding

Table 1

Respondent and Non-Respondent and Other Practice Characteristics of US Obstetrician-Gynecologists Surveyed, 2015 (n=482)

Characteristic	OB-GYN		
	Respondents (n=353)	Non-Respondents (n=129)	P-Value ^a
Age in years, mean (SD)	48.9 (10.8)	49.2 (10.6)	0.86
Male, %	29.9	42.2	0.01
Region, %			
Midwest	21.3	18.6	
Northeast	19.8	26.4	
South	36.0	36.4	
West	23.0	18.6	0.39
Location of Practice, %			
Urban	55.5	57.4	
Suburban	41.6	41.1	
Rural	2.8	1.6	0.71
Setting, %			
Private practice	64.9	76.6	
Hospital/clinic	27.3	15.6	
HMO	7.8	7.8	0.03
Number of Sites in Multi-site System, %			
2-3	17.6	NA	
4-6	22.9	NA	
7-9	15.4	NA	
10	44.1	NA	NA

^aWilcoxon test

Abbreviations: OB-GYN, obstetrician-gynecologist; HMO, health maintenance organization.

Note: Boldface indicates statistical significance (p<0.05)

Table 2

Factors Associated with Giving Both Tdap and Influenza Vaccines Among US Obstetricians-Gynecologists, 2015 (n+294)^a

Variable	Does not give both Tdap and influenza vaccines n=78 (27%) %	Gives both Tdap and influenza vaccines n=216 (73%) %	Bivariate PR (95% CI)	Multivariable PR (95% CI)
Gender**				
Male	49	25	0.73 (0.60–0.88)	0.78 (0.66–0.93)
Female	51	75	Ref.	Ref.
Mean (sd) age in years	52.7 (11.0)	46.7 (10.6)	0.93 (0.90–0.96) per 5 years	
Setting**				
Private practice	86	54	Ref.	Ref.
Other (Hospital/clinic, HMO, Public Health, University)	14	46	1.43 (1.25–1.62)	1.23 (1.08–1.39)
Region				
Midwest	15	24	1.28 (1.06–1.54)	
Northeast	19	18	1.14 (0.91–1.42)	
South	49	31	Ref.	
West	17	28	1.30 (1.08–1.55)	
Mean (sd) Factor 1* Financial Barriers (per 1 point)^b	1.9 (0.8)	1.1 (0.8)	0.82 (0.77–0.88)	0.86 (0.77–0.96)
Mean (sd) Factor 2** Patient Attitudinal Barriers (per 1 point)	1.2 (0.7)	1.4 (0.7)	1.11 (1.03–1.21)	1.16 (1.07–1.26)
Mean (sd) Factor 3* Practice Barriers (per 1 point)	1.7 (0.9)	1.0 (0.8)	0.82 (0.76–0.88)	0.87 (0.78–0.97)
Mean (sd) Factor 4 Visit-level Barriers (per 1 point)	1.3 (0.8)	1.3 (0.7)	0.99 (0.90–1.08)	

Abbreviations: Tdap, tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine; PR, prevalence ratio; CI, confidence interval; ref., reference; sd, standard deviation; HMO, health maintenance organization.

^a n of 294 includes physicians providing care to pregnant patients with non-missing outcomes

^b Cronbach's alpha for factors: 1=0.89; 2=0.87; 3=0.80; 4=0.68

Note: Boldface indicates statistical significance (*p<0.05, **p<0.01)