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## Changes in and Current Status of Obstetrician-Gynecologists' Knowledge, Attitudes, and Practice Regarding Immunization

Meaghan A. Leddy, MA,\*† Britta L. Anderson, BA,\*†  
Michael L. Power, PhD,‡ Stanley Gall, MD,§ Bernard Gonik, MD,¶  
and Jay Schulkin, PhD\*\*

\*Doctoral Candidate, Department of Psychology, American University, Washington, DC; †Research Associate, ‡Senior Research Associate, \*\*Director of Research, Research Department, American College of Obstetricians and Gynecologists, Washington, DC; §Professor, Obstetrics, Department of Obstetrics and Gynecology and Women's Health, University of Louisville School of Medicine, Louisville, KY; and ¶Professor, Division of Maternal and Fetal Medicine, Department of Obstetrics and Gynecology, Wayne State University School of Medicine, Detroit, MI

Vaccines are important tools for disease prevention and, in obstetric patients, to prevent transmission to infants. Obstetrician-gynecologists are well situated to screen for immunization status of women of child-bearing age and to provide appropriate vaccinations. A series of research investigated obstetrician-gynecologists' beliefs, practices, and knowledge regarding immunization. Surveys were sent out in 2007 to Fellows of the American College of Obstetricians and Gynecologists.

Most obstetrician-gynecologists viewed screening for vaccine-preventable diseases to be within their professional role, and a majority administers at least some vaccines. Over half agreed financial factors (eg, inadequate reimbursement, cost of storing vaccines) were barriers to vaccine administration. Other perceived barriers were a concern over safety of vaccinations during pregnancy and a view that administering vaccines was not part of their usual practice. They were also concerned about their level of training. A majority believed their immunization training was less than adequate, and believed their practice would benefit from continuing medical education courses. One study identified changes in Michigan obstetrician-gynecologists' attitudes, knowledge and practices since 2000. More Michigan ob-gyns are assessing vaccination needs, viewing this as part of their professional purview, and, in general, their knowledge of vaccine recommendations has improved. Concerns over the safety of vaccines in pregnancy as well as financial burdens of immunization have increased.

Immunization is an important part of women's health care and has been, at least partially, incorporated into obstetrician-gynecologist practice. Financial burdens and physician concerns over training remain barriers to vaccine administration.

**Target Audience:** Obstetricians & Gynecologists, Family Physicians

**Learning Objectives:** After completion of this educational activity, the participant should be better able to modify prescribing practices to increase the rates of appropriate use of vaccinations in the care of women, identify and then resolve barriers in practice to proper administration of vaccines, and recall the immunizations recommended for pregnant women.

The standard practices of obstetrician-gynecologists to incorporate aspects of primary care (1), which have increasingly, although not universally, widened includes the provision of vaccines. Immunizations

have had significant public health success (2), and can protect women, fetuses, and newborns from a variety of infections. Obstetrician-gynecologists can play a key role in providing women vaccines that are appropriate for their age and pregnancy status. For example, influenza infections during pregnancy, which are vaccine preventable, increase morbidity and mortality among gravidas, and remain a leading cause of preventable morbidity in both pregnant and newborn populations (3). However, past research has shown that obstetrician-gynecologists do not typically incorporate immunization into routine patient care (4).

The advent and release of the human papillomavirus (HPV) vaccine introduced a gynecologically relevant vaccine to the United States. HPV is the most common sexually transmitted infection in the United States (5), and persistent infections of high-risk types have been associated with cervical and anogenital cancers and genital warts (5–7). HPV has been shown to be a necessary cause of invasive cervical cancer (8,9). In addition to cervical screening, women can now be protected by early vaccination against HPV.

HPV is most prevalent in women aged 20 to 24, and an estimated 80% of sexually active individuals are infected with at least one type of HPV by 50 years of age (10). In 2006, the quadrivalent HPV vaccine was approved in the United States for use in females between 9 and 26 years old. Clinical trials indicated the vaccine protects against HPV types 6 and 11, which are associated with genital warts, as well as types 16 and 18, which are associated with 70% of cervical cancers (5,11,12).

Obstetrician-gynecologists can play a significant part in the administration of the HPV vaccine. Since the vaccine's release, the American College of Obstetricians and Gynecologists (ACOG) has recommended

the use of this vaccine (13); thus, it is of interest to examine the HPV-related practice patterns, opinions, and knowledge of obstetrician-gynecologists in this postlicensing period.

The ACOG performed a series of research investigating physicians' knowledge, activities, and opinions regarding vaccinations. This article reviews 3 separate studies: the first was a nationwide study investigating the current knowledge, attitudes, and practices of obstetrician-gynecologists regarding immunization; the second examined nationwide practices, knowledge and attitudes regarding HPV vaccine, as one example of a gynecologically relevant immunization practice; the third study identified changes since 2000 with regards to immunization knowledge, attitudes and practices only of Michigan obstetrician-gynecologists. Our results demonstrate that physicians are generally knowledgeable of current vaccination recommendations, although have concerns about financial, informational and educational barriers to immunization. The results also indicate that immunization knowledge of Michigan ob-gyns has improved, and that they are more commonly providing primary care to patients.

## NATIONWIDE IMMUNIZATION TRENDS

Two studies (14,15) investigated immunization trends in a national sample of obstetrician-gynecologists. Results revealed that most ob-gyns offer vaccines in their offices, although respondents who indicated they provide primary care were more likely to administer vaccinations (15). Physicians who agreed with the statement, "routine screening for vaccine preventable diseases falls outside of the routine practice of an ob/gyn," were less likely to administer vaccines. Table 1 depicts the proportions of

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Reprint requests to: Meaghan A. Leddy, MA, ACOG-Research Department, 409 12th St, SW, Washington, DC 20024. E-mail: mleddy@acog.org.

TABLE 1  
Administration rates of specific vaccines among those who administer vaccines (15)

Immunization	Percent of Those Who Give Vaccines That	
	Administer This Particular Vaccine	Mean Administrations per Month (SD)
HPV	91.0	20.6 (28.0)
Influenza	66.8	30.07 (31.19)
TDAP	29.9%	8.78 (11.50)
MMR	28.1%	4.25 (5.05)
Varicella	19.1%	5.16 (8.15)
Pneumococcal	14.3%	1.90 (2.59)
HAV	11.0%	2.06 (3.24)
Herpes zoster	8.5%	3.09 (5.75)
Meningococcal	7.3%	0.71 (.76)

respondents who provide various vaccines, and the mean number of administrations given monthly (15).

A majority disagrees with the view that vaccine administration is outside the routine practices of an ob-gyn; however, results identified several barriers to vaccination that can be improved (15). One of the most common obstacles identified was financial concerns. Physicians cited financial costs as a reason to not mandate the HPV vaccine (14; Table 2), and believed it to be a reason why their patients refused the HPV vaccine (14; Table 3). A majority indicated that free or low-cost vaccines would improve their ability to administer vaccines in their office (15). Other cost-related concerns identified by a majority of respondents were inadequate reimbursement to physician (59.5%), cost of ordering vaccines (55.8%), and cost of storing and maintaining an inventory of vaccines (55.0%) (15). The concerns regarding a lack of reimbursement to doctors is supported by the fact that 26.6% reported that they have submitted insurance claims for vaccine administration and have not been paid (15).

The results of Power et al (15) highlighted the importance of additional training and education in improving ob-gyns' rates of vaccine administration. A majority of respondents indicated that their medical school and residency training regarding immunization was barely adequate or worse (15; Fig. 1). A

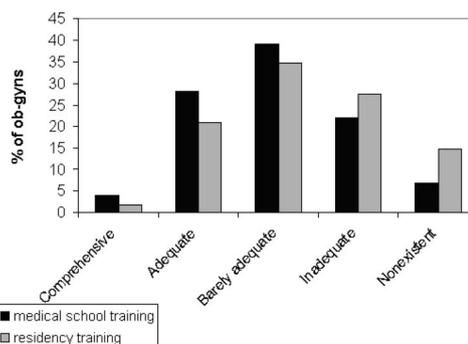


Fig. 1. Perceived adequacy of ob-gyn's training on immunization during medical school (black) and residency (gray).

majority indicated that a CME course on immunization would benefit their practice and that patient informational material would likely help the administration of vaccines in their practices (15; Fig. 2).

A majority also indicated that devoting resources to developing educational materials for both ob-gyns and patients should be a priority for ACOG, although younger physicians were more likely to recommend this (15). About one-third of respondents to our national study agreed that "we still do not know enough about the effects of vaccines on the fetus to administer them safely in pregnancy," with 52.5% disagreeing and 15.4% remaining neutral (15). Concern about the current knowledge of fetal effects of immunization may act as a deterrent to offering vaccines; those who agree that not enough is known to delivery vaccines safely in pregnancy reported stocking and administering fewer vaccines in their practices (15).

Despite the fact that ob-gyns seem open to vaccine administration, it seems that patients may not be utilizing these physicians as an immunization resource. A majority agreed that there is low demand for vaccines in their practices, and just under half

TABLE 2  
Percent of physicians who agree or strongly agree with various reasons why the HPV vaccine should not be mandated (14)

	Percent
Financial cost to the patient	65.9
Lack of reimbursement to physician	35.2
Do not agree with any mandated vaccinations	30.2
Not enough research has been done	12.5
Has not been proven safe or effective	9.1
Do not agree with vaccination at all	1.9

TABLE 3  
Physicians' beliefs as to why their patients refuse the HPV vaccine (14)

	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)
Financial cost of the vaccine	42.8	41.1	8.8	2.6	4.7
Are currently pregnant	13.0	35.2	26.9	13.0	12.0
Do not feel as though they are at risk	12.8	41.2	19.9	18.7	7.4
Have already been diagnosed with HPV	9.1	38.8	22.1	20.3	9.7
Have already been vaccinated for HPV	7.9	15.2	26.1	27.3	23.6
Do not feel the efficacy of the HPV vaccine has been proven	6.2	25.2	24.0	31.5	13.1
Religious reasons	5.7	19.2	26.0	27.2	21.9
Do not agree with vaccination in general	6.2	22.8	24.3	31.5	15.1
Medical reasons	0.6	9.6	31.8	36.3	21.6

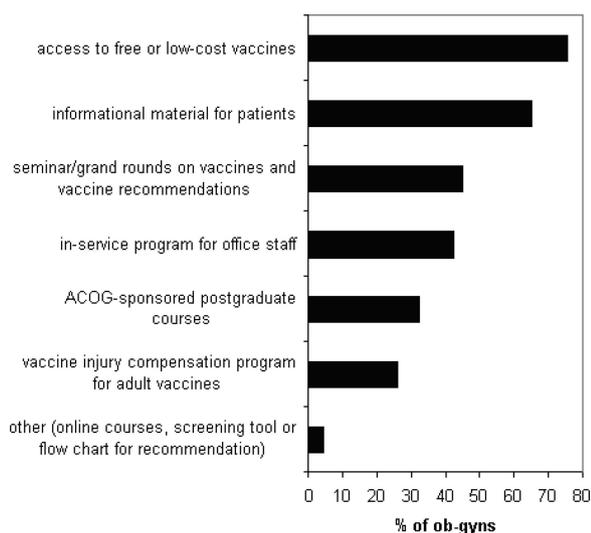


Fig. 2. Resources ob-gyns indicated would improve their ability to provide vaccines in their offices.

indicated that immunization is not within their typical practice (15).

Despite concerns that they need more training regarding vaccination, most ob-gyns indicated they felt knowledgeable regarding current vaccine recommendations, and few indicated they were uncomfortable with vaccine administration. Results support these claims; these studies demonstrate that ob-gyns are relatively knowledgeable of current vaccination recommendations (15). In fact, 99.0% knew that the hepatitis B virus (HBV) vaccine should be given to patients with high-risk occupations, and a majority correctly identified the recommendations that the Hepatitis B (HBV) vaccine be given to newborns (86%), adolescents (86%), pregnant women with risk factors (69.8%), and patients with a positive test for a sexually transmitted disease (56%) (15). A majority (84.5%) of respondents also correctly agreed with current recommendations that all pregnant women receive the influenza vaccine (15). Very few respondents incorrectly agreed that the influenza vaccine should be avoided in pregnant women due to teratogenic effects (1%) or that it should not be given to breast-feeding women (3.3%) (15). Physicians who were in concordance with recommendations that all pregnant women receive the influenza vaccine were more likely to stock and administer this vaccine (15). With regards to the relatively new HPV vaccine, a majority of respondents (88.4%) correctly responded that it protects against four types of HPV (14). However, less than half correctly responded with the percentage of cervical cancers (40.6%) or of genital warts (41.8%) protected against. Only 6.4% of re-

spondents got all 3 questions wrong, and 22.9% filled in all 3 blanks correctly (14).

With regards to safety of vaccines during pregnancy, a majority correctly identified that the influenza (89.8%), HBV (64%), and tetanus, diphtheria, and acellular pertussis (TDAP; 58.6%) vaccines are considered to be safe during pregnancy (15). Nearly all ob-gyns recognized that the measles, mumps and rubella vaccine (97.5%) and varicella (92.9%) are contraindicated in pregnancy (15). Those members who believed we do not know enough about the fetal effects of immunization to deliver them safely in pregnant patients were less likely to say that the influenza, HBV and TDAP vaccines are safe for gravidas (15).

### CHANGES IN MICHIGAN OBSTETRICIAN-GYNECOLOGISTS' IMMUNIZATION TRENDS SINCE 2000

Given that Gonik et al (4) studied Michigan obstetrician-gynecologists' immunization practices in 2000, 1 study (16) aimed to identify changes in this population. Importantly, results showed that more physicians are assessing patients' vaccination needs than they were in 2000. For example, Michigan obstetrician-gynecologists were asked whether they currently assessed their patients for 9 vaccine-preventable diseases and 5 associated vaccines (tetanus/diphtheria/acellular pertussis, measles/mumps/rubella, influenza, varicella, and pneumococcus). Only 3% of Michigan respondents did not assess their obstetric patients for these 9 diseases, down from 19% in 2000. About one quarter (25.8%), down from 40% in 2000, of physicians did not assess for any vaccine-preventable disease for their gynecologic patients. Fourteen percent assessed for all 9 diseases.

Overall, Leddy et al (16) demonstrated that Michigan ob-gyns' knowledge of vaccine recommendations have improved. Only 1.7% answered fewer than 7 knowledge-based questions correctly, down from 5.5% in 2000. Ninety-six percent of respondents recognized CDC recommendations to give HBV vaccine to patients in high-risk occupations, and 70.7% identified the need for HBV vaccination in adolescents. This latter statistic is in sharp contrast with the 69% who were unfamiliar with the adolescent HBV recommendation in 2000 (4). A small number (15%) indicated that all women over age 65 years required vaccination against hepatitis B, although the current CDC recommendation indicates this should be given only if other risk factors are present.

TABLE 4  
Immunization recommendations for pregnant women

Pregnant Women Vaccine	Should be Considered if Otherwise Indicated	Contraindicated During Pregnancy	Recommended if Other Risk Factors Exist (eg Lifestyle)
Hepatitis A (HAV)			X
Hepatitis B (HBV)			X
Human Papillomavirus (HPV)			
Influenza (Inact.)	X		
Influenza (LAIV)		X	
Routine			
Meningococcal (MCV4)			X
Pneumococcal			X
Measles, mumps, rubella (MMR)		X	
Tetanus-diphtheria	X		
Tetanus-diphtheria-pertussis (Tdap)			X
Varicella		X	

Adapted from Morbidity and Mortality Weekly Report 57: Recommended Adult Immunization Schedule—United States, 2009. Atlanta, GA: CDC, 2008 (17).

Although immunization knowledge in general has increased, results show that there has been some increased concern that certain vaccines are not safe in pregnancy, despite CDC recommendations (16). For influenza, 87.1% agreed with the CDC that maternal morbidity and mortality increased in the second and third trimesters. More physicians (89.2%) believe the influenza vaccine is safe for obstetric patients, in concordance with the CDC; however, fewer believed that the TDAP, HBV (50.9% and 62.4%, respectively, vs. 73%–83% in 2000) and pneumococcal (31.4% vs. 48% in 2000) vaccines are safe in pregnancy, although the CDC recommends that pregnant patients with risk factors receive these vaccines (Table 4); the same was true for the pneumococcal vaccines.

A greater percentage of physicians are knowledgeable of the vaccines that are contraindicated in pregnancy. While a small minority of physicians indicated that it was acceptable to give measles/mumps/rubella (2.1%) and varicella (8.4%) vaccines during pregnancy, contrary to current recommendations, these rates have decreased since 2000 when 6% and 14% of respondents indicated these 2 vaccines were safe in obstetric patients, respectively.

Most of the changes between 2000 (4) and the contemporary study (16) were found with regards to physicians' attitudes. More obstetrician-gynecologists are viewing immunization as part of their routine practice (60% stated it was not part of their routine patient care in 2000 vs. 42.1% in the current study), although the belief that immunization is not part of their routine patient care was the most commonly cited deterrent to offering vaccines in both studies.

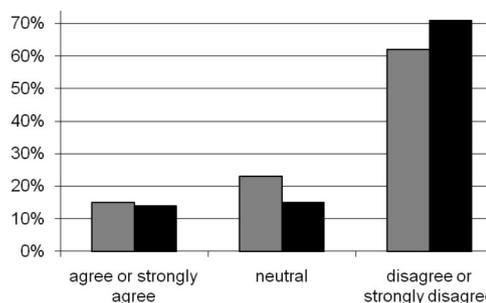


Fig. 3. The percentages of ob-gyns who agree, disagree, or are neutral that routine screening for vaccine-preventable diseases is outside the scope of practice for an obstetrician-gynecologist in both Gonik et al, (4) (gray) and Leddy et al, (16) (black).

Fourteen percent agreed or strongly agreed routine screening for vaccine-preventable diseases is outside the scope of practice for an obstetrician-gynecologist, compared with 15% who were neutral, and 70.7% who disagreed or strongly disagreed (16), representing a slight shift from 2000 (Fig. 3).

Greater proportions of ob-gyns cited financial concerns as deterrents; the percentage of ob-gyns who agreed that high costs to order (62.7%), high costs to store (65.5%), and inadequate reimbursement (60.7%) were higher than the 50% who cited financial deterrents in the study by Gonik et al (4). A lack of available vaccines has become less of a problem, with only 26.3% currently citing this as a concern (16), compared with 43% in 2000 (4). Uncertainty regarding current vaccine recommendations and lack of comfort with administration have also become less common deterrents; in 2000, each of the

aforementioned concerns were ranked at 30% (4), compared with the current results of 18.1% agreeing or strongly agreeing they are currently uncertain of recommendations, and 9.2% being uncomfortable with administration (16).

In nearly 1 decade, more Michigan obstetrician-gynecologists view vaccine administration as within their role and part of their usual patient care activities, and are assessing patients' needs for more vaccines. They are also knowledgeable regarding current immunization recommendations, although fewer are certain about vaccine safety in pregnancy. Further gains are necessary; less than 1 in 5 respondents are assessing for all 5 vaccines in their gynecologic patients. Additionally, while gynecologic patients' needs for the influenza vaccine were the most commonly assessed, and are improved from 2000, only two-thirds are currently assessing this need. It is important that more gains be made in viewing immunization as within ob-gyns' role, and part of their routine responsibilities.

## DISCUSSION

Most ob-gyns offer vaccines in their offices and a majority disagree with the view that vaccine administration is outside the routine practices of an ob-gyn (15); however, results identified several barriers to vaccination that can be improved. One of the most commonly identified obstacles to vaccine administration was financial concerns (14–16). Physicians are concerned about the costs of ordering and storing vaccines, as well as reimbursement. They also highlighted the financial burdens that vaccines cause for patients, and cited this as a reason not to mandate the HPV vaccine (14).

Despite perceptions that their medical school and residency training regarding immunization is less than adequate, and that they would benefit from CME courses, most ob-gyns are knowledgeable regarding current vaccine recommendations and comfortable with vaccine administration (14–16). However, it is important that knowledge be improved to disseminate vaccination practices among ob-gyns. For example, physicians who were in concordance with recommendations that all pregnant women receive the influenza vaccine were more likely to stock and administer this vaccine.

Results also highlight the possibility that physicians report a low demand for vaccines in their practices because patients have anticipated that their obstetrician-gynecologist does not offer them, thus creating a self-fulfilling prophecy, which keeps

ob-gyns' vaccine administration rates low. This conception should be investigated and challenged to improve immunization rates, and improve the overall health of mothers and infants.

Although physicians' beliefs about the reasons patients refuse the HPV vaccine may be exaggerated or incorrect (14), it seems that efforts need to be made to educate patients. For example, nearly a half of physicians stated that their patients refuse the HPV vaccine based on doubts about its efficacy. Physicians should make efforts to educate patients and ameliorate these concerns; for example, one study found that in vaccinated groups combined persistent HPV infections and HPV-related diseases fell by 90% compared to placebo controls (18). Almost a third agreed that their patients refuse the HPV vaccine because they have already been diagnosed with one type; however, this is not a contraindication to getting this vaccine. Again, patients need to be given accurate information surrounding the appropriateness and effectiveness of the HPV vaccine.

We also identified changes in Michigan ob-gyns' attitudes, knowledge and practices since 2000 (16). More Michigan ob-gyns are assessing vaccination needs, viewing this as part of their professional purview and in general, their knowledge of vaccine recommendations has improved. Concerns over the safety of vaccines in pregnancy as well as financial burdens of immunization have increased.

Our series of research is limited by the fact that all responses are based on physician recall; however, our studies indicate that future efforts should focus on increasing ob-gyns' provision of primary care, improving knowledge of vaccine recommendations, and ameliorating the immunization-related financial burdens for patients and physicians.

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