Health By Numbers
Rhode Island Department of Health • David Gifford, MD, MPH, Director of Health
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Seasonal Influenza Vaccination Coverage Among Pregnant Women In Rhode Island

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Pregnant women have increased morbidity and mortality from influenza infection, due to the physiologic changes associated with pregnancy.[1] The **Advisory Committee on Immunization Practices** (**ACIP**) recommends influenza vaccination for all women who are pregnant or will be pregnant during influenza season, with **trivalent inactivated influenza vaccine** (**TIV**).[2] TIV has been considered safe and effective during any stage of pregnancy.[2] In addition, a recent study conducted in Bangladesh demonstrated that influenza vaccination during pregnancy had a significant effect in reduction of influenza illness among their infants up to 6 months of age.[3] **The American College of Obstetricians and Gynecologists** (**ACOG**) and **the American Academy of Family Physicians** (**AAFP**) also recommend routine vaccination of all pregnant women. Despite these recommendations, the National Health Interview Survey showed that only 24% of pregnant women received influenza vaccine during the 2007-2008 influenza season.[2]

This report describes the trends of influenza vaccination coverage among pregnant women in Rhode Island, characteristics related to influenza vaccination during pregnancy, and reasons for not being vaccinated.

Methods

Data from the 2002-2007 Rhode Island **Pregnancy Risk Assessment Monitoring System** (**PRAMS**) were analyzed to assess influenza vaccination coverage rates among pregnant women. PRAMS, a surveillance project of **the Centers for Disease Control and Prevention** (**CDC**) and state health departments, collects state-specific, population-based data on maternal behaviors and experiences before, during, and shortly after delivery of a live infant.[4] Rhode Island has collected PRAMS data since 2002; each year, about 1,400 Rhode Island recent mothers respond to the survey.

Rhode Island included three influenza immunization questions in the PRAMS survey: 1) "Did you get a flu vaccination during your most recent pregnancy?" (Data have been collected since 2002); 2) If not "What were your reasons for not getting a flu shot during your most recent pregnancy?" (Data were collected only for 2002 and 2003); and 3) "At any time during your most recent pregnancy, did a doctor, nurse, or other health care worker offer you a flu vaccination or tell you to get one?" (Data have been collected since 2004). PRAMS data were weighted to represent all Rhode Island women who have delivered a live infant each year, and were analyzed to estimate influenza vaccination coverage, 95% confidence intervals, and chi-square *p*-values. SUDAAN software was used for data analyses, which takes into account the complex sample design of the survey. Response rates for the years of data examined were 70% or higher.

Results

The percentage of women who received influenza vaccine during their pregnancy increased significantly from 18.2% in 2002 to 33.4% in 2007 ($p<0.0001$). Although vaccination coverage rates increased consistently during the period, a substantial increase was observed from 2004 to 2005 (8.1 percentage points or 37% increase; $p<0.0001$), and a marginal increase was observed from 2006 to 2007 (3.0 percentage points or 10% increase; $p=0.1674$). The percentage of women who reported that their health care providers recommended

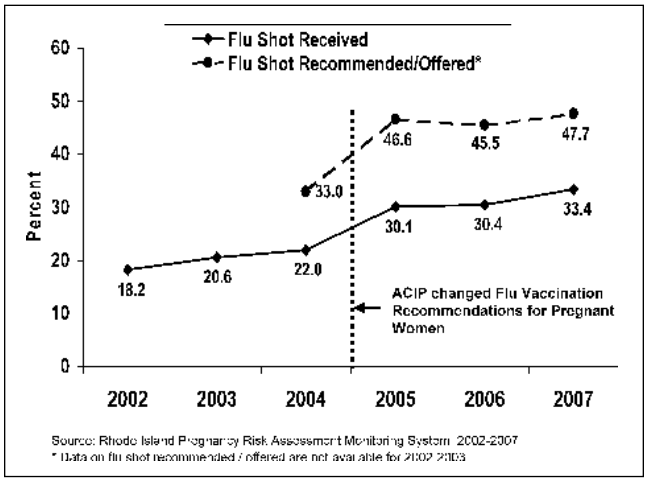

Figure 1. Percentage of women who received influenza vaccine during pregnancy and percentage of women who were recommended/offered influenza vaccine, Rhode Island, 2002-2007

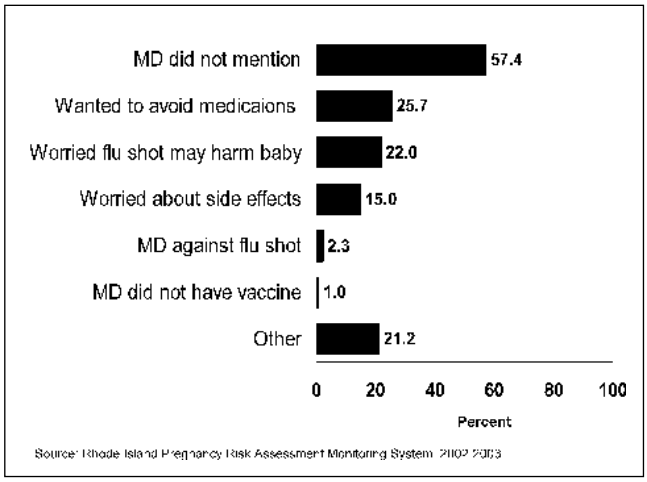

Figure 2. Reasons for not getting influenza vaccination during pregnancy, Rhode Island, 2002-2003

Table 1. Influenza vaccination coverage rates among women with a recent live-birth by selected characteristics, Rhode Island, 2005-2007 (n = 4,156)

	%	95% CI	*P*-Value
Overall	31.3	(29.6 33.0)	
Maternal Age (in year)			
< 20	29.5	(24.2 – 35.5)	0.1265
20-29	30.0	(27.6 32.6)	
≥ 30	33.0	(30.5 – 35.6)	
Maternal Ethnicity			
Hispanic	37.5	(33.8 – 41.3)	0.0005
Non-Hispanic	29.7	(27.7 31.9)	
Maternal Race			
White	31.2	(29.4 33.1)	0.9765
Black	31.2	(26.0 – 36.9)	
Other+	32.0	(25.7 39.0)	
Maternal Education			
< High School	32.3	(28.1 – 36.8)	0.0003
High School	26.1	(23.2 29.3)	
> High School	34.0	(31.7 – 36.4)	
Household Income			
< $10K	32.7	(28.6 – 37.0)	0.0001
$10K - <$25K	28.8	(25.1 32.7)	
$25K - <$50K	24.0	(20.5 – 27.9)	
≥ $50K	34.7	(32.0 37.6)	
Marital Status			
Married	33.7	(31.5 – 35.9)	0.0007
Not married	27.7	(25.2 – 30.4)	
Insurance for Prenatal Care			
Public	29.2	(26.6 31.9)	0.1145
Private	32.0	(29.8 – 34.4)	
Prenatal Care Initiation			
1st Trimester	31.7	(29.9 – 33.6)	0.0979
> 1st Trimester	27.8	(23.8 32.2)	
Pregnancy Intendedness			
Intended	33.1	(31.0 35.4)	0.0075
Unintended	28.4	(25.7 – 31.2)	
WIC Participation			
Yes	31.3	(28.8 – 33.9)	0.9553
No	31.4	(29.1 – 33.7)	
Flu Vaccine Recommended/ Offered			
Recommended/Offered	62.9	(60.2 – 65.5)	<0.0001
Not Recommended/Offered	4.1	(3.2 5.2)	

Data Source: Rhode Island Pregnancy Risk Assessment Monitoring System, 2005-2007
Other category includes American Indian/Native American, Asian/Pacific Islander, and other.

or offered influenza vaccine during pregnancy also significantly increased from 33.0% in 2004 to 47.7% in 2007 ($p<0.0001$). A similar substantial increase in the recommendations/offers was observed from 2004 to 2005 (13.6 percentage points or 41% increase; $p<0.0001$), but there was no significant increase during 2005-2007. (Figure 1)

In the 2002-2003 PRAMS survey, pregnant women who did not get vaccinated were asked to give the reasons (multiple reasons were allowed). The reasons included: My doctor did not mention anything about a flu shot during my pregnancy (57.4%); I wanted to avoid medications during my pregnancy (25.7%); I was worried that the flu shot might harm my baby (22.0%); I was worried about side effects of the flu shot for me (15.0%); My doctor recommended against getting a flu shot (2.3%); My doctor did not have the vaccine (1.0%). Other reasons included: I don't normally get the flu shot; I was in the first trimester of pregnancy during the flu season; I was not pregnant during the flu season. (Figure 2)

Influenza vaccination coverage during pregnancy was significantly higher among Hispanic women (37.5%), women with > high school education (34.0%), women who had annual household incomes ≥ $50,000 (34.7%), married women (33.7%), and women with intended pregnancy (33.1%) than for their counterparts. Women who were recommended or offered influenza vaccine by their health care providers were 15 times more likely to be vaccinated than women who were not recommended or offered the vaccine (62.9% vs. 4.1%). (Table 1)

Discussion

Although the influenza vaccination coverage among pregnant women increased significantly from 2002 to 2007, the rate is still alarmingly low. Only one third of Rhode Island women received influenza vaccine during their pregnancy in 2007.

Among other characteristics, influenza vaccination was strongly associated with health care provider recommendations/offers: when health care providers recommended or offered influenza vaccine, pregnant women were much more likely to get vaccinated. Of considerable concern, in 2007, less than one half of Rhode Island women (47.7%) reported that their health care provider recommended or offered influenza vaccination during their pregnancy. Consistently, in 2002-2003, the reported major reason for not getting vaccinated was that their doctor did not mention anything about influenza vaccination during their pregnancy.

A substantial increase in influenza vaccination coverage and recommendations/offers for vaccination observed from 2004 to 2005 could be, in part, related to changes in ACIP recommendations in May 2004, stating that due to the increased risk for influenza-related complications, pregnant women could be vaccinated during all trimesters of pregnancy. Prior to this change, influenza vaccination was recommended only for women who would be in their second or third trimester of pregnancy during flu season.

This study has some limitations: 1) PRAMS data are self-reported by women 2-6 months postpartum and therefore their reporting on influenza vaccination and provider recommendations may be subject to recall bias, and 2) data on reasons for not getting an influenza vaccination were collected only for 2002 and 2003, which were prior to changes in ACIP recommendations for pregnant women.

The findings of this study indicate that health care providers play a critical role in the acceptance of influenza vaccine by pregnant women. To improve influenza vaccination coverage among pregnant, health care providers should use the first prenatal care encounter to educate women about the risk of influenza complications during pregnancy and the protective effect of influenza vaccination on women and their infants, and providers should offer vaccination at the earliest opportunity during influenza season.

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Disclosure of Financial Interests

The authors have no financial interests to disclose.

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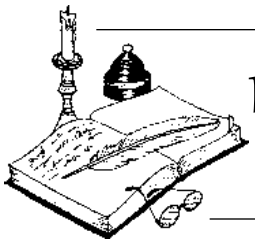
The CDC published a related article in partnership with the Rhode Island Department of Health: "Receipt of Influenza Vaccine During Pregnancy Among Women With Live Births - Georgia and Rhode Island, 2004-2007"; MMWR 2009;58; 972-5. Abstract at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5835a2.htm



Physician's Lexicon

Words Foretelling the Future

Long before the profession of medicine discovered effective interventions to allay the symptoms of human ailment, it assumed the heavy, and often hazardous, burden of foretelling the medical futures of patients, more an act of blind courage than clinical insight. The vocabulary of medical prediction, of prognosis, is therefore rich in synonyms variously derived from Latin, Greek and Old German.

The augurs were a collegium of priests in ancient Rome assigned the duty of foretelling and interpreting the future. They observed the flights of birds (their direction, species, numbers) and then translated the gathered data to prophesy the future – whether it be the outcome of a war just beginning, the felicity of an imminent marriage or the early phases of an illness in a patient. Augury, then, becomes the art of revealing the future by the trained interpretation of natural signs, such as the flight of birds or even the configuration of tea-leaves upon the inner surface of a cup. The word inaugurate originally meant to divine the future and thus to consecrate or to install its reality. It has now come to mean to begin formally. Augur, in turn, was probably descended from an older Latin word, *augos,* meaning to increase (as in the English word, augment) and belatedly gave rise to words such as august, meaning to increase in majesty, to make venerable.

Omen comes from a Greek word meaning to think or to discern the details of the future. It is the root of the English words ominous and abominable.

The word, prognosis is from the Greek, *gnosis*, meaning knowledge and the prefix *prae-* meaning before.

Prophecy is from the Latin, and earlier from the Greek, *propheta*, meaning one who speaks for the gods; and the verb, to predict, stems from the Latin *prae-* meaning before and *dicere,* to speak. To portend is also from the Latin, *portendere,* meaning an omen; and is based earlier on *tendere*, meaning to stretch or to move in a certain direction. A portent is therefore an omen, usually foreboding, giving rise to the English word, portentious, equivalent in meaning to ominous or menacing. Presage is similarly of Latin derivation and is based on the root, *sagire*, meaning to perceive [see the English word, sagacity.] Revelation is from the Latin, *revelationum*, meaning to uncover, to reveal. And apocalypse, is derived from the Greek, literally meaning away from the covering, an uncovering or a revelation. When capitalized, it is a synonym for the Scriptural Revelation of St. John the Divine.

Soothsaying descends from the Old High German word, *soth*, meaning truth or reality. And thus a soothsayer is one who reveals, often for a fee, the unembellished, truthful future. For obvious reasons, most soothsayers, sometimes called mountebanks (from Italian, *montimbanco*, to mount a bench) or charlatans (from Italian, *ciarlare*, to prattle), were often itinerant hucksters (from the Dutch, *hokester*, meaning to bear on one's back), leaving town before the future became the present.

– Stanley M. Aronson, MD