Seasonal Influenza Vaccination Among Pregnant Women in Rhode Island, 2002–2011

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Pregnant women are at increased risk for morbidity and mortality from influenza infection, likely due to the physiologic changes associated with pregnancy.[1] Preventing influenza during pregnancy is an essential component of prenatal care, and vaccination is the most effective strategy. Vaccinating pregnant women for influenza can protect both the women and their infants, especially infants aged less than six months who are not old enough to receive influenza vaccination.[2,3] Since 2004, the **Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP)** has recommended routine vaccination for all pregnant women during influenza season with **trivalent inactivated influenza vaccine** (TIV), at any stage of pregnancy.[2] **The American College of Obstetricians and Gynecologists (ACOG)** and the **American Academy of Family Physicians (AAFP)** also support ACIP's recommendation of routine vaccination of all pregnant women.

This report describes the trends of the influenza vaccination rates among pregnant women in Rhode Island, timing and venues of vaccination, and reasons for not being vaccinated. The report also provides recommended actions for health care providers to improve influenza vaccination among pregnant women.

Methods

We analyzed two different data sets from the **Rhode Island Pregnancy Risk Assessment Monitoring System (PRAMS)**: the 2002-2010 PRAMS calendar year survey data and the 2010-2011 PRAMS flu insert survey data. PRAMS is a collaborative surveillance project of the CDC and 37 state health departments. PRAMS collects state-specific, population-based data on maternal behaviors and experiences before, during, and shortly after pregnancy.[4] Each year, about 1,300 Rhode Island women who have recently given birth (two to six months postpartum) participate in the surveillance through mail or telephone survey.

PRAMS calendar year survey has collected influenza (flu) vaccination data for several years using the following two questions: "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?" and "Did you get a flu vaccination during your most recent pregnancy?" The 2010-2011 PRAMS flu insert survey collected additional information on flu vaccination during that particular flu season. The additional questions included were: "Since August 1, 2010, did you get a flu shot?", if the respondent said yes, then they were asked: "Did you get this flu shot *during* or *after* your most recent pregnancy?", "During what month and year did you get the flu shot?" and "Where did you get your flu shot?" If the respondents did not get a flu shot since August 1, 2010, they were asked "What were your reasons for *not*

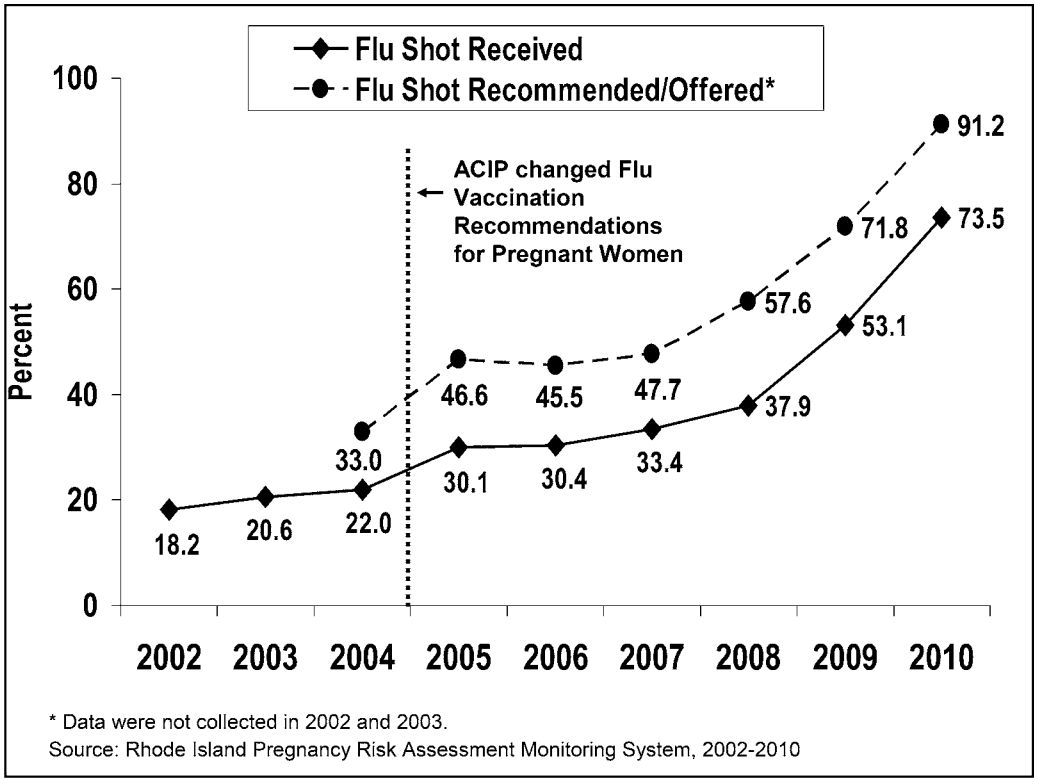

Figure 1. Percentage of women who received influenza vaccination during pregnancy and percentage of women who were recommended/offered influenza vaccine, Rhode Island, 2002-2010.

getting a flu shot since August 1, 2010?" The 2010-2011 flu insert data were collected only from September 2010 to May 2011 (n=888). These data are not directly comparable with calendar year's vaccination coverage data due to the differences in time frames. PRAMS data were weighted to represent all Rhode Island women who have delivered a live infant. The weighted response rates for all the survey years since 2002 were 65% or higher. To make the report simple, we presented only point estimates of the data without confidence intervals.

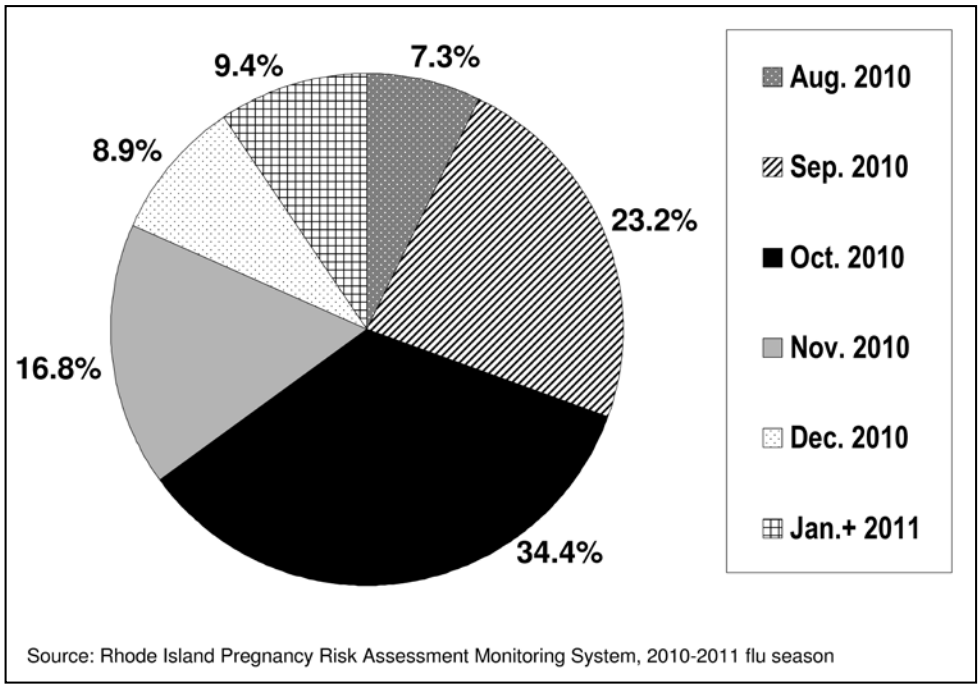

Figure 2. Timing of influenza vaccination among women with a recent live birth, Rhode Island, 2010-2011 flu season.

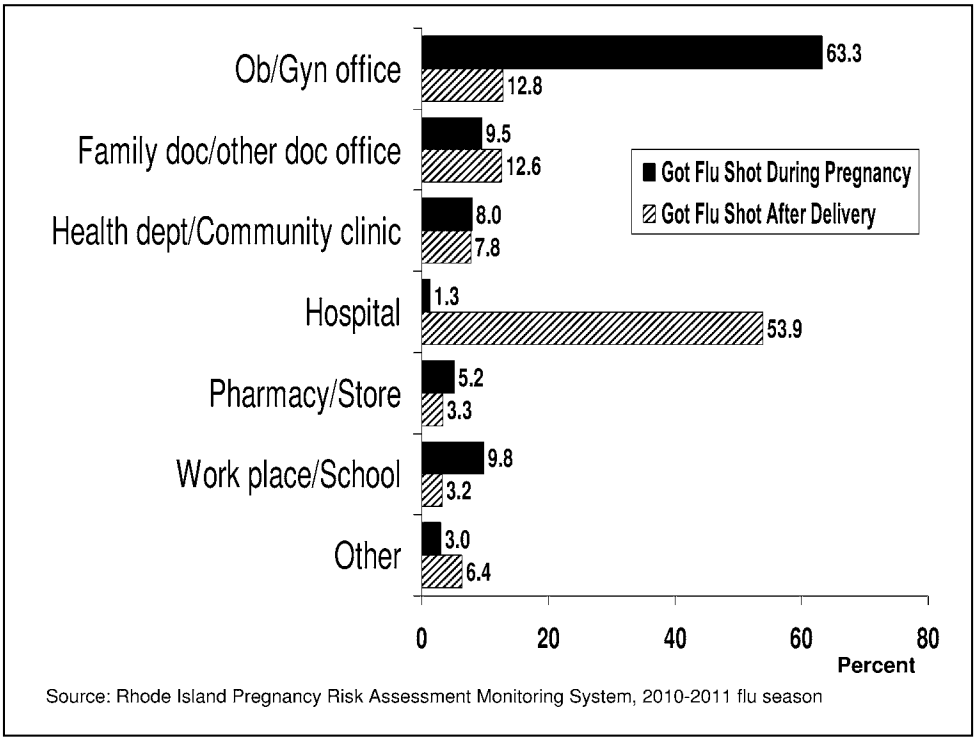

Figure 3. Venues of influenza vaccination among women with a recent live birth, Rhode Island, 2010-2011 flu season.

Results

Data from the PRAMS Calendar Year Survey

The percentage of women who received influenza vaccine during their pregnancy increased significantly from 18.2% in 2002 to 73.5% in 2010 (p<0.0001). Although vaccination coverage rates increased consistently during the period, substantial increases were observed from 2004 to 2005 (8.1 percentage points or 37% increase), from 2008 to 2009 (15.2 percentage points or 40% increase) and from 2009 to 2010 (20.4 percentage points or 38% increase). The percentage of women who reported that their health care provider recommended or offered influenza vaccine during their pregnancy also significantly increased from 33.0% in 2004 to 91.2% in 2010 (p<0.0001). A similar pattern of increases in the provider's recommendations/offers was observed from 2004 to 2010. (Figure 1)

Data from the 2010- 2011 Flu Insert Survey

Timing of Vaccination

The flu insert survey data showed that 71.4% of women with a recent live birth received an influenza vaccination in the 2010-2011 flu season: 61.0% were vaccinated *during* pregnancy and 10.4% were vaccinated *after* pregnancy. Most women reported receiving the vaccine in October (34.4%), followed by September (23.2%), November (16.8%), and December (8.9%). About 9% were vaccinated during January-May, 2011. (Figure 2)

Venues of Vaccination

The venues for receipt of vaccination were significantly different between women who were vaccinated during pregnancy compared to those who were vaccinated during the post-partum

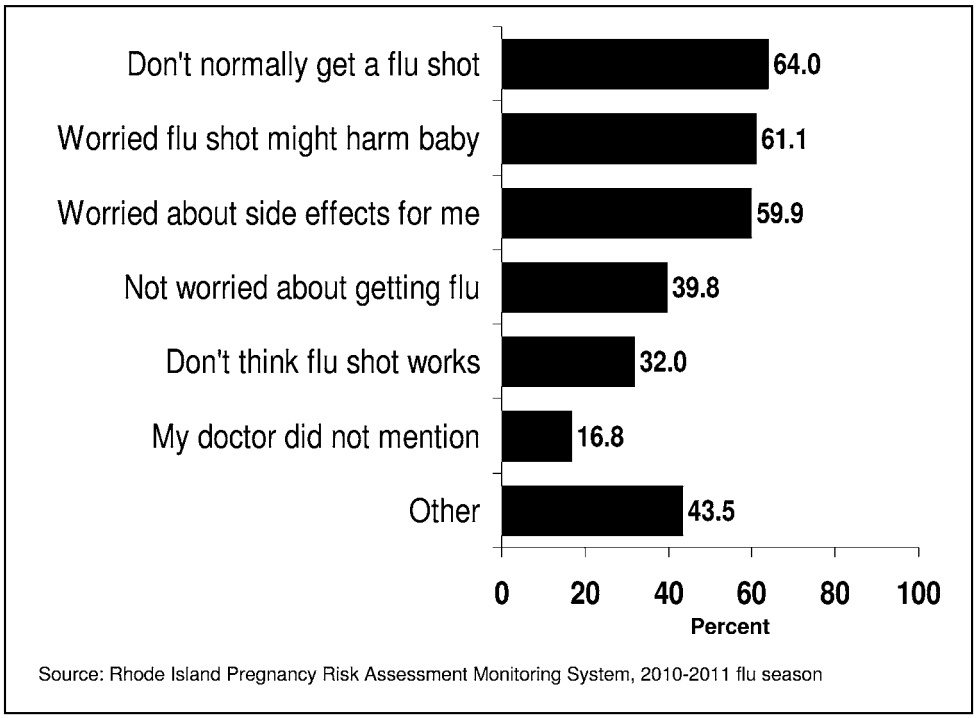

Figure 4. Reasons for not getting influenza vaccination during pregnancy, Rhode Island, 2010-2011 flu season.

period. The most common location for women who were vaccinated during pregnancy was the obstetrician or gynecologist's office (63.3%), followed by work place or a school setting (9.8%), and family doctor or other doctor's office (9.5%). Hospitals (53.9%) were the most common location for women vaccinated during the post-partum period, followed by the obstetrician or gynecologist's office (12.8%), and family doctor or other doctor's office (12.6%). (Figure 3)

Barriers to Vaccination

Women who did not receive flu vaccination during the 2010-2011 flu season were asked to give the reasons (multiple reasons were allowed). The reasons for not getting vaccinated included: I don't normally get a flu shot (64.0%); I was worried that the flu shot might harm my baby (61.1%); I was worried about side effects of the flu shot for me (59.9%); I was not worried about getting sick with the flu (39.8%); I don't think the flu shot works (32.0%); and my doctor didn't mention anything about getting a flu shot (16.8%). (Figure 4)

Discussion

Although the influenza vaccination coverage among pregnant women increased significantly from 2002 to 2010, more than one quarter (26.5%) of women still did not receive an influenza vaccination during their pregnancy in 2010. A substantial increase in influenza vaccination coverage observed from 2004 to 2005 could be, in part, related to changes in ACIP recommendations in May 2004, stating that pregnant women could be vaccinated during any trimester 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. The increase in vaccination coverage rates observed since 2008 can be attributed to several factors. These may include, but are not limited to, an overall heightened awareness among pregnant women and prenatal care providers about the risks of influenza during the 2009 H1N1 influenza pandemic. The pandemic led to increased influenza education and outreach efforts targeting health professionals and pregnant women. In addition, the **Rhode Island Department of Health (HEALTH)** engaged in active recruitment of prenatal providers and other vaccine providers into the state-supplied vaccine program to ensure that influenza vaccine was accessible to pregnant women across the state.

The data indicate that the majority of *pregnant women* were vaccinated at their obstetrician or gynecologist's office during their prenatal care visits, while the majority of *postpartum women* were vaccinated at the hospital before they were discharged. The data also indicate that vaccine safety concern was one of the major barriers to vaccination among pregnant women.

The data reported here have several limitations: PRAMS data are self-reported by women two to six months postpartum and therefore their reporting can be subject to recall bias. Data from the flu insert survey are not comparable with annual influenza vaccination coverage data due to the differences in time frames. In the flu insert survey, the respondents who completed the survey during September were less likely to be vaccinated than the respondents who completed the survey during April or May.

It is well documented that when health care providers strongly recommend or offer influenza vaccine, their patients are much more likely to be vaccinated.[5] To improve influenza vaccination coverage among pregnant women, health care providers should use the first prenatal care encounter to educate women about the safety of influenza vaccine, the risk of influenza complications during pregnancy, and the protective effect of influenza vaccination on women and their infants. To prevent missed opportunities for vaccination in the practice setting, health care providers should consider establishing an influenza vaccine reminder system, maintaining standing orders for vaccination, and offering influenza vaccine at the earliest opportunity during influenza season.

Acknowledgments

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References

1. Centers for Disease Control and Prevention (CDC). Seasonal Flu Vaccination Safety and Pregnant Women. Available at http://www.cdc.gov/flu/protect/vaccine/qa_vacpregnant.htm.
2. Centers for Disease Control and Prevention (CDC). Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP), 2010. *MMWR*. August 6, 2010;59(RR08):1–62. Available at http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5908a1.htm.
3. Zaman K, Roy E, Arifeen SE, et al. Effectiveness of maternal influenza immunization in mothers and infants. *N Engl J Med*. 2008;359:1555–64.
4. Centers for Disease Control and Prevention (CDC), Pregnancy Risk Assessment Monitoring System (PRAMS). Available at http://www.cdc.gov/prams.
5. Rhode Island Department of Health. Influenza Vaccination Among Pregnant and Postpartum Women in Rhode Island: The Importance of the Prenatal Care Provider. Issue Brief, October 2011. Available at http://www.health.ri.gov/publications/issuebriefs/2011InfluenzaVaccinationAmongPregnantAndPostpartumWomenInRhodeIslandTheImportanceOfThePrenatalCareProvider.pdf.

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We estimated rates of seasonal influenza vaccination among pregnant women in Georgia and Rhode Island and identified factors associated with being vaccinated. RESULTS: The prevalence of immunization for seasonal influenza in 2006 and 2007 combined was 18.4% (95% confidence interval [CI]: 15.9-21.1) in Georgia and 31.9% (95% CI 29.8-34.0) in Rhode Island.Â Our findings indicate a need for strategies to promote seasonal influenza vaccine use among pregnant women. Health care providers can play a significant role in increasing influenza vaccination coverage rates among pregnant women by advising women to be vaccinated and by addressing their concerns about vaccine safety. Level of evidence: III. We estimated rates of seasonal influenza vaccination among pregnant women in Georgia and Rhode Island and identified factors associated with being vaccinated. RESULTS: The prevalence of immunization for seasonal influenza in 2006 and 2007 combined was 18.4% (95% confidence interval [CI]: 15.9â€“21.1) in Georgia and 31.9% (95% CI 29.8â€“34.0) in Rhode Island. Multivariable analyses showed that in Georgia, multiparous women were significantly less likely to have been vaccinated than primiparous women (adjusted odds ratio [OR] 0.60; 95% CI 0.40â€“0.89). In Georgia, among those not vaccinated, 43% indic