

# Increasing Influenza Vaccination Rates in a Busy Urban Clinic

Rebecca C. Pierson<sup>1</sup>, Anita M. Malone<sup>2</sup>, David M. Haas<sup>2,\*</sup>

<sup>1</sup>Department of Medicine, Division of Clinical Pharmacology, Indiana University, Indianapolis, Indiana, USA. <sup>2</sup>Department of Obstetrics and Gynecology, University of Michigan, Ann Arbor, Michigan, USA. Department of Obstetrics and Gynecology and Department of Medicine, Division of Clinical Pharmacology, Indiana University, Indianapolis, Indiana, USA

**Influenza infection is the cause of thousands of hospitalizations and deaths each year; infection during pregnancy results in increased morbidity and mortality. Underserved women are particularly susceptible to not receiving recommended vaccinations. This project explored the effect of a simple paper based prompt on the influenza vaccination rate in a resident continuity clinic for the underserved. Using this reminder to providers to discuss the influenza vaccination with their patients, we were able to increase vaccination rates in our clinic from 2.2% to 14.2%. This implementation of a simple, low cost, low tech prompt to providers increased the rate of influenza vaccination in our clinic and we present this approach as an easy to implement method of improving vaccination rates. We also suggest this method as an alternative to an alert in the electronic medical record in situations where the electronic medical record may not be accessed during every patient encounter.** *Journal of Nature and Science, 1(3):e57, 2015.*

Influenza | Human: prevention & control | Reminder systems | Vaccination | Pregnancy | Humans | Infectious: prevention & control

## Introduction

Influenza infections have been shown to result in nearly 36,000 deaths and 148,000 hospitalizations annually.<sup>1</sup> In pregnancy, influenza infection has been shown to result in increased hospitalizations and longer hospitalization periods.<sup>2,3</sup> Additionally, febrile illness during pregnancy has been shown to be associated with increased congenital malformations<sup>4</sup>. Influenza vaccination is the most effective way to reduce infection and a vaccine has been widely available in the United States since 1976. The Centers for Disease Control and Prevention (CDC) noted that 134.5 million doses of the vaccine were distributed during the 2013-2014 season and overall 42.2% of the US population  $\geq 18$  years old was vaccinated. The vaccination rate for the high risk population aged 18-49 years old was 38.7%; for the female high risk population of the same age group, the rate was 41.1%.<sup>1</sup>

Starting in 2004, the Advisory Committee on Immunization Practices (ACIP) has recommended vaccination of all persons greater than 6 months of age (including pregnant women); the American College of Obstetricians and Gynecologists (ACOG) recommends vaccination of all women who will be pregnant during influenza season.<sup>5</sup> It has been shown that influenza vaccination is safe in pregnancy<sup>6,7</sup> and that vaccination can reduce morbidity during pregnancy.<sup>8</sup> Vaccination of pregnant women also provides passive immunity both transplacentally and through breast feeding after delivery and has been shown to reduce neonatal and infant morbidity.<sup>8,9</sup> In spite of these data, only 52% of women pregnant during the 2013-2014 influenza season reported that they had been vaccinated.<sup>10</sup> Others have shown that the underserved population is particularly prone to missing recommended vaccinations.<sup>11,12</sup>

Previous studies have shown increased rates of vaccination with the use of an automatic alert in the electronic medical record ("best practice alert")<sup>13,14</sup> or a standing order for the vaccine.<sup>15</sup> In an effort to increase the rate of vaccination in a clinic in which the electronic medical record is not exclusively used and there is not a standing vaccination order in place, we created a simple paper based prompting system as an alternative to the best practice alert. The objective of this study was to demonstrate whether the use of a simple prompting system would increase influenza vaccination rate.

## Materials and Methods

Our quality improvement study was conducted in the setting of a single site resident Obstetrics and Gynecology clinic in an urban clinic for underserved and indigent women. We have a diverse patient population and see approximately 300 patients per month for routine prenatal care, high risk prenatal care, and both routine and problem-based gynecologic care. Our hospital system serves as a safety net for the inner city and indigent population: our payer mix is 40% uninsured, 29% Medicaid, 20% Medicare, 8% commercial, and 3% other insurance. Our clinic does not have a standing vaccination order. No protected health information was recorded or accessed for this study. The study was exempted from review by the Indiana University Institutional Review Board. This was a multiple time series study over the course of two consecutive influenza seasons.

At the beginning of our study, all providers were formally notified that the influenza vaccine was available in the clinic and were encouraged to offer the vaccine per normal clinic protocol. Providers were made aware of the study and given instructions regarding study protocol. Only the inactivated injectable vaccine was administered, per normal clinic protocol, regardless of encounter type, during the 2010-2011 and 2011-2012 seasons.

**Influenza Vaccine Quality Project**

Have you had a flu shot this year?  
 Yes     No

If yes...  
 When \_\_\_\_\_  
 Where \_\_\_\_\_

If no, would you like to have a flu shot today?  
 Yes     No

If no, please document reason for refusal:  
 \_\_\_\_\_

Patient Type:  
 OB     Postpartum     Gyn

Today's Date \_\_\_\_\_

**Figure 1.** Form used to record vaccination information.

To both prompt a discussion between the patient and provider as well as record information for our study, we created a brightly colored paper form (Figure 1). The clinic staff attached the form to the front of the patient's chart during the check-in process. The provider recorded the date of encounter, appointment type (obstetric, gynecologic, postpartum), and whether the patient had been previously vaccinated. If the patient had not been previously vaccinated, the provider recorded whether the patient desired vaccination at the current encounter. If the patient declined, the reason for refusal was recorded. We included all patients presenting

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\*Corresponding Author. David M. Haas, MD, MS, Dept. of OB/GYN, 550 N. University Blvd, UH 2440, Indianapolis, Indiana 46202, USA. (317) 880-3960 (office). Email: dahaas@iupui.edu  
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**Table 1.** Total number of patients vaccinated by appointment category.

	2010-2011 Season		2011-2012 Season	
	Total vaccinated	Percent Vaccinated	Total vaccinated	Percent Vaccinated
<b>Obstetric</b>	73	3.7	179	13.1
<b>Gynecologic</b>	24	1.0	267	14.3
<b>Postpartum</b>	4	1.5	24	11.6
<b>Unidentified<sup>o</sup></b>	---	---	17	---
<b>Totals</b>	101 <sup>^</sup>	2.2	487 <sup>^</sup>	14.2 <sup>*</sup>

<sup>o</sup>Study prompts returned with no appointment type indicated. <sup>^</sup>Does not include patients who were previously vaccinated. <sup>\*</sup>p<0.001 with 95% CI 0.11 – 0.13.

**Table 2.** Reasons for refusal of the influenza vaccine during the 2011-2012 study period.

Reason for Refusal	Percent of Patients Offered Vaccination
Fear of becoming ill after vaccination	25.4
Afraid of needles or shots	12.9
"I don't get sick"	8.2
Feeling ill on day of visit	5.0
Fear of effects on fetus	2.9*
Contraindication to vaccination	2.0
Doubt of effectiveness of vaccine	1.8
No reason or unique reason given	43.9

\*Percent of obstetric patients offered vaccination.

for care between October 25, 2011 and January 27, 2012; we excluded gynecology patients presenting for preoperative appointments, patients presenting to non-resident subspecialty clinic appointments, patients presenting to the nurse clinic for injections or prescriptions only, and Centering Pregnancy™ obstetric patients (the Centering program has its own vaccination reminder program). Gynecologic patients were included in our study as we recognize that many women do not have a Primary Care Physician and otherwise might not have access to the vaccine in a health care setting.

We compared our rate of vaccination to the rate of vaccination in the same period during the previous year. We determined the total number of patients vaccinated during the prior year by extracting encounters by CPT code for influenza vaccination from our hospital pharmacy records. Data were analyzed using Excel (Microsoft, v2010); statistical difference in vaccination rates was calculated using chi squared analysis.

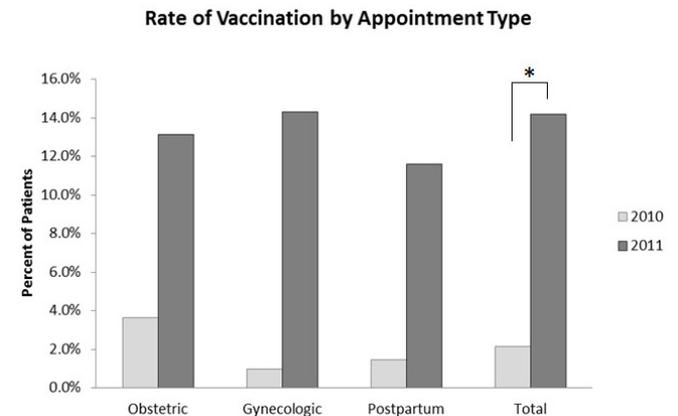
We collected study materials during the time period to include the beginning of available vaccine doses and the highest prevalence of influenza (October through January). Because we did not have accurate information for patients in the baseline year about whether or not they had already had an influenza vaccine when they presented to our clinic, we only compared the vaccination rates between the two years using the total number of women coming to clinic as the denominator instead of only those women who had not already had a vaccination. We did not perform an a priori sample size calculation as we planned to include all patients meeting study criteria during this period. A post-hoc power calculation demonstrated that the study was adequately powered to detect the difference found between the groups with an alpha of 0.05.

**Results**

During the study period, 3435 individual patients presented for care in our clinic. Of these, 1316 were offered the vaccination (38.3%). The percent of patients offered the vaccine in the prenatal care subgroup was similar (36.5%). Of the patients who were offered the vaccination during the intervention period, 36.3% indicated that they had previously received the vaccination. Thirty-seven percent accepted and were vaccinated during the same encounter (14.2% of the total presenting for care, Table 1). For the corresponding period during the previous year (Table 1), only 2.2% of the total number of patients presenting for care were vaccinated (p<0.001, Figure 2).

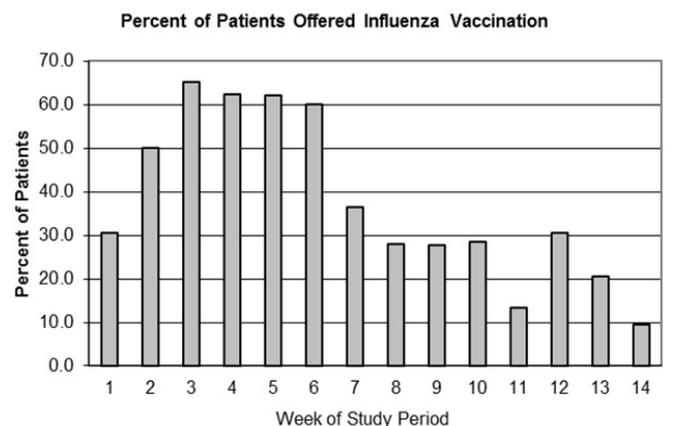
Of the patients who declined the vaccination, the most common reason for refusal was fear of becoming ill after receiving the vaccine (25.4%). Reasons for refusal are shown in Table 2. Of the patients presenting for prenatal care, only 2.9% reported the fear of effects on the fetus as a reason for refusal of vaccination. The majority of patients (43.9%) were unable or unwilling to state

a specific reason for their refusal or gave a reason that was unique and was unable to be included in any other category.



**Figure 2.** Percent of women in each appointment category who received the influenza vaccine during each study period. Vaccination rate for the 2011 season is significantly increased compared to the 2010 season (p<0.001).

During our study period, we noticed an anticipated pattern encountered when implementing a new program in the number of patients who were offered the vaccination. For the first seven weeks of the study, >30% of all patients were offered vaccination with ≥60% in weeks 3, 4, 5, and 6. For the remainder of the study, <30% of patients were offered a vaccination (Figure 3).



**Figure 3.** Percent of patients who were offered the influenza vaccine during the study period, displayed in 1 week increments.

## Discussion

During the 2011-2012 influenza season, our overall vaccination rate was 14.2%, which was significantly increased compared to the previous season's rate of 2.2%. We attribute this to our implementation of a paper based prompt to providers which likely resulted in an increased number of discussions about the vaccine with patients and ultimately increased vaccination rate. When including women who noted they had already received the vaccination, 28.1% of the total women presenting for care were vaccinated when leaving the clinic. While it is encouraging that we were able to dramatically increase our vaccination rate, our clinic is still well below the national rate of 42.0% for adult women during the 2011-2012 season<sup>16</sup> and the rate of 45.6% for the 2013-2014 season<sup>1</sup> and the Healthy People 2020 objective of 70% for adults over age 18 years.<sup>17</sup> Our rate of vaccination of pregnant patients (13.1%) is also below the national rate of 52.2% reported during the 2013-2014 season and 46.4% during the 2011-2012 influenza season<sup>18</sup>. Given that the national vaccination coverage for adults actually decreased from the 2010-11 to the 2011-12 season (40.5 to 38.8%), it is encouraging that our vaccination rate increased.<sup>19</sup> Our vaccination rate for the season prior to our study is comparable to other rates in large multi-specialty clinics.<sup>6</sup>

Other investigators have utilized multiple methods to increase vaccination rates in outpatient clinics. A recent study showed an increase in vaccination rate of pregnant women from 41.8% to 60.9% after the implementation of a best practice alert in the electronic medical record.<sup>13</sup> Another group analyzed several methods including provider education and maintaining stock of the vaccine and were able to show an increase in from <1% to 37% with the addition of a standing order for vaccination for pregnant women presenting for care.<sup>15</sup> By using a health maintenance inventory sheet, Rodney *et al.* were able to show an increase in pneumococcal vaccination rate from 1.6 to 14.6% and in increase in tetanus vaccination from 3.2% to 19.8%.<sup>20</sup> Larson *et al.* sent postcard reminders to patients and showed a vaccination rate of 59.7% in those who received the postcard compared to 30.0% in those who did not.<sup>21</sup> However, post card reminders and a standing vaccine order are not feasible in some clinic settings. As we did not at the time of the study use an electronic medical record in our outpatient clinic, an electronic alert was not possible. Our clinic has since converted to electronic charting but the system in which we document prenatal care does not allow for alerts. The method described in this study was an effective, low cost intervention that did not rely on the electronic record.

It is concerning that the number of patients who were offered the vaccine trended down as the study period progressed. While it is likely that greater numbers of patients will report that they have been previously vaccinated as the season progresses, patients may be new to prenatal care or may be presenting for an annual visit, or may have declined the vaccine previously for a reason that is no longer valid. These patients should still be offered the vaccine. The downtrend could also be a result of provider fatigue or frustration with the study prompt; though we attempted to make the study process as unobtrusive as possible, it is possible that providers became frustrated with the extra step added to patient encounters and did not record as many encounters as the study progressed. Though this illustrates one of the difficulties in making practice

changes in a large multi-provider clinic, we would in future similar studies make the process of completing the study prompt easier as well as streamline the collection process to facilitate completion and return of the prompts.

During this study, we identified many points of possible education, both for providers and patients. Some study sheets were returned with the comment that the patient had declined the vaccine based on an allergy to eggs. The CDC has provided recommendations regarding this issue: persons with a true anaphylactic reaction to previous influenza vaccines or to eggs should not receive the vaccine. However, persons with hives or other minor reaction may receive the vaccine and a thorough history should be taken to elucidate whether a true egg allergy exists and what symptoms the patient has experienced.<sup>22</sup>

Another point of education we are planning to address is that the majority of our patients who declined the vaccine cited the fear of becoming ill afterward as the reason they declined. We are planning to implement a discussion tool<sup>23</sup> that is short and straightforward and could be used by providers at each clinic visit to address patient concerns regarding the vaccine. We also plan to implement bilingual information posters in our examination rooms as another way of both providing patient information and a reminder to both patients and providers to discuss the vaccine. Given that pregnant women have been shown more likely to indicate intent to obtain influenza immunization if they perceive that they are more susceptible to become ill and require more than a single exposure message to indicate that they intend to be immunized<sup>24</sup>, we expect that these measures will result in an increase in vaccination rate.

Limitations of the study include that the rate of vaccination was based on the total number of patients who presented for care; analyzing the number of unique visits would likely provide a more accurate assessment of vaccination rate. Our study was also limited in that the reported total number of patients vaccinated did not include patients who were offered and accepted the vaccine but for whom the paper prompt was not returned for analysis. In the future, we would increase efforts to motivate and invest clinic staff and providers in our quality improvement projects. We did not study the entire influenza season but attempted to capture the beginning of the vaccination period during the weeks when the greatest number of patients would be impacted by vaccination.

We have shown that a simple, straightforward reminder to providers in the paper chart can increase rates of influenza vaccination. We provide this inexpensive and easy to implement strategy as an alternative to the electronic best practice alert as a method of reminding providers to discuss the vaccination when they are in the physical presence of the patient as well as in situations where patient encounters are not recorded in the electronic record or when a best practice alert is not possible.

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