Pharmacist-Managed Vaccination Program Increased Influenza Vaccination Rates in Cardiovascular Patients Enrolled in a Secondary Prevention Lipid Clinic

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Study Objectives. To determine whether a vaccination program in a pharmacist-managed secondary prevention lipid clinic increased influenza immunization rates in a high-risk population, and whether age or gender disparity existed among those vaccinated.

Design. Retrospective chart review.

Setting. Large, multispecialty, group practice.

Patients. A total of 476 and 266 patients seen at clinic visits during the 2003–2004 and 2004–2005 influenza seasons, respectively.

Measurements and Main Results. Immunization rates were compared before (2003–2004 influenza season) and after (2004–2005 influenza season) the implementation of the influenza vaccination program; \( \chi^2 \) analysis was used for all statistical inferences. Vaccination rates increased significantly from 39% to 76% (\( p<0.0001 \)) after program implementation. No before-after difference in rates was noted based on gender. Before implementation, patients younger than 65 years were less likely versus those aged 65 years or older to receive the influenza vaccine (29% vs 58%, \( p<0.0001 \)). Age disparity in vaccination rates was eliminated after initiation of the program.

Conclusion. The pharmacist-managed program increased influenza vaccination rates in high-risk patients with cardiovascular disease in advance of the newly published secondary prevention guidelines. Age-related differences in the vaccination rates were eliminated after program implementation.

Key Words: prevention, risk factors, influenza vaccine, lipids, gender.

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any age with chronic pulmonary or cardiovascular disorders as high-risk populations and recommended yearly influenza vaccination for these populations.\textsuperscript{1} In addition, the American Heart Association and the American College of Cardiology recently released new guidelines advocating influenza vaccination for all patients with coronary and other atherosclerotic vascular disease.\textsuperscript{3}

Healthy People 2010 advocates that health care providers achieve a 90% immunization rate for all high-risk individuals older than 65 years and a 60% immunization rate for high-risk individuals aged 18–64 years.\textsuperscript{1} Unfortunately, national immunization rates for high-risk individuals are appropriately 65%, 46%, and 26% for those older than 65 years, those aged 50–64 years, and those aged 18–49 years, respectively. These data clearly identify the need for higher influenza immunization rates in high-risk populations.

Pharmacists in the role of immunization provider are supported by the American College of Physicians–American Society of Internal Medicine.\textsuperscript{4} Furthermore, state and national pharmacy organizations advocate pharmacist participation in the role of immunization provider.\textsuperscript{5} Pharmacists have the legal authority to administer vaccinations in 44 states (including Texas, where our study was conducted), and states allowing pharmacists to directly administer vaccines achieve higher statewide immunization rates than other states.\textsuperscript{6} In addition, pharmacist-managed immunization programs have increased influenza vaccination rates in hospitals and rural primary care clinics.\textsuperscript{7,8}

Efforts are needed to increase influenza vaccination awareness and rates among high-risk individuals. Clinical pharmacists employed in institutions and ambulatory health care clinics are strategically located to provide vaccinations as part of their usual standard of care. The primary objectives of our study were to determine whether a vaccination program in a pharmacist-managed secondary prevention lipid clinic increased influenza immunization rates in a high-risk population, and whether gender and age disparity existed among those vaccinated.

Methods

Clinical Setting

Kelsey-Seybold Clinic is a large, multispecialty, group practice in Houston, Texas. The secondary prevention lipid clinic is a collaborative effort between the Kelsey-Seybold Clinic Department of Cardiology, the Kelsey Research Foundation, and the University of Houston College of Pharmacy. The lipid clinic staff includes three cardiologists, a clinical pharmacist, pharmacy students, and postgraduate pharmacy residents. The clinical pharmacist or cardiologists screen patient charts from the Kelsey-Seybold clinic and identify those patients who should be seen at the lipid clinic. Patients who visit the clinic have a documented diagnosis of cardiovascular disease, peripheral vascular disease, or cerebrovascular disease and thus qualify for routine influenza vaccinations regardless of age. The clinical pharmacist collaborates with the cardiologists to optimize the pharmacologic and nonpharmacologic therapy for approximately 1000 patients/year.

Study Patients

The institutional review board at the University of Houston approved this project as a retrospective study. Eligible patients had a scheduled routine lipid clinic visit during the 2003–2004 influenza season (October 1, 2003–February 28, 2004) and the 2004–2005 influenza season (October 1, 2004–February 28, 2005). Immunization dates, clinic visit dates, age, and gender were routinely recorded for patients seen at the lipid clinic during both influenza seasons and stored in the patient’s medical record. Data from the medical record were extracted to an administrative clinical tracking database. Immunizations received at other Kelsey-Seybold clinics were identified using the clinical tracking database for any patient from the lipid clinic with the International Classification of Diseases, Ninth Revision code for influenza immunization (V04.81).

Influenza Vaccine

During the 2003–2004 influenza season, no formal immunization program existed at Kelsey-Seybold. Clinics independently screened patients for influenza vaccination. During the 2004–2005 influenza season, the clinical pharmacist, residents, and students certified in immunization delivery screened patients and offered the influenza vaccination, under a standing-order protocol, to all patients treated at the lipid clinic as part of their usual activities. After appropriate screening, each patient requesting the vaccine received 0.5 ml intramuscularly. Vaccine delivery was documented in the medical record along with the vaccination date, vaccine lot number, manufacturer, expiration date, volume injected,
injection site, and signatures of both the patient and the vaccine administrator. Coding for vaccination and administration was added to the office visit billing form.

Statistical Analysis

Information collected for all study patients included identification number, date of clinic visit, receipt of influenza vaccine, gender, and age. From these data, the rate of influenza immunization was determined by dividing the number of patients receiving the influenza vaccine by the total number of patients seen in the lipid clinic during the specified 2003–2004 and 2004–2005 periods. Differences in immunization rates between the two periods were compared using $\chi^2$ analysis. The SAS statistical program, version 9.1 (SAS Institute Inc., Cary, NC) was used for all analyses. A p value less than 0.05 was considered to indicate a statistically significant difference.

### Results

A total of 476 and 266 patients were seen at lipid clinic visits during the 2003–2004 and 2004–2005 influenza seasons, respectively. During both seasons, the patients were mostly men (78% and 75%, respectively, p=0.47; Table 1). Fewer patients aged 65 years or older were seen during the 2003–2004 than the 2004–2005 season (33% and 44%, respectively, p=0.0035).

During the 2003–2004 influenza season, the overall vaccination rate was 39% in patients scheduled for lipid clinic visits (Figure 1). Rates increased significantly to 76% after vaccination was incorporated as part of the usual standard of care during the 2004–2005 season (p<0.0001). Of those receiving the vaccine during the 2004–2005 season, 133 (66%) were vaccinated during their routine lipid clinic visit.

No significant difference based on gender was noted in vaccination rates before and after implementation of the vaccination program (Figure 2). Before program implementation, patients younger than 65 years seen in the clinic were less likely to receive the influenza vaccine than those 65 years or older (29% and 58%, respectively, p<0.0001). Age disparity in vaccination rates was eliminated in this patient population after program implementation (Figure 3).

All opportunities for vaccination were provided during the originally scheduled 30-minute clinic appointment; screening, administration, and documentation required approximately 5 minutes. Follow-up for adverse effects was not planned; however, no adverse events were noted in the patients’ medical records.

### Table 1. Demographics of the Study Patients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Influenza Season (n=476)</th>
<th>Influenza Season (n=266)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td></td>
<td>369 (78)</td>
<td>200 (75)</td>
<td>0.47</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>107 (22)</td>
<td></td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>&lt; 65</td>
<td>≥ 65</td>
<td>0.0035</td>
</tr>
<tr>
<td></td>
<td>318 (67)</td>
<td>158 (33)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>≥ 65</td>
<td>149 (56)</td>
<td></td>
</tr>
</tbody>
</table>

### Figure 1. Vaccination rates in high-risk patients with cardiovascular disease before (gray bar) and after (black bar) implementation of a pharmacist-managed vaccination program (p<0.0001).

### Figure 2. Distribution of vaccination rates in high-risk patients with cardiovascular disease by gender for the two influenza seasons (gray bars represent women, black bars represent men; p>0.4).
Discussion

The results of our study indicate that incorporating an influenza vaccination program into an established secondary prevention lipid clinic increased vaccination rates in high-risk patients with cardiovascular disease within a multispecialty group practice. The increase in vaccination rates at our clinic was approximately 2-fold, consistent with that seen in another pharmacist-managed vaccination program, in which vaccination rates increased from 24% to 54%.8 Our program was especially effective at increasing influenza vaccination rates in patients younger than 65 years. Vaccination rates were 76% after program implementation, exceeding the goal of 60% set by the Healthy People 2010 initiative for this age group.1 The 77% vaccination rate in those aged 65 years or older fell short of attaining the 2010 goal of 90%; however, improvements over the previous year's rate were observed.

Accessibility of the pharmacist with direct responsibility for patient evaluation and vaccine delivery in our lipid clinic likely contributed to the increased vaccination rates. Furthermore, availability of the vaccine at routine cardiology office visits allowed patients to be immunized with no additional visit to their primary care physician or vaccination clinic. Offering the influenza vaccine to patients in our clinic is now part of the standard of care. This follows the guidelines issued by the American Heart Association and the American College of Cardiology advocating influenza vaccination for secondary prevention in patients with cardiovascular disease.3

In our study, implementation of an influenza vaccination program in a cardiology clinic that employed a clinical pharmacist required minimal effort. The benefits of vaccinating patients with cardiovascular disease have been demonstrated. One study showed that influenza vaccination reduced hospitalizations for cardiac disease and stroke in those aged 65 years or older.9 A case-control study demonstrated that influenza vaccination reduced hospitalizations for acute respiratory and cardiovascular disease in high-risk adults aged 18–64 years.10 Moreover, additional studies have demonstrated that influenza vaccination was associated with reduced risk of stroke11 and of myocardial infarction in patients who had experienced one previously.12

Despite these findings, national immunization rates are below the goals set by the Healthy People 2010 initiative.1 Published data from the Behavior Risk Factor Surveillance System survey indicated that 70% of those receiving the influenza vaccine did so in traditional health care settings, such as a physician's office.13 Therefore, our program provided the opportunity to target high-risk patients with cardiovascular disease and avoid missed opportunities for vaccination that may have contributed to low rates in this population during the previous year.

High-risk patients younger than 65 years have reported that the main reasons for not receiving vaccination against influenza were not knowing the vaccine was needed and not routinely being offered the vaccine.14 Furthermore, results of a nationwide survey suggested that practitioners may miss opportunities to vaccinate their high-risk patients because vaccination strategies were not built into their practice setting.15

Expanding the role of pharmacists as vaccination providers in our clinic has been valuable. Plans are in place to continue our program, with hopes of attaining the vaccination goals set by the Healthy People 2010 initiative. Our clinic also plans on offering the pneumococcal vaccine in addition to a yearly influenza vaccine.

Thus, pharmacists working in any clinic throughout ambulatory care centers are in a unique position to provide services due to their patient access, the minimal time required to immunize, and their ability to educate patients about the benefits of immunization. This premise is further strengthened by our study.

Figure 3. Distribution of vaccination rates in high-risk patients with cardiovascular disease by age for the two influenza seasons (gray bars represent age < 65 yrs, black bars represent age ≥ 65 yrs).  \( a \text{ } p<0.0001 \) for the difference between age groups for the 2003–2004 season; \( b \text{ } p=0.8 \) for the difference between age groups for the 2004–2005 season.
results, which demonstrated increased vaccination rates after implementation of an immunization program within a pharmacist-managed secondary prevention lipid clinic.

This study has several limitations. First, the influenza vaccination data were collected from the clinical tracking database, so vaccinations received outside the Kelsey-Seybold clinic would not have been recorded. Second, vaccination coding errors could have occurred, causing a misrepresentation of the vaccination rates. Third, the study design focused on providing comprehensive medical care, including influenza vaccination for high-risk patients, thus precluding evaluation of the vaccination’s effectiveness in preventing influenza or its complications. Finally, because the clinical pharmacist responsible for scheduling patients had obligations with the college of pharmacy, fewer appointment slots were available during the second year of the program.

A potential limitation was posed by the unexpected shortage of vaccine during the 2004–2005 influenza season. However, all of our patients were in the high-risk category, and enough vaccine was provided to the clinic to ensure adequate immunization for this population.

Conclusion

To our knowledge, this study is the first to report an influenza vaccination program in an established secondary prevention lipid clinic. Our results proved conclusively that the pharmacist-managed immunization program improved vaccination rates. These rates increased significantly after implementation of the program, which targeted high-risk patients with cardiovascular disease. The significance and success of this program are further supported by the recently published secondary prevention guidelines advocating influenza immunization for this population. Based on the results of this study and on the recently published guidelines, as part of risk factor management, pharmacists should focus on preventive measures such as vaccinations.

References