Executive Summary

The goal of this effort was to improve adult immunization rates within a large urban health care system.

To measure improvement efforts, we calculated each month the percentage of adults 65 years and older who leave clinic visits with up-to-date pneumococcal vaccination were calculated.

This was accomplished through the development of three key aspects: standing orders, an immunization registry, and an algorithm to recommend vaccinations based on age and past vaccination history, but also on health history and risk factors for specific diseases.

If you were looking to purchase health insurance for yourself or perhaps the company for whom you work, the first stop you might make would be the National Committee for Quality Assurance (NCQA) Web site (2007) to review the Healthcare Effectiveness Data and Information Set (HEDIS). This is a tool used by more than 90% of America’s health plans to measure performance on important dimensions of patient care and service. HEDIS includes performance measures related to dozens of important health care issues. The major/primary measures include dimensions such as quitting smoking advice, specific medication management related to diseases, cancer screenings, patient access to primary care physicians, and childhood/adolescent immunization status (NCQA, 2007). For adults, the HEDIS only reports on influenza and pneumococcal vaccines in patients ages 50 years and older (NCQA, 2008).

Health Impact and Cost Effectiveness

Pneumonia and influenza combined are the eighth leading cause of death in older adults in the United States (Centers for Disease Control and Prevention [CDC], 2008). Despite the known benefits of vaccinations, their use in the adult population is suboptimal. The National Center for Health Statistics (2007) reported vaccination among adults 18 year of age and over by race for 2006 (see Table 1). O’Malley and Forrest (2006) found immunization rates below recommended levels for all Medicare beneficiaries. Disparities between White and Black beneficiaries were large: 17% difference for each vaccine. Racial disparities in the receipt of influenza and pneumococcal vaccines persist among the elderly despite having basic insurance coverage and a usual physician. The Partnership for Prevention ranked prevention services based upon potential to decrease disease burden and cost effectiveness. Both influenza and pneumococcal vaccines for adults received high prevention scores (score of 8/10 for both vaccines). Cost effectiveness incorporated both morbidity and mortality, and the potential savings included all medical costs for avoided treatments or reduced costs for less-intensive, earlier-stage treatments. These costs included inpatient, outpatient, laboratory, radiology, pharmacy, and caregiving (Maciosek, Solberg, Coffield, Edwards, & Goodman, 2006).

Table 1. Vaccination among Adults 18 Years of Age and over by Race for 2006

<table>
<thead>
<tr>
<th>Race</th>
<th>% Influenza Vaccination</th>
<th>% Pneumococcal Vaccination</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>47.1</td>
<td>60.0</td>
</tr>
<tr>
<td>Black or African American</td>
<td>34.8</td>
<td>35.5</td>
</tr>
<tr>
<td>American Indian/ Alaska Native</td>
<td>56.3</td>
<td>57.5</td>
</tr>
<tr>
<td>Asian</td>
<td>44.6</td>
<td>35.5</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>31.7</td>
<td>33.3</td>
</tr>
</tbody>
</table>

Background

In October 2002, the Centers for Medicare and Medicaid Services (CMS) mandated in the Federal Register that all patients be assessed and that all eligible adult patients be immunized for influenza and pneumococcal pneumonia upon admission to the hospital. In the past few years both the CMS and the Joint Commission on Accreditation of Healthcare Organizations have begun reviewing the inpatient immunization compliance rates for adult influenza and pneumococcal vaccinations.

While childhood immunization registries are common, they are not utilized to the same extent in adult populations (Kolasa, Cherry, Chikatowsky, Reyes, & Lutz, 2005; Melinkovich, Hammer, Staudenmaier, & Berg, 2007; Niederhauser, Walters, & Ganeko, 2007). Denver Health & Hospital Authority (DH), the CDC, and other agencies recognized that care is provided at a variety of clinical settings (Morbidity and Mortality Weekly Report [MMWR], 2000a; Nichol, 2006; Rust, Strothers, & Zimmerman, 2005). Accurate tracking of adult immunizations in a registry provides the most complete record and is essential to improving adult immunization rates. To prompt and assist clinical staff in assessing and providing recommended vaccines for adult patients, standing orders or protocols are seen as integral to this process (Middleton et al., 2005; MMWR, 2000b). Standing orders for immunizations are cost effective in the inpatient setting when compared to pre-printed order sets and physician reminders (Honeycutt, Anderson, Wirth, & Coleman, 2005).

Denver Health & Hospital Authority is an integrated safety net health care delivery system, consisting of a 500-bed public hospital, a Level I trauma center, the County Public Health Department, and Primary Care Services through the Denver Community Health Services (DCHS) division. DCHS sites span nine different geographically located clinical campuses and provided 360,000 visits in 2006. Beginning in 1995, a DH pediatric immunization initiative resulted in the development of a computerized registry, “VaxTrax,” and an algorithm known as “the rule” that would assess immunization need based on immunization history, age, and co-morbid conditions (using ICD-9 codes in LCR). The collaborative group identified five focus areas in which to target improvement of adult immunization rates:

1. Link the current immunization registry with the current lifetime clinical record (LCR, an electronic clinical information database).
2. Develop an electronic clinical decision support tool (algorithm) within LCR known as “the rule” that would assess immunization need based on immunization history, age, and co-morbid conditions.
3. Develop a standing order policy that institutionalized the immunization rule as a decision support tool for assessing patient immunization need and empowered medical assistants to administer vaccines based on that assessment without a provider order.
4. Report immunization rates based on existing data sources to provide monthly feedback on the progress of these quality improvement efforts.
5. Select and implement the rule at two pilot sites using a rapid improvement process before rolling the intervention out for system-wide implementation:
   a. one family medicine clinic (where staff already provided pediatric immunizations based on a standing order); and
   b. one adult internal medicine clinic.

It was determined the work on the standing order policy, the algorithm/rule, and the data review could each proceed simultaneously with various task force members involved and steering committee oversight. The pilot sites were visited by CCGC facilitators for flow analysis, to review their current patient care flow processes with an eye toward improving their adult immunization compliance and to coordinate rapid improvement processes with a clinic work group to incorporate adult immunization process changes into the clinic.
Track Immunization Rates

Immunization rate feedback informs process improvement. It was determined that the data that would be most meaningful to the staff was the percentage of eligible patients who visited the clinic in the last month who were current on their immunizations within that month. This indicator (eligible patients) was selected because it is sensitive to improvement activities occurring each month in the clinic. Individuals were considered eligible for an immunization based on their age and/or co-morbid conditions, and past immunization history. The improvement efforts for pneumococcal vaccinations undertaken are demonstrated in Figure 1.

Implementation

The standing orders and the clinical decision support tool (the algorithm/rule) were incorporated into the two pilot sites in February-March 2007. Initially it was recognized that staff and providers did not trust the immunization data and that the pilot clinics had no standard work or processes in place regarding immunizing adult patients. There was inconsistent immunization assessment as well as communication and documentation of vaccine refusals. In addition pneumococcal (PPV) and tetanus immunization were handled differently than influenza. Both pilot clinics gathered work groups to assist with forming one new standardized immunization process. Based on the pilot, the following key processes were in place:

- Medical assistant (MA) activates the immunization rule and places the findings in the patient’s chart to communicate the need for single or multiple immunizations.
- The patient is then asked to review the adult screening questionnaire for any possible vaccine precautions or contraindications (Immunization Action Coalition, 2008) and they are given the corresponding Vaccine Information Statements (VIS) to read and take home.
- If patient has contraindications the MA documents the contraindications on the chart to communicate with provider and documents contraindications in VaxTrax registry. Thus, on subsequent visits VaxTrax will prompt users regarding any contraindicated vaccinations.
- The MA either administers the vaccine(s) prior to provider visit or after provider visit based on team preference.
- If vaccines are administered, the MA documents them in the registry including vaccine type, manufacturer, lot number, date, site of administration, provider, VIS form and date, and also completes the billing.
- If the patient refuses vaccine(s), the MA communicates this information to the provider. The provider then discusses the refusal with the patient. If the patient agrees to accept vaccine after the provider visit, the MA administers vaccine and documents in VaxTrax. If the vaccines are refused, that information is also documented in VaxTrax.

Both pilot sites successfully implemented the new immunization processes, with notable immunization rate improvements within the first quarter (see Figure 1). The success of this process is derived from the ability to have vaccines recommended for each patient via the LCR rule and that a standing order allowed the MAs to administer the vaccines and take the provider out of the loop in most cases.

Pilot sites proved it was feasible to incorporate utilization of the rule into the workflow of the MAs with some alterations to the patient flow processes. Formal roll out to other DCHS Primary Care Internal Medicine and Family Practice clinics was completed by the summer of 2007.

Conclusions

Using computerized clinical decision support technology (immunization algorithms or rules) and a policy that streamlined check-in procedures and empowered MAs to administer immunizations without a provider order resulted in improved adult immunization rates.

One contributing factor in the rate increase was improved identification of adult patients eligible for immunizations because the ICD-9 codes used by the computerized algorithm/rule perform a more comprehensive assessment of vaccine eligibility than was accomplished using the broad categories of chronic diseases in normal paper standing orders. In fact, staff occasionally have challenged the rule recommendation, but on close inspection the rule has always performed accurately based on its programming.

The rule functioned both as an educational tool
for providers and it has been an effective clinical tool to win provider trust of the automated process. One of the limitations of the rule is that it depends on the accuracy of the ICD-9 diagnosis coded, so that if a diagnosis is in error the rule will not function optimally. When the rule was used at every patient visit, the immunization rates for that month increased dramatically (pilot site 1, Feb-Apr 07 assessment period).

The second ingredient in the apparent success of this intervention is the creation of a standing order policy that allowed check-in staff to administer vaccines based on the clinical decision support tool. Because the rule is accessed at check-in and assesses immunization eligibility using data from both the VaxTrax immunization registry and the electronic clinical information database, it prevented MAs from having to perform dual searches of both the immunization registry and electronic clinical information database, thus streamlining the MA check-in processes.

The standing order policy also empowered MAs to give immunizations without a provider order. Medical assistants function under medical delegation, in the same manner that physical therapists and respiratory therapists function (the physician writes a patient-specific order which the MA implements). Agency policy (or standing orders) directs the activity of all employees that function in that capacity (immunization administration). In addition, this new adult immunization process avoids duplication of services and wasted resources (e.g., unnecessary revaccination) and allows the provider more time to deal with other medical concerns. Thus, the immunization process became even more efficient for the providers, the clinical support staff (MAs), nursing staff, and the patients.

**REFERENCES**


