Increasing pneumococcal vaccination rates among adults with cystic fibrosis

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Streptococcus pneumoniae commonly inhabits the respiratory tract and colonizes 5–10% of healthy adults. The most common clinical syndrome associated with S. pneumoniae is pneumococcal pneumonia. Each year in the United States, over 500,000 people contract pneumococcal pneumonia, and more than 175,000 of them are hospitalized. S. pneumoniae accounts for 35% of cases of adult community-acquired pneumonia and up to 50% of cases of hospital-acquired pneumonia. Some 40,000 deaths each year are attributable to this infection. The frequency of resistance to more than one drug has been reported to be as high as 40%, and 15% of cases have shown resistance to more than three drugs.

S. pneumoniae is the fourth most common bacterium isolated from the sputum of patients with cystic fibrosis (CF). Patients with CF lack the ability to properly clear encapsulated bacteria, like S. pneumoniae, and are at increased risk of severe disease. In addition, CF patients may not have adequate levels of pneumococcal antibodies. Lahari and Waltz reported that 7–39% of patients with CF did not have adequate antibody levels and concluded that immunizing CF patients with pneumococcal 23-valent polysaccharide vaccine (PPV-23) is warranted. Currently, the Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) recommends administering one dose of PPV-23 to children with high-risk medical conditions (e.g., chronic lung disease) and to children older than two years who have previously been vaccinated with the seven-valent conjugated vaccine. In 1995, only 11.8% of patients ages 18–49 with chronic lung disease and 29.9% of patients ages 50–64 years with chronic lung disease reported ever receiving pneumococcal vaccine. According to data from the 2001 Behavioral Risk Factor Surveillance System (BRFSS) analyzed by CDC, only 55.9% of respondents ages 65–74 years reported ever receiving a pneumococcal vaccine, despite the recommendation by ACIP to vaccinate all persons who are 65 years of age or older. The 2002 BRFSS revealed a marginal improvement, to 61.8%. Collectively, the data indicate that efforts to dramatically improve rates of adult vaccination against pneumococcal infection are needed, especially in patients with high-risk medical conditions like CF.

To our knowledge, no studies have been published to date on the pneumococcal vaccination rates of adult patients with CF. The purpose of this study was to determine if documenting PPV-23 vaccination status on a cover sheet in the medical chart would increase vaccination rates.

Methods. Our initial task was to document the current prevalence of PPV-23 vaccination in adult patients with CF at the Intermountain Cystic Fibrosis Adult Center, located at the University of Utah Hospitals and Clinics. Before the study began, we obtained approval from our institutional review board. We selected for review only active patient medical charts. An active medical chart was defined as the chart of a patient who had been seen in the clinic within the previous 12 months. Charts were reviewed to assess current PPV-23 immunization status; if immunization status was not documented, patients were contacted by telephone.

Beginning in July 2002, the adult immunization status of each patient was printed on the cover sheet of the medical chart. The cover sheet included the following information: name; contact information for the patient, the family, the patient’s pharmacy, and the patient’s primary care physician; the date of the most recent PPV-23 vaccination; and the date of the next PPV-23 vaccination due. The data were ascertained by telephone interview and chart review.

Results. Of the 518 charts reviewed, 265 (51%) were found to be active medical charts. The cover sheet was present in 239 (90%) of the active charts. The cover sheet was printed on the cover sheet of the medical chart. The cover sheet included the following information: name; contact information for the patient, the family, the patient’s pharmacy, and the patient’s primary care physician; the date of the most recent PPV-23 vaccination; and the date of the next PPV-23 vaccination due.

Conclusion. Increasing pneumococcal vaccination rates in adult patients with CF is needed. The documentation of PPV-23 vaccination status on the cover sheet of the medical chart may be a useful strategy to increase pneumococcal vaccination rates in adult patients with CF.
care provider; genotype; medical problems; colonizing bacteria; influenza and pneumococcal immunization status.

During each clinic visit, the pharmacist verified and updated the patient's immunization status on the cover sheet. If the patient had not previously received or provided documentation indicating the receipt of one dose of PPV-23 since two years of age, we either vaccinated the patient at the time of the clinic visit or recommended that he or she receive the vaccination from another health care provider. A secretary entered the updated cover sheet information into a Microsoft Access database (Microsoft, Redmond, WA). Updated cover sheets were then printed for each subsequent clinic visit.

Data analysis was performed by using SSPS for Windows (version 11.5, SPSS, Inc., Chicago, IL). The chi-square test was used to evaluate the null hypothesis that providing education about the option to receive the vaccination (13.5% [13/96]), or declined to receive the vaccination (6.3% [6/96]).

Over 98% (62/63) of unvaccinated patients accepted our recommendation to be vaccinated with PPV-23 in the clinic or during a stay at the University of Utah Hospital. Of the patients who were vaccinated at our center, 79% (49/62) received their vaccination in the outpatient clinic and 21% (13/62) during hospitalization. The mean age of vaccinated patients (29.3 years) did not differ significantly from that of unvaccinated patients (26.3 years) (p = 0.222, two-tailed t test). There was no significant difference with respect to gender between vaccinated and unvaccinated patients (p = 0.507) or between patients who were counseled and considering vaccination and patients who were not (p = 0.199).

Discussion. Even with the current CDC ACIP recommendations, the rate of pneumococcal vaccination remains well below the Healthy People 2010 target of >90% of people 18–64 years of age who are considered to be at high risk. Our study found that only 14.5% of our CF patients at baseline had ever been vaccinated with PPV-23, a rate consistent with those previously reported.

A number of computer-based strategies for improving pneumococcal vaccination rates in adults have been published. Clement et al. conducted a two-year study in a general internal medicine clinic and reported that 38% of the patients were eligible, according to guidelines at the time of the study, to receive the pneumococcal vaccination. The investigators implemented a computer-generated reminder that was placed in the chart one day before the patient’s scheduled clinic visit. This reminder included numerous preventive care recommendations, one of which was vaccination against pneumococci. The control group did not receive a computer-generated reminder. The computer-generated reminders produced a 49% physician response rate in the treatment group and 29% in the control group (p < 0.0001).

More recently, Dexter and colleagues implemented a computer-generated reminder system for several preventive therapies, including pneumococcal vaccination for all patients admitted to a hospital general medicine service. The baseline pneumococcal vaccination rate was 0.8%. A computer-generated reminder was displayed during the daily computerized physician-order-entry session if the patient was transferred or was discharged from the hospital and the patient’s electronic medical record included at least one indication for the vaccine. At the end of the 18-month study period, the vaccination rate was 35.8% (p < 0.001).

One potential limitation of these studies is their external validity. The results of computer-based reminder programs may apply only to the computer program that was tested. In addition, computer-based medical records are not being used in all practice settings; many clinics and hospitals still have a paper charting system. Documentation of immunization is commonly recorded in writing by the health care provider administering the vaccination, and this documentation may or may not get entered into the electronic medical record.

Simple methods, such as written reminders to providers, have also been effective at improving pneumococcal vaccination rates. Klein and Adachi implemented a system in which a health care provider identified patients admitted to the hospital as being at high risk on the basis of then current guidelines. Within 24 hours of admission, such a patient’s chart was stamped to identify the patient’s high-risk status and eligibility to receive PPV-23. The investigators documented an 8% increase in PPV-23 vaccination rates at the end of the
first year (p < 0.05) and a 17% increase at the end of year 2 (p < 0.001). In a similar study, Schreiner et al. reported that a provider reminder system improved PPV-23 vaccination rates from 19% at baseline to 36% at the end of a five-month period (p < 0.001). Six months after the reminder system was discontinued, the vaccination rate declined to 23% (p < 0.001). Other studies have also found favorable effects on vaccination rates of provider-based reminder programs and provider assessment and feedback.13,14

Education is another strategy that has proven successful at improving immunization rates. Elangovan et al. focused their educational efforts on patients. Before a patient arrived for a clinic visit, a research nurse reviewed the patient’s PPV-23 immunization status. Patients who had not been immunized were counseled in the clinic’s waiting room. At the end of a three-month period, the PPV-23 vaccination rate had increased from 54% to 79% (p < 0.001). Siriwardena administered a questionnaire to patients at high risk of pneumococcal infection that collected data on demographics, perception of risk, prior knowledge of pneumococcal vaccination, and attitudes about pneumococcal vaccination at baseline and one year later. Interventions, including educating health care providers during monthly primary care team meetings, implementing a pneumococcal vaccination protocol, and educating patients with posters, resulted in an increase in the vaccination rate from 4.5% of patients with chronic lung disease to 19.2%. In addition, patients who identified themselves as being in a high-risk group and those who had previously heard about pneumococcal vaccination were more likely to have a positive attitude toward vaccination.

Health care providers play a pivotal role in influencing a patient’s decision on whether to receive pneumococcal vaccination. Kamal et al. found that patients who had visited their physicians within the preceding year were almost twice as likely to receive pneumococcal vaccination as those who had not. In a survey by Nichol and colleagues, patients were 15 times more likely to receive the PPV-23 vaccination if their health care provider had recommended it.

According to CDC, “Every contact with the health-care system should be used to review and update vaccination status.” The opportunity to vaccinate hospitalized patients against pneumococci is missed in up to 80% of hospitalized patients. The CDC Task Force on Community Preventive Services has strongly advised that providers use reminder or recall strategies in the patient’s chart. In addition, retrospective assessment of and feedback on provider performance are recommended.

Even though our cover-sheet reminder system was highly effective at improving PPV-23 vaccination rates, our study is not without its limitations. The Intermountain Cystic Fibrosis Adult Center is a highly specialized clinic; all the patients have a diagnosis of CF and are candidates for PPV-23. As a result, the only necessary screening is determining whether the patient has already received PPV-23. This is not true for other general medicine clinics, where a health care provider must identify candidates for the vaccine. Another potential limitation is that we analyzed data on active patients only. Patients who have been seen by a health care provider within the previous year are more likely to receive PPV-23 than patients who have not. Our provider reminder system consists of a cover sheet placed at the front of the patient’s medical chart; the opportunity to give a PPV-23 vaccination could be missed if the cover sheet is misfiled, misplaced, or lost. In addition, the health care provider has to be sure to document the patient’s current vaccination status on the cover sheet, whether the patient received the vaccination in our clinic or not.

Conclusion. The pneumococcal vaccination rate among adult patients receiving treatment for cystic fibrosis increased from 14.5% to 65.6% after a reminder system was implemented in which each patient’s immunization status was printed on the cover sheet of the medical chart. References

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