

A Virtual Clinic Improves Pneumococcal Vaccination for Asplenic Veterans at High Risk for Pneumococcal Disease

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We developed a “virtual clinic” to improve pneumococcal vaccination among asplenic adults. Using an electronic medical record, we identified patients, assessed their vaccination status, entered orders, and notified patients and providers. Within 180 days, 38 of 76 patients (50%) received a pneumococcal vaccination. A virtual clinic may optimize vaccinations among high-risk patients.

Keywords. asplenia; electronic medical record; immunization; PCV13 vaccine; pneumococcal disease.

In 2011, pneumococcal vaccination coverage among adults in the United States was 20% for high-risk adults aged 19–64 years and 62% for adults ≥ 65 years, well below the Healthy People 2020 goals of 60% and 90%, respectively [1,2]. The Advisory Committee on Immunization Practices (ACIP) revised the 2015 adult vaccination schedule to include algorithmic, patient-based guidance for healthcare providers regarding pneumococcal vaccines [3]. Sorting out the indications and timing for the recently approved 13-valent pneumococcal conjugate vaccine (PCV13) versus the 23-valent pneumococcal polysaccharide vaccine (PPSV23) is complex and presents a significant challenge to healthcare providers. An additional barrier is insufficient time to obtain an accurate vaccine history and discuss the indications, benefits, and risks of vaccination with patients, especially considering that time constraints already limit the ability to

address other important medical issues [4]. We sought to create an intervention that improved pneumococcal vaccination coverage among patients at a Veterans Affairs (VA) medical center without increasing the workload of primary care providers. To attain this objective, we developed a “virtual clinic” relying upon the Veterans Health Administration’s (VHA’s) robust electronic medical record (EMR), systematically identifying patients who had not received PCV13 or had not completed their PPSV23 series. For the initial iteration of the virtual clinic, we focused on patients with anatomic or functional asplenia because this population is at very high risk for pneumococcal disease.

METHODS

In January 2015, we used structured query language (SQL) within the local VHA’s administrative database to identify patients with asplenia, searching for the clinical terms “splenectomy”, “injury to spleen”, “asplenia”, and “asplenic” within patient problem lists. We limited the query to patients who were active in our medical center (defined as a clinic visit or hospitalization in the previous 2 years) and who had not received PCV13 or had received < 2 PPSV23 doses over 5 years. In February 2015, following a focused chart review to verify the SQL data, we proceeded with a 3-part EMR-based intervention for each patient. The first part of the intervention was an order for PCV13 or PPSV23, as appropriate, that expired after 90 days. (2) The second part of the intervention was a note in the EMR to explain the rationale for the order and to notify the primary care provider (PCP) by including him/her as a cosigner. The third part of the intervention was a letter automatically generated within the EMR and mailed to the patient recommending that they get a pneumococcal vaccine (Supplemental Figure S1). The letter sought to educate patients about the risk for pneumococcal disease and the protective benefit of vaccination. It also encouraged patients to discuss pneumococcal vaccines with their healthcare provider at their next scheduled visit or to schedule an appointment to obtain a pneumococcal vaccine if they did not have an upcoming visit. The letter also included a list of clinics where vaccines could be obtained and Vaccine Information Statements from the Centers for Disease Control and Prevention. An infectious disease physician (R.L.J.) completed the chart reviews and steps 1–3 above.

The primary outcome was receipt of the recommended pneumococcal vaccination within 180 days of the intervention. This observation period (February–July 2015) partially overlapped with the release of an EMR-based clinical reminder in May 2015. The reminder prompted nurses and providers to query

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patients about pneumococcal vaccination and, when appropriate, administer PCV13 or PPSV23. We used a cumulative hazard plot to examine the rate of PCV13 vaccination before and after the intervention period. We also evaluated the medical record to determine reasons patients received or did not receive the vaccine. Documentation of and reasons for vaccine refusal were sometimes recorded in medical record and, less commonly, in the EMR-based clinical reminder. We made follow-up phone calls to a subset of patients (n = 10) who did not seek vaccination despite receiving the notification letter. These patients participated in semistructured interviews about their

perceptions of pneumococcal vaccines. This work met local institutional criteria for operational improvement activities exempt from ethics review.

RESULTS

The SQL query identified 126 patients within our VA medical center as asplenic; 92 met the criteria of being active in the system. Of these, 79 (86%) patients had either not received PCV13 or had received PCV13 but had received <2 PPSV23 doses over 5 years. Of the 79 eligible patients, 76 received the intervention

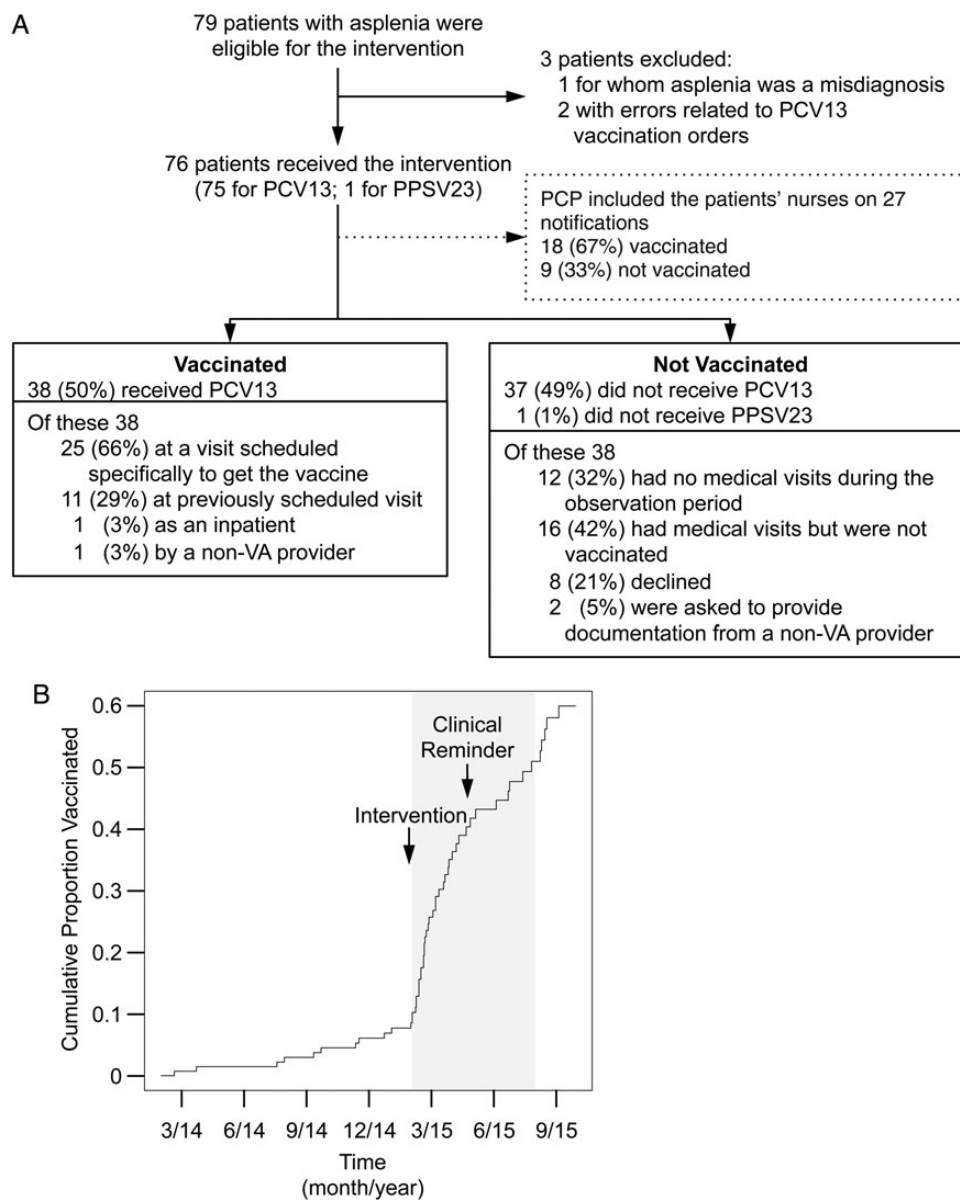


Figure 1. (A) The primary outcome (solid lines) was vaccination with the recommended pneumococcal vaccine within the 180-day observation period. The primary care provider (PCP) included the nurse on the notification for a subset of patients (dashed lines). (B) Cumulative hazard plot showing the rate of 13-valent pneumococcal conjugate vaccination (PCV13) 12 months before and 8 months after the intervention. The shaded area indicates the 180-day observation period. Abbreviations: PPSV23, 23-valent pneumococcal polysaccharide vaccine; VA, Veterans Affairs.

(Figure 1A). One patient had already received PCV13 and was eligible for a 2nd PPSV23. Among the remaining 75 patients, 47 (63%) and 15 (20%) had received 1 or 2 PPSV23 vaccines, respectively. We chose to prioritize PCV13 in accordance with ACIP recommendations [3]. Among 76 patients included in the virtual clinic, 38 (50%) received the recommended pneumococcal vaccine within the 180-day observation period. In the subsequent 60 days, an additional 4 patients from our cohort were vaccinated, bringing the total to 42 of 76 (55%). In contrast, in the 12-month period before the intervention, only 10 active patients with asplenia were vaccinated, despite the availability of PCV13 at that time (Figure 1B). Patients initiated 7 of the 25 visits specifically scheduled to receive their vaccine. For the 38 patients who were not vaccinated during the 180-day observation period, clinic staff documented in the EMR that 8 patients declined the vaccine. During the assessment of outcomes, we noted that some PCPs added the patients' nurse to the notification placed in the EMR. Among the 27 patients for whom this occurred, 18 received the vaccine.

DISCUSSION

To our knowledge, this is the first description of a virtual clinic used to improve pneumococcal vaccination rates in a specific population of high-risk patients. Previous work by Lau et al [5] indicated that patient outreach, education, and clinical reminders are effective strategies to improve pneumococcal vaccination. Our virtual clinic coupled outreach with education by sending letters notifying patients of their need for pneumococcal vaccination. These letters specifically suggested that patients should discuss pneumococcal vaccines with their provider. At least 7 patients initiated a clinic appointment after receipt of their letter.

Clinical reminders incorporated within the EMR may increase the likelihood of pneumococcal vaccination among patients at VA medical centers [6]. The clinical reminder prompts discussion of pneumococcal vaccines with patients and permits documentation of vaccine refusal or acceptance. However, this intervention still leaves the burden of choosing and ordering the appropriate pneumococcal vaccine to providers. Furthermore, the proliferation of clinical decision support notifications targeting various medical conditions and health measures can often lead to "alert fatigue" [7]. In our virtual clinic, we sought to avoid these issues by entering vaccine orders in the EMR and by tailoring notifications to PCPs and patients. Notification of providers established a link with clinical staff from the virtual clinic, who could provide guidance beyond that available from a computer-based algorithm.

Supporting our experience, Lau et al [5] found that team changes that reduce the involvement of PCPs in vaccination are beneficial. We sought to achieve this within the virtual clinic by having our staff, rather than the PCPs, use the EMR to

identify patients at high risk for pneumococcal disease, determine their specific pneumococcal vaccine needs, and place the appropriate order [4]. Several PCPs successfully implemented further team changes by including their patients' clinic nurses on the EMR notes generated from the virtual clinic. These actions illustrate the spirit of team collaboration intended with the VHA's implementation of patient-centered medical homes, termed Patient Aligned Care Teams (PACTs) [8]. In this vein, we offered support and information to patients and providers; our virtual clinic team received e-mail or phone correspondence from 5 providers and 1 patient.

The VHA's robust EMR and patient-centered infrastructure were both highly conducive to this intervention. Nevertheless, several components may be generalized to other healthcare settings. In particular, these include using data queries to identify high-risk patients needing vaccinations; sending letters to patients encouraging discussions and appointments; and alerting providers about specific patients in need of vaccinations. The latter approach was implemented by Desai et al [9] in the form of paper point-of-care reminders to physicians, demonstrating improved pneumococcal vaccination rates among patients attending rheumatology clinics.

CONCLUSIONS

Our study has some limitations. First, the intervention focused on a small group of patients within a single medical center. Second, we did not systematically assess the reasons why patients did not receive the recommended vaccine. Follow-up phone calls to a subset of patients who did not seek vaccination despite receiving the notification letter revealed confusion among PCV13, PPSV23, and the influenza vaccine; these interviews can inform future educational outreach to both providers and patients. Third, the updated EMR-based clinical reminder, which overlapped with the observation period, may have prompted the administration of some pneumococcal vaccinations. Comparison of the rate of PCV13 vaccination immediately following our intervention and following the clinical reminder, however, suggests that the EMR-based clinical reminder was not the chief determinant of vaccine administration. Finally, we did not anticipate the potential for clinic nurses to increase the likelihood of pneumococcal vaccination among their patients [10]. Therefore, we plan to include both providers and PACT nurses on notifications within the EMR in subsequent iterations of the virtual clinic as we proceed with our efforts to vaccinate additional groups of patients at high risk for pneumococcal disease.

Supplementary Data

Supplementary material is available online at Open Forum Infectious Diseases online (<http://OpenForumInfectiousDiseases.oxfordjournals.org/>).

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