Pharmacist Impact on Immunization Rates in Asplenic Patients

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Abstract

Background: *Asplenic patients can present unique challenges when updating immunizations. Pharmacists have proven to have a positive impact on immunization rates in asplenic patients.*

Objectives: *To determine the impact of pharmacist intervention on the up-to-date immunization status in asplenic patients in a single rural family medicine clinic and identify quality improvement opportunities for the immunization service.*

Service Description: *The pharmacist obtained an initial list of asplenic patients to create a longitudinal tracking spreadsheet for immunizations that identified missing vaccines for each patient; provider education on vaccine needs in this population and the service was also provided. The ongoing service consists of regular updates to the spreadsheet as patients receive vaccines and a quarterly check of the entire spreadsheet to determine needed vaccines; if needed vaccines are identified, the pharmacist facilitates a patient appointment to obtain the vaccine.*

Methods: *A retrospective chart review was completed in Spring 2022 for all patients included in the baseline report. Patients were categorized based on vaccine status and outstanding vaccines were noted. An evaluation was completed to determine if any identifiable trends across providers were evident based on patient immunization status.*

Results: *A total of 33 asplenic patients were identified at baseline; three (9%) were up-to-date at baseline. Of the 30 patients who were maintained in the clinic, 16 (53.5%) were up-to-date at the point of review. Pharmacist intervention increased the total vaccine completion rate by 44.5% from baseline to follow-up. The biggest improvement for a specific immunization status was made on the meningitis b vaccine; Haemophilus influenzae b showed the highest completion rate at follow-up. No trends were noted across providers that indicated why some providers had patients with higher immunization rates than others.*

Conclusion: *Pharmacist intervention contributed to an increase in immunization rates in a single immunocompromised patient population that requires a specialized immunization schedule.*

Keywords: immunocompromised host; vaccination; pharmacist, immunization, splenectomy

Background

Pharmacists have proven to have a positive impact on immunization rates and can assist in all areas of the immunization process.[1,2] A pooled analysis of six randomized controlled trials showed that pharmacists serving as educators, administrators, and facilitators of immunizations can have a positive impact on immunization rates.[1] A meta-analysis of eight studies similarly reviewed the impact pharmacists can have on immunization rates. The researchers evaluated a variety of immunizations and vaccination sites and found that pharmacists can have a significant impact depending on the type of vaccine, site of administration, location, and sample size. Additionally, pharmacist-driven initiatives showed an overall risk ratio for immunizations of 2.95.[2]

Asplenic patients have increased risk for infection due to modified immune response. For this reason, the Advisory Committee on Immunization Practices (ACIP) and Centers for Disease Control and Prevention recommend additional vaccinations to improve immunity in these patients.[3,4] Additional vaccines recommended in this population are meningococcal b (MenB), meningococcal conjugate vaccine sub groups ACWY (MenACWY), haemophilus influenzae type b (Hib), pneumococcal vaccines (pneumococcal conjugate 13 (PCV13), and pneumococcal polysaccharide 23 (PPSV23)). The 2022 adult immunization guidelines now include updated recommendations for pneumococcal conjugate 15 and 20 (PCV15 and PCV20).[4]

For unique populations such as asplenic patients, it can be challenging to get up-to-date on immunizations. There are a variety of proposed explanations for these challenges, including timely access to vaccines post-splenectomy, provider awareness of needed vaccines, and changing recommendations.[4,5] A meta-analysis of international literature found that, for specific immunizations recommended in the asplenic population, the immunization rate for individual vaccines ranges from 13.3% (meningococcal b vaccine) to 55.1% (pneumococcal vaccine).[6] Based on the immunocompromising condition and increased risk for infection that asplenic patients have, it is recommended that these patients receive additional vaccinations outside of what is recommended in the routine immunization series.[7]

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Because pharmacists can have a positive impact on immunization effects in the general population, it is important to consider the influence they can have on immunizing unique populations like asplenic patients. A pharmacist-driven electronic tracking tool has been demonstrated to improve immunization rates in asplenic patients in an inpatient trauma center by 10%, which, while not statistically significant for the study, may have broader clinical relevance.[8]

This project evaluated the impact of a pharmacist embedded in a rural clinic delivering a targeted service for asplenic patients on vaccination rates. The patient population for this intervention was all asplenic patients at one rural ambulatory care clinic. This clinic, whose single onsite clinical pharmacist has a 50% time responsibility, is located in rural eastern South Dakota in a town with a population of approximately 22,000. The breakdown of payers for the clinic is roughly 46% Medicare, 46% private/commercial, 4% Medicaid, 3% other, and <1% self-pay. The multi-specialty clinic has 20 providers (the majority are family medicine) who see approximately 80,000 active patients annually who travel from as far as 60 miles away. The pharmacist was asked to devise a project specific for this population because other providers in the clinic recognized challenging gaps in care related to vaccination status for asplenic patients. The clinic electronic health record did not have an automated mechanism to indicate missing immunizations.

Objectives

The primary objective of this project was to determine the effect of pharmacist intervention on the up-to-date immunization status in asplenic patients in a single rural family medicine clinic. Secondary objectives were to evaluate the accuracy of the asplenic patient list after 18 months of service and to identify reasons for gaps in vaccinations in the asplenic patient population.

Service Creation and Description

To identify patients for this service, a report was run in the electronic health record in December 2020 to identify all patients with the diagnosis codes of Q89.01 (asplenia) or Z90.81 (absence of spleen). For all patients on this report, a comprehensive chart review was conducted by the pharmacist to first confirm asplenic diagnosis and then to identify: (1) asplenic-specific vaccines that had been administered in the clinic, and (2) reasons for vaccine administration delays if applicable. The pharmacist also reviewed the state immunization registry for each patient.[9] The asplenic-specific vaccines were defined as those vaccines recommended by ACIP for asplenic patients in addition to those recommended for all adults at the time of the service (MenB, MenACWY, Hib, PCV13, and PPSV23).[4] Of note, PCV15 and PCV20 were approved and recommended for this patient population during this timeframe but were excluded because neither was covered by insurance during the period the study was conducted.

This data was converted into a Microsoft Excel-based spreadsheet tracking tool, which was designed to track patients and the status of their current vaccinations. Patients' vaccines were coded using a red, yellow, and green system. Green indicated a vaccine series was complete, yellow indicated a vaccine was needed or anticipated in the future but not past due (this categorization also included the 'due date' for the vaccine), and red indicated a vaccine was either at or past the vaccine 'due date'. When the spreadsheet was created, the pharmacist provided written education via email to the healthcare team and patient about the immunizations needed for asplenic patients.

In practice, the service consists of (1) the pharmacist reviewing and updating the spreadsheet-based patient data (including color-coding) to determine current vaccine status on a quarterly basis, and (2) updating the spreadsheet longitudinally as patients receive vaccines in-clinic. If a patient is not up-to-date on a vaccine, the pharmacist confirms this status via the patient chart, double-checks the state immunization registry, notifies the provider via email, and contacts the patient or the provider team to arrange an appointment to obtain the vaccine. The pharmacist then updates the spreadsheet at the time immunizations are given. This cyclic process, with the pharmacist reviewing the spreadsheet and contacting providers if patients need or are behind on immunizations, is repeated every three months via a scheduled time block on the pharmacist's calendar. New patients with an asplenia diagnosis can be referred to the service at the time of diagnosis.

Methods

To evaluate this service, a retrospective chart and immunization registry review were completed in Spring 2022 for all patients included in the baseline report (which occurred in December 2020). These reviews were identical to the original used to collect baseline data and included vaccines administered (in clinic or per the immunization registry) and reasons for vaccine administration delays (e.g., 'vaccine hesitancy' listed in the chart). In addition, the patient's primary provider was noted. Descriptive statistics were used to evaluate the data related to vaccine completion and data was also collated and reviewed to identify if differences existed by individual providers related to patient immunization status.

All asplenic patients were categorized by vaccine status using four categories: (1) up-to-date at the time of review, (2) 0-3 months past due, (3) 3-6 months past due, or (4) more than 6 months past due. 'Up-to-date' was defined per vaccine dose, so if a patient was on track to receive a multi-dose series but the next dose was not yet due they would be classified as up-to-date. 'Past due' started at one day post eligibility for the next dose in a series (or first dose of any vaccine that was needed). For single-dose vaccines, 'past due' dates were determined by when the patient should have received the dose based on diagnosis of asplenia, even if the patient came to the clinic with a previous diagnosis.

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To identify patient maintenance in the service, the same report used originally at baseline to identify patients with asplenia was re-run to identify any new patients who would meet criteria to be included in the service. Patients who were no longer receiving care at the clinic compared to the baseline data in December 2020 were identified on the tracking spreadsheet.

Results

A total of 33 patients were identified at baseline for inclusion in this service. Of these, three (9%) were up to date on all vaccines at baseline. Of the 33 asplenic patients in the clinic at baseline, three were lost to follow-up and excluded from follow-up evaluation. Data from the remaining 30 patients were evaluated from the initial assessment through the follow-up period. Of these 30 patients,16 (53.5%) were up-to-date on all vaccines at the point of review. Pharmacist intervention increased the total vaccine completion rate by 44.5% from baseline to follow up.

Three new patients were identified upon the review of the follow-up report of asplenic patients. Of the three new patients, none were up-to-date on immunizations and none had experienced a pharmacist intervention at the time of data collection. At follow-up, a total of 17 of 33 patients (30 from baseline evaluation plus the three new patients) were not up-to-date. Of these, all had at least one vaccine that was more than 6 months past due. Of the patients not up-to-date on all vaccines, all 17 patients (100%) had received at least one of the five reviewed vaccines, but two patients were missing four vaccines, and five patients were missing either one, two, or three vaccines. The majority of patients without up-to-date vaccines had been to the clinic but also had noted vaccine hesitancy on the chart. Hesitancy was most frequently found in chart notes and not as a diagnosis code. No other reasons for gaps in vaccinations were noted from the chart review.

Figure 1 contains the baseline and follow up data for each specific immunization. The biggest improvement in specific immunization status was made on the MenB vaccine: from 9.1% to 48.5% (3/33 to 16/33). Haemophilus influenzae b showed the highest completion rate at follow-up (91%) but also had a high baseline completion rate.

Examination of data from the ten providers who treated asplenic patients showed that one provider had 100% compliance and three providers each had 0% compliance at the end of the study; the providers with 0% compliance saw a total of 9 patients. The average compliance rate for providers with more than a 0% compliance rate was 66.7% (16 of 24 asplenic patients seen by providers without 0% compliance). All providers showed efforts to improve vaccination rates upon review of chart documentation. No identifiable trends were noted regarding providers except that providers with high rates of vaccinations seem to have strong provider-patient relationships. Details regarding provider trends are not presented here to protect provider identity in this rural clinic.

The approximate time to update the spreadsheet for all patients in the service is approximately 2.5 hours every three months. Longitudinal updates take less than a minute per update to review the email or clinic note and update the spreadsheet. Time spent specific to the retrospective chart review (outside of dissemination activities) is estimated at three hours total in addition to usual service-specific duties.

Discussion

The findings demonstrate a marked improvement from baseline in immunization rates and the service appears to be working as intended to support increased vaccination rates in the high-risk asplenic patient population. The results found in this review exceed expectations for pharmacist-driven immunization interventions targeting asplenic patients based on the literature. This service saw a change of 45.3% from baseline, which is notably higher than what is found in the published literature, which is closer to 10% improvement.[8] This distinction may be due to the differences in size of the pharmacy teams at the respective institutions or to the relatively low baseline vaccination rate of the population in this study. Because of the low baseline in the original patient population, the results should be interpreted with caution in clinics that have a different baseline vaccination compliance rate. Certain providers had higher levels of compliance compared to others, but no pattern emerged as to why some providers were more successful than others. Because vaccine hesitancy was noted in charts of patients with low vaccine compliance, it appears that the need for vaccines is being discussed by all providers. Delving further into specific areas of vaccine hesitancy or providing education on approaches to address patient's vaccine hesitancy may be future areas of improvement for this service.

Haemophilus influenzae b vaccine had the highest completion rate likely because it is recommended as a single-dose vaccine in asplenic patients whereas other vaccines need to be dosed more frequently. Although there were improvements, the majority of the patients were not up-to-date with their MenB vaccine series at baseline and follow-up. The MenB vaccination is the most recent vaccination to be added to the recommended immunization schedule for asplenic patients. The low number of patients up-to-date on the MenB vaccine may have also been impacted if they had not had an office visit since the new recommendations were in place or if their physician was not familiar with the new vaccination recommendations for MenB. Additionally, the COVID-19 pandemic likely had an impact on the overall immunization status of patients, as most patients had not been vaccinated or had a clinic visit since the start of the pandemic.

The findings suggest a need for additional education to providers and patients on the requirement of a specialized immunization schedule based on the diagnosis of asplenia. Reviewing the medical record for new asplenia diagnosis on a more frequent basis is also an improvement for this service that

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can be easily added to workflow. The tracking tool could also be more easily utilized if the vaccine data were exported from the medical record into the tracking tool so the tracking did not require a manual update with receipt of each vaccination. Some electronic health record platforms facilitate this functionality, which might be a consideration for other clinics, but it was not present in the platform used at this clinic.

Although this single-site project achieved satisfactory outcomes, it has drawbacks related to the amount of pharmacist time required to complete the process. The time involved in this service is used to review patient data and update the tracking tool every few months, conduct quality checks on the tracking tool to ensure it is updated (e.g., searching multiple places for immunization records), and contacting providers, care teams, and patients to provide education. This service is relatively simple in terms of time for a clinic-embedded pharmacist and the number of patients in this patient population was reasonable for a pharmacist workload in this particular clinic, but the time component could be a restraint for pharmacists embedded in other sites or with different workloads.

While we believe this quality project to be accurate, limitations in the data reviewed are possible due to the design of the service. If patients are asplenic but do not have the correct diagnosis code, or if there is an alternate diagnosis code being used, they may be missed on the reporting tool. If a patient receives a vaccination elsewhere, it could also be missed. While the pharmacist does review the state immunization reporting tool, potential for inaccuracies exists there as well.

It is important to note that, based on the current immunization recommendations, asplenic patients will likely never have their entire vaccine series "completed", as booster doses of some vaccines (e.g., MenB and MenACWY) will always be needed. This spreadsheet-based tracking tool appears to meet the ongoing needs of this service since it is adaptable for evolving vaccine recommendations and real-time insurance coverage. As an example, when insurance providers began to cover newer pneumococcal vaccines after the study timeframe, they were added to the tracking spreadsheet, so the tool can be modified in real-time based on evolving recommendations, insurance coverage, and other factors. Although the current spreadsheet is designed solely to track vaccination needs for asplenic patients, it could be adapted to track vaccine needs for other high-risk patient populations such as those living with other immunocompromised conditions.

Next steps in this project may include expansion to other patient populations such as patients living with HIV, patients with cochlear implants, and patients with other diagnosed immunocompromising conditions. Questions for future inquiry include identifying and addressing vaccine hesitancy or other reasons why certain patients are not up-to-date on their immunizations and why some immunizations seem to present more challenges to get to 'up-to-date' status than others. While vaccine hesitancy education is already provided at the clinic, education related to vaccine hesitancy specifically in adults will be included in the next year. Additionally, collaboration with providers will be sought to identify ways to document more specific factors contributing to vaccine hesitancy so tailored outreach plans can be developed. This service will continue on its current trajectory with a more frequent update for asplenic patients enrolled in the clinic and enhanced education to providers and patients on immunization schedules with the hopes of improving compliance-related metrics.

Conclusion

This study demonstrates that a pharmacist service embedded in a single, rural ambulatory care clinic contributed to increased immunization rates in a single immunocompromised patient population that requires a specialized immunization series. Gaps in patient lists can be remedied with more frequent checks for new patients and additional work is needed to better understand vaccine hesitancy in some patients. Applying the results of this study may provide a method for primary care clinics to increase immunization rates for immunocompromised disease states.

The opinions expressed in this paper are those of the authors.

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Deidra Van Gilder: Conceptualization, Methodology, Formal Analysis, Investigation, Writing - Original Draft, Visualization
Shanna O'Connor: Writing - Review and Editing

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