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Original Study

Impact of an Additional Immunizing Pharmacist at an Interprofessional Student-led Clinic for the Underserved

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Abstract

Background: To streamline workflow during peak influenza season in our weekly student-led free Interprofessional Community Clinic (ICC), an additional pharmacist shift solely responsible for providing immunization services was implemented from October 2018 to February 2019. The objective of this study was to determine the impact of adding an immunizing pharmacist, in addition to a clinical pharmacist, on adherence to Centers for Disease Control and Prevention (CDC) vaccine recommendations and overall immunization rates at ICC.
Methods: A retrospective chart review of patient visits from October 2017 to February 2019 was conducted. Vaccination rates and CDC recommendation adherence were compared to a historical control when an immunizing pharmacist was not scheduled. Chi-square analysis was performed on categorical data; Fisher's exact test was used to assess impact of an immunizing pharmacist on vaccination rates and adherence to CDC recommendations. A p-value of <0.05 was considered statistically significant.
Results: A total of 78 patient visits and 58 unique patients were included. There was a significant increase in the adherence to CDC recommendations for pneumococcal vaccine when an immunizing pharmacist was present ($p=0.02$). There was no significant difference in the adherence to CDC recommendations for all other vaccines and overall vaccine rate between the two groups ($p>0.05$).
Conclusion: Implementation of an immunizing pharmacist in an interprofessional clinic significantly impacts the adherence to CDC recommendations for pneumococcal vaccine without significantly impacting the overall vaccine rate. Benefit of an additional pharmacist dedicated to vaccinations should be weighed for workflow improvement versus impact on vaccine adherence and rate.

Introduction

Immunizations are one of many preventative tools available to ensure better public health. They are also considered an integral part of an individual's health care for their ability to decrease the risk of acquiring immunization preventable diseases and their spread among individuals who are medically unable to receive them. Despite the well-established evidence for their safety and efficacy, the Centers for Disease Control and Prevention (CDC) has not seen a high average of immunization adherence in adults in the United States.[1] The rate of immunization remains even lower in patrons residing in medically underserved areas due to various social, structural and systemic barriers.[2,3] Under the Affordable Care Act, immunizations are covered for insured individuals; however, individuals without insurance may not have adequate access and coverage of immunizations. Student-led free clinics serve as a crucial resource to the underserved community for preventative health care services including immunizations.

Practice Description

The Interprofessional Community Clinic (ICC) is a student-led pro bono clinic at Rosalind Frank-

lin University of Medicine and Science (RFUMS) located in North Chicago, Illinois. Founded in 2013 and operating for four hours one night a week, the clinic serves two main purposes: provide healthcare to underserved patients and train health professional students in interprofessional health care delivery. The ICC provides medical, podiatric, behavioral health, and physical therapy services to adults from neighboring underserved communities. The ICC Medicine Clinic is staffed by interprofessional teams of 3-4 students from various professions (medicine, physician assistant, nursing, pharmacy, physical therapy, podiatry, and psychology) who are supervised by licensed faculty practitioners. The team addresses ongoing medical concerns and executes care plans for preventative health, including immunizations. Current clinic funding allows for the provision of vaccine services to eligible patients at no cost. These vaccines include but are not limited to inactivated influenza, pneumococcal (PPSV23 and PCV13), tetanus (Td and Tdap), hepatitis A and B, human papillomavirus (HPV), and meningococcal. As part of the routine medical visit at ICC, patients are screened and offered vaccinations based on age and medical conditions per the CDC Adult Immunization Schedule.

Approximately ten licensed and trained pharmacists participate in the ICC Medicine Clinic as the lead clinical pharmacist on a rotating basis. Responsibilities of this clinical pharmacist include education regarding current vaccination standards, optimization of pharmacotherapy, drug information provision, and supervision of student pharmacists in performing medication management and counseling services. They also perform several key aspects in provision of immunizations, including screening for indications and precautions, determining the timing and quantity of dosing, administering the vaccine, patient consent and education, and reporting of adverse events. Having received the formal training via American Pharmacist Association's Pharmacy-based Immunization Delivery Certificate in their first professional year, student pharmacists assist in delivering this important health service to ICC patients.

Pharmacists and Immunizations

Numerous publications have demonstrated the impact of pharmacists on vaccine rates and adherence. A 2016 systematic review of 36 studies demonstrated that regardless of pharmacist role, immunization rates increase when a pharmacist is involved in the immunization process.[4] Higginbotham et al. assessed the impact of using a pharmacist immunizer on immunization rates in a primary health care center serving uninsured, low income adults in Pittsburgh, Pennsylvania.[5] Results showed that utilizing an immunizing pharmacist had a significant impact on increasing adult immunization rates and improving patient adherence to immunizations. Additionally, Stilwell et al. performed a similar intervention for low-income, uninsured adults in a free clinic located in Wilmington, North Carolina and demonstrated that this pharmacist driven immunization program resulted in increased rates of immunizations.[6] More than 500 patients eligible for immunizations received a total of 1878 vaccines per the Advisory Committee on Immunization Practices (ACIP) recommendations. The impact of such preventative services in an interprofessional student-led free clinic has not been evaluated thus far.

Practice Innovation

In order to optimize the role of the clinical pharmacist on the interprofessional team and streamline clinic workflow during peak influenza activity period, the ICC added an additional pharmacist shift solely responsible for providing immunization services from October 2018 to February 2019. This additional immunization pharmacist was scheduled for two of the four operating hours of the ICC every week. Responsibilities of the immunizing pharmacist were to perform chart review and assess patients' eligibility for CDC recommended vaccines ahead of patient appointment, discuss the needs for vaccines during interprofessional patient case discussions, supervise student pharmacists in educating patients, obtain consent, prepare doses, administer vaccinations, and complete necessary documentation in the clinic's electronic medical record (EMR). This additional immunizing pharmacist permitted the lead clinical pharmacist to remain with the interprofessional team and assist with other clinical and educational needs. The impact of this immunizing pharmacist on adherence to

CDC vaccine recommendations and overall immunization rates is unknown.

Objective

The primary objective of this study was to evaluate whether staffing an immunizing pharmacist in addition to a clinical pharmacist at a student-led interprofessional community clinic for underserved patients increases adherence to CDC vaccine recommendations as well as overall immunization rates.

Methods

A retrospective chart review was performed for ICC Medicine Clinic patients seen between October 2017 and February 2019. Patient visits from October 2017 to February 2018 were included as a historical control and compared to patient visits from October 2018 to February 2019 when an immunizing pharmacist was on duty. Patient visits were excluded when neither pharmacist was present or the visits were scheduled at other ICC specialty clinics. Patient demographics, medical history, indicated vaccines, documented offer to vaccinate, receipt of vaccination and documented presence of an immunizing pharmacist were collected from the clinic EMR. Each patient visit was evaluated utilizing the corresponding ACIP and CDC recommendations for that given year.[7]

Baseline assumptions considered during data collection included the following: 1) patients were assumed to be indicated for immunizations if no documented history of an immunization was recorded; 2) if the EMR indicated completion of all the required vaccinations per patient self-reporting, vaccines were marked as not indicated; 3) both types of pneumococcal vaccines were combined into one category; 4) vaccinations with lower volume, such as hepatitis A, HPV and meningitis were categorized as 'other'; 5) live zoster, recombinant zoster, and measles mumps rubella immunizations were excluded from evaluation as either the ICC is unable to offer these vaccines due to cost or patients are assumed to have received them as part of childhood vaccines. This study was approved by the Institutional Review Board at RFUMS.

Statistical Analysis

Categorical variables were summarized as frequencies and percentages and compared using a Pearson's Chi-square test. Fisher's exact test was used to assess the differences in vaccination rates and adherence to immunization guidelines between the group with an immunizing pharmacist present and the historical control. A two-sided p-value was reported for each test using a p-value less than 0.05 to determine statistical significance. All analyses were conducted using IBM SPSS Statistics for Windows (version 26, IBM Corp, Armonk, NY, USA).

Results

A total of 78 patient visits were screened with 58 unique patients included in the analysis. Table 1 describes pertinent population demographics. The study population included predominantly Hispanic females with an average age of 48.5 years. Most patients had several comorbidities with diabetes (25.8%) listed as the second highest primary reason for the visit.

A total of 20 visits with the presence of an immunizing pharmacist was compared to 58 visits in the historical cohort with no immunizing pharmacist present. The percent of vaccine needs identified and offered for all vaccines was higher in the immunizing pharmacist group versus the historical control (21%-64% versus 0%-53%). The overall rate of vaccine administration was 55% in the immunizing pharmacist cohort versus 36% in the historical control (p=0.14).

Table 1. Significant population demographics

Characteristics	Frequency, N=58 (%)
Demographics	
Age (40-50 years)	20 (34.5)
Female	39 (67.2)
Hispanic	55 (94.8)
Obese	24 (41.4)
Primary Visit Reason	
Diabetes	15 (25.8)
Musculoskeletal issue	11 (18.9)
Hypertension	6 (10.3)
Dyslipidemia	5 (8.6)
Other	21 (36.2)

Table 2. Impact of immunizing pharmacist on vaccines

Vaccine	Immunizing Pharmacist Present, N=20 (%)	Historical Control, N=58 (%)	P-value
Influenza			
Indicated	14 of 20 (70)	38 of 58 (66)	0.79
Offered	9 of 14 (64)	20 of 38 (53)	0.54
Received	8 of 9 (89)	15 of 20 (75)	0.63
Pneumococcal			
Indicated	8 of 20 (40)	32 of 58 (55)	0.30
Offered	4 of 8 (50)	3 of 32 (9)	0.02*
Received	2 of 4 (50)	2 of 3 (67)	1.00
Td/Tdap†			
Indicated	14 of 20 (70)	44 of 58 (76)	0.77
Offered	3 of 14 (21)	5 of 44 (11)	0.39
Received	1 of 3 (33)	4 of 5 (80)	0.46
Hepatitis B			
Indicated	4 of 20 (20)	22 of 58 (38)	0.18
Offered	1 of 4 (25)	0	0.15
Received	0	0	-
Other‡			
Indicated	2 of 20 (10)	0	-
Offered	1 of 2 (50)	0	-
Received	0	0	-

**P-value <0.05 considered statistically significant.*
†Tetanus, Diphtheria, and Pertussis
‡Lower volume vaccines such as hepatitis A, HPV and meningitis, etc.

Table 2 demonstrates the impact of an immunizing pharmacist per vaccine. Number of pneumococcal vaccines offered was significantly higher in the immunizing pharmacist group compared to the historical control group (50% versus 9%, p=0.02). The difference was not significant for receipt of pneumococcal vaccine. More influenza vaccines were offered and received when an immunizing pharmacist was present, 64% versus 53% and 89% versus 75% respectively, but this difference was not statistically significant (p=0.55 and 0.63). Similarly, the presence of an immunizing pharmacist resulted in more Td/Tdap and hepatitis B vaccines being offered, 21% versus 11% and 25% versus none, but these differences were not statistically significant (p=0.39 and 0.15). There were no patients who received hepatitis B vaccine in either of the cohorts. Numerically more patients were identified and offered vaccines in the 'other' category when an immunizing pharmacist was present, but there were no such patients identified in the historical control group.

Discussion

This study demonstrated that the addition of a second pharmacist dedicated to the provision of immunizations did not improve the overall rate of immunizations but did significantly improve the adherence to CDC guidelines by identifying and offering more patients the pneumococcal vaccine.

Overall vaccine rate in the immunizing pharmacist group was higher than that in the historical control group; however, this finding failed to show statistical significance. The addition of an immunizing pharmacist also increased the percentage of patients offered and administered the influenza vaccine, Td/Tdap and hepatitis B. Despite the failure to demonstrate a statistically significant different, a 14% higher influenza vaccine administration in the immunizing pharmacist group, is a clinically significant finding as an increase in influenza vaccination by 5% has shown to decrease influenza-related hospitalizations by

4,000-10,000.[8] Although the number of patients in this study is much smaller, this positive trend may justify the addition of an immunizing pharmacist in order to impact vaccine-related outcomes.

The presence of an immunizing pharmacist increased the identification of patients indicated for pneumococcal vaccine—a vaccine patients and prescribers may be less familiar with. As this vaccine requires shared clinical decision making and may also incur a significant cost to our patients if received at a community pharmacy, the administration of this vaccine at a student-led free clinic can improve access. The immunizing pharmacist is able to lead the decision making in an interprofessional team in a timely manner and offer this vaccine free of charge to our patients. Authors recognize that the receipt of the vaccine did not change with the presence of an immunizing pharmacist. Several possible reasons may be attributed to this finding: 1) the pharmacist is not directly involved with the offering of the vaccine which may impact delivery of this recommendation and 2) patient autonomy, despite our best efforts, can still be a barrier to actually receiving a vaccine.

A historical control was selected rather than a concurrent control to avoid crossover bias when the immunizing pharmacist service was implemented. As an immunizing pharmacist was not present at every ICC shift, this helped to eliminate any bias that could have been introduced if a provider's knowledge base and clinical decisions were impacted after working with an immunizing pharmacist. Although results cannot be attributed to the presence of an immunizing pharmacist with certainty without the use of a true control, there were no other significant process changes that could have contributed to these findings.

Authors recognize the limitations of this study. A small sample size may have led to inadequate power to detect a difference amongst groups. Immunizing pharmacist shifts were only two-hour shifts and given the voluntary participation, not all the shifts were filled every time the clinic was in operation, contributing to the small sample size of the intervention group. Further, documentation was done primarily by first to third year health professions students who were supervised by clinicians with varying degrees of comfort with the EMR. This led to variations in documentation, recording of vaccine offers and more importantly vaccine refusals which were not consistently and routinely documented. This might very well be the reason why vaccine offers did not align with vaccine indication for patients; documentation processes therefore need to be improved at the clinic. Lastly, the study included a retrospective chart review with a small number of vaccines which limited random sampling. Despite these limitations, some being specific to the way how our clinic functions and how the immunizing pharmacist's shifts were scheduled, this study was among the first to evaluate the impact of such an intervention on immunization rates and adherence to CDC guidelines in a student-led interprofessional clinic.

Given the small difference in vaccine rates between the two groups, individual clinics will have to determine the utility of an additional immunizing pharmacist position. At our clinic, the immunizing pharmacist position allowed the clinical pharmacist to remain with the interprofessional clinic team for other clinical and educational functions. Even though it failed to show significant impact on vaccination rates, our clinic will consider continuing this position for peak influenza season to help improve clinical workflow. In the future, the clinic will consider 1) measuring impact of an immunizing pharmacist in subsequent years with an aggregate of a larger sample size; 2) evaluating an immunizing pharmacist's impact on vaccine related knowledge and behaviors among interprofessional student and faculty practitioner teams; and 3) standardizing documentation of vaccine eligibility, offer and refusal.

Overall, this study demonstrates that the addition of a pharmacist solely responsible for immunization services in addition to a clinical pharmacist on the interprofessional team significantly increases adherence to CDC recommendations for those indicated for pneumococcal vaccine; however, it does not significantly impact the adherence to CDC recommendations for all other vaccine or rate of vaccine administration in general. For our clinic, the intent of adding the immunizing pharmacist was to optimize the role of the clinical pharmacist on the interprofessional team and streamline clinic workflow during high

vaccine administration periods such as influenza season. Although not formally evaluated in this study, the addition of the immunizing pharmacist did achieve this goal. Our clinic provides care to an underserved and uninsured population who otherwise would not have access to vaccines; therefore, it is important that all efforts be made to continue to offer such preventative health services. While there may be a similar goal for other student-led free clinics, pharmacist time and efforts should be weighed against the potentially small benefit of impacting vaccine adherence and rates.

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Disclosures

The authors have no conflicts of interest to disclose.

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