Enhancing Vaccine Uptake in Hospitalized Patients: The Critical Role of Pharmacists in Promoting Influenza and Pneumococcal Immunization

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Abstract

This study evaluates the role of pharmacists in promoting immunization efforts within a large tertiary hospital, focusing on influenza and pneumococcal vaccines. A prospective cohort study involving 1,000 hospitalized patients found that pharmacist-led interventions significantly increased vaccination rates for influenza (from 45% to 75%) and pneumococcal vaccines (from 35% to 65%). Patient acceptance improved, with vaccine refusal rates decreasing from 20% to 10%. Additionally, these interventions led to a reduction in vaccine-preventable infections, shorter hospital stays, and lower 30-day readmission rates. The findings underscore the critical role of pharmacists in enhancing immunization coverage and improving patient outcomes in hospital settings.

Keywords: Pharmacists, immunization, hospital settings, influenza vaccine, pneumococcal vaccine, patient outcomes, vaccine acceptance

Introduction

Immunization is a cornerstone of public health, significantly reducing the burden of vaccine-preventable diseases such as influenza and pneumococcal infections. These diseases are particularly concerning in hospitalized patients, who are often more vulnerable due to underlying health conditions, advanced age, or weakened immune systems (Centers for Disease Control and Prevention [CDC], 2020). Despite the well-documented benefits of vaccination, immunization rates in hospital settings remain suboptimal, leaving many patients at risk for severe complications, prolonged hospital stays, and increased mortality (Amodio et al., 2014).

Pharmacists, with their extensive knowledge of pharmacotherapy and direct patient care, are uniquely positioned to lead immunization efforts within hospital settings. Their role extends beyond traditional pharmacy duties to include patient education, identification of eligible patients, and administration of vaccines. Studies have shown that pharmacist-led immunization programs can significantly increase vaccine uptake, particularly for influenza and pneumococcal vaccines, which are critical for preventing respiratory infections in hospitalized patients (Hurley et al., 2014).

The integration of pharmacists into hospital-based immunization programs is an effective strategy for overcoming barriers to vaccination, such as missed opportunities, patient hesitancy, and lack of awareness among healthcare providers. By actively promoting immunization and ensuring that vaccines are administered

during hospital stays, pharmacists can play a crucial role in reducing the incidence of vaccine-preventable diseases, improving patient outcomes, and supporting public health goals (Rosini et al., 2020).

This study aims to examine the role of pharmacists in promoting and administering influenza and pneumococcal vaccines in hospitalized patients. By evaluating the impact of pharmacist-led immunization efforts, this research seeks to provide evidence-based recommendations for enhancing vaccine uptake and optimizing immunization practices in hospital settings.

Literature Review

Immunization Rates in Hospitalized Patients

Immunization, particularly against influenza and pneumococcal diseases, is a critical preventive measure for hospitalized patients, who are often at increased risk for severe complications from these infections. However, despite the availability of vaccines, immunization rates among hospitalized patients remain lower than desired. Studies have consistently shown that a significant proportion of eligible patients do not receive recommended vaccines during hospital stays, leading to missed opportunities for disease prevention (Amodio et al., 2014). Barriers to vaccination in hospital settings include logistical challenges, lack of coordination between healthcare providers, and limited awareness among patients and staff regarding the importance of vaccination (Hurley et al., 2014).

Impact of Immunization on Hospitalized Patients

The benefits of immunization for hospitalized patients are well-documented. Influenza vaccination, for instance, has been shown to reduce the incidence of influenza-related complications, decrease the length of hospital stays, and lower mortality rates among high-risk patients (Nichol et al., 2003). Similarly, pneumococcal vaccination is effective in preventing invasive pneumococcal disease, which can lead to serious outcomes such as pneumonia, meningitis, and bacteremia, particularly in elderly and immunocompromised individuals (Moberley et al., 2013). By ensuring that hospitalized patients receive these vaccines, healthcare providers can significantly improve patient outcomes and reduce the burden on healthcare systems.

Pharmacists' Role in Immunization

Pharmacists have emerged as key players in promoting immunization, not only in community settings but also within hospitals. Their expertise in pharmacotherapy and patient care, combined with their accessibility and trustworthiness, positions them uniquely to lead vaccination efforts. Pharmacists can identify patients who are eligible for vaccination, provide education on the benefits of immunization, and directly administer vaccines (Rosini et al., 2020). In hospital settings, pharmacists often collaborate with other healthcare providers to ensure that vaccines are incorporated into routine patient care, particularly for those at high risk for complications from vaccine-preventable diseases.

The involvement of pharmacists in immunization programs has been associated with increased vaccine uptake and improved vaccination rates. For example, a study by Hurley et al. (2014) found that pharmacist-led interventions, including patient education and vaccine administration, significantly increased influenza vaccination rates among hospitalized patients. Pharmacists' ability to provide comprehensive medication

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reviews and assess potential contraindications also contributes to safer and more effective immunization practices.

Barriers and Facilitators to Immunization in Hospitals

Several factors influence the success of immunization efforts in hospital settings. Barriers to vaccination include lack of awareness among healthcare providers and patients, concerns about vaccine safety, and logistical challenges such as the timing of vaccine administration during hospital stays (Hurley et al., 2014). Additionally, the fragmentation of care in hospitals can lead to missed opportunities for vaccination, particularly if there is no clear responsibility assigned for assessing and administering vaccines.

On the other hand, facilitators of successful immunization programs include strong institutional support, the integration of vaccination protocols into hospital workflows, and the involvement of dedicated healthcare professionals such as pharmacists. Education and training for healthcare staff on the importance of vaccination and strategies to address patient hesitancy can also enhance vaccine uptake (Amodio et al., 2014). The use of electronic health records (EHRs) to track vaccination status and identify eligible patients has been shown to improve vaccination rates by providing timely reminders to healthcare providers (Vann et al., 2018).

Evidence of Pharmacist-Led Immunization Programs

Research has demonstrated the effectiveness of pharmacist-led immunization programs in increasing vaccine coverage among hospitalized patients. For example, a study conducted by Steyer et al. (2004) showed that implementing a pharmacist-driven immunization protocol in a hospital setting led to a significant increase in pneumococcal vaccination rates among eligible patients. Similarly, pharmacist-led interventions have been associated with higher influenza vaccination rates, particularly when pharmacists are involved in patient education and directly administering vaccines (Rosini et al., 2020).

These studies highlight the potential of pharmacists to address gaps in immunization coverage and to play a critical role in public health efforts within hospital settings. By leveraging their expertise and patient interactions, pharmacists can ensure that vaccines are administered efficiently and effectively, thereby reducing the incidence of vaccine-preventable diseases and improving overall patient outcomes.

Gaps in the Literature

While the existing literature provides strong evidence of the benefits of pharmacist-led immunization programs, several gaps remain. Most studies have focused on specific vaccines, such as influenza and pneumococcal vaccines, leaving a need for research on pharmacists' roles in promoting other vaccines recommended for hospitalized patients, such as hepatitis B and Tdap (tetanus, diphtheria, and pertussis). Additionally, there is limited research on the long-term impact of pharmacist-led immunization efforts on patient outcomes, such as the reduction in hospital readmissions or healthcare costs associated with vaccine-preventable diseases.

Furthermore, research is needed to explore the barriers to wider implementation of pharmacist-led immunization programs in hospitals, particularly in settings with limited resources or where pharmacists are not yet fully integrated into the healthcare team. Future studies could also examine the impact of emerging

technologies, such as digital health tools and EHRs, on enhancing the effectiveness of pharmacist-driven immunization efforts.

The literature strongly supports the role of pharmacists in promoting immunization in hospital settings, particularly for influenza and pneumococcal vaccines. Pharmacist-led interventions have been shown to increase vaccine uptake, improve patient outcomes, and support broader public health goals. However, there is a need for further research to address gaps in the literature and to explore new strategies for optimizing the role of pharmacists in hospital-based immunization programs. As the healthcare landscape continues to evolve, the integration of pharmacists into immunization efforts will be essential for enhancing patient care and preventing the spread of vaccine-preventable diseases.

Methodology

Study Design

This study employed a prospective cohort design to evaluate the effectiveness of pharmacist-led immunization initiatives in promoting the uptake of influenza and pneumococcal vaccines among hospitalized patients in a large tertiary hospital. The research was conducted over a 12-month period, from January 2022 to December 2022, and focused on assessing the impact of these initiatives on vaccine administration rates, patient acceptance, and overall patient outcomes.

Setting

The study was conducted at a large tertiary hospital located in an urban area, known for its comprehensive range of medical services and a high volume of inpatient admissions. The hospital has a well-established pharmacy department, where clinical pharmacists are integral members of the multidisciplinary care teams. The immunization initiatives were implemented across multiple hospital units, including general medical wards, surgical units, and intensive care units (ICUs).

Population and Sample

The study population consisted of adult patients (aged 18 years and older) who were admitted to the hospital during the study period and were eligible for influenza or pneumococcal vaccination based on national immunization guidelines. Inclusion criteria included patients with underlying health conditions such as chronic respiratory disease, diabetes, cardiovascular disease, or immunocompromised status, which increased their risk of complications from influenza or pneumococcal infections. Exclusion criteria included patients with contraindications to vaccination, those who had already received the relevant vaccines within the recommended time frame, and those who declined participation in the study.

A total of 1,000 patients met the inclusion criteria and were enrolled in the study through consecutive sampling. The sample was representative of the diverse patient population typically seen in the hospital, including a wide range of ages, comorbidities, and levels of health literacy.

Pharmacist-Led Interventions

The pharmacist-led immunization initiatives were the central intervention in this study and included the following key components:

1. Patient Screening and Identification: Pharmacists conducted daily reviews of electronic health records (EHRs) to identify patients eligible for influenza and pneumococcal vaccination. Automated alerts were integrated into the EHR system to notify pharmacists of eligible patients upon admission.

2. Patient Education and Counseling: Pharmacists provided individualized education to patients about the benefits and potential risks of vaccination, addressing common misconceptions and concerns. Educational materials were also distributed, including brochures and posters placed in patient rooms and common areas.

3. Vaccine Administration: Pharmacists were authorized to administer vaccines directly to patients at the bedside. In cases where vaccines were not immediately available, pharmacists coordinated with the hospital's pharmacy and nursing staff to ensure timely administration.

4. Collaboration with Healthcare Teams: Pharmacists worked closely with physicians, nurses, and infection control teams to integrate vaccination into the standard care protocols for eligible patients. This collaboration included regular communication during multidisciplinary rounds and updates in the EHR to reflect vaccination status.

5. Follow-Up and Documentation: Pharmacists documented all vaccinations in the EHR and provided followup to ensure that any adverse reactions were promptly addressed. Additionally, they reported vaccination outcomes to the hospital's infection control committee and contributed to ongoing quality improvement initiatives related to immunization.

Data Collection

Data were collected prospectively from the hospital's EHR system and pharmacy records. The data included patient demographics (age, gender, comorbidities), vaccination status (pre- and post-intervention), reasons for vaccine refusal (if applicable), and any adverse events following vaccination. Data on patient outcomes, including incidence of influenza or pneumococcal infection during hospitalization, length of hospital stay, and readmission rates, were also collected.

The primary outcome measure was the rate of vaccine administration among eligible patients, comparing rates before and after the implementation of pharmacist-led interventions. Secondary outcomes included patient acceptance of vaccines, incidence of vaccine-preventable infections during hospitalization, and the impact of vaccination on length of hospital stay and readmission rates.

Data Analysis

Quantitative data were analyzed using descriptive and inferential statistics. Descriptive statistics summarized patient demographics, vaccination rates, and patient outcomes. The effectiveness of pharmacist-led interventions was assessed by comparing vaccination rates before and after the intervention using chi-square tests for categorical variables and t-tests for continuous variables.

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A logistic regression analysis was conducted to identify factors associated with vaccine uptake, including patient demographics, comorbidities, and the presence of pharmacist interventions. The impact of vaccination on clinical outcomes, such as the incidence of vaccine-preventable infections and length of hospital stay, was analyzed using multivariate regression models, adjusting for potential confounders.

Ethical Considerations

The study was approved by the ethics committee. Informed consent was obtained from all patients prior to their participation in the study. Patients were assured that their decision to participate or decline would not affect their standard of care. All data were de-identified to ensure patient confidentiality and privacy. The study adhered to ethical guidelines for research involving human subjects, ensuring the protection of patient rights and data security.

Findings

Patient Demographics and Clinical Characteristics

The study included 1,000 hospitalized patients who were eligible for influenza or pneumococcal vaccination during the 12-month study period. The demographic and clinical characteristics of the patients are summarized in Table 1. The mean age of the patients was 65.8 years (SD = 13.4), with a slightly higher proportion of males (53%). The majority of patients had at least one chronic condition, with diabetes (38%) and chronic obstructive pulmonary disease (COPD) (25%) being the most common.

Characteristic	Value		
Total Patients (n)	1,000		
Age (mean ±SD, years)	65.8 ±13.4		
Gender (% male)	53%		
Common Comorbidities (%)			
- Diabetes	38%		
- COPD	25%		
- Cardiovascular Disease	30%		

Table 1. Patient Demographics and Clinical Characteristics

Impact of Pharmacist-Led Interventions on Vaccination Rates

The primary outcome of the study was the rate of vaccine administration among eligible patients before and after the implementation of pharmacist-led interventions. Prior to the intervention, the vaccination rate for influenza was 45%, and for pneumococcal vaccines, it was 35%. After the pharmacist-led initiatives were implemented, the vaccination rates increased significantly to 75% for influenza and 65% for pneumococcal vaccines (p < 0.01 for both). These results are summarized in Table 2.

Tuble 2. Vaccination Rates Defote and Titter Fnannaelst Eed Interventions					
Vaccine Type	Pre-Intervention (%)	Post-Intervention (%)	p-value		
Influenza	45%	75%	< 0.01		
Pneumococcal	35%	65%	< 0.01		

Table 2. Vaccination Rates Before and After Pharmacist-Led Interventions

Statistically significant at p < 0.01.

Patient Acceptance of Vaccines

The study also evaluated patient acceptance of vaccines, which was an important factor in the success of the pharmacist-led interventions. The rate of vaccine refusal decreased from 20% pre-intervention to 10% post-intervention (p < 0.05). The primary reasons for vaccine refusal before the intervention included concerns about vaccine safety (50%), lack of perceived need (30%), and fear of needles (20%). After the intervention, these concerns were significantly mitigated through pharmacist-led education and counseling, as shown in Table 3.

Table 3. Reasons for Vaccine Refusal Before and After Pharmacist-Led Interventions

Reason for Refusal	Pre-Intervention (%)	Post-Intervention (%)	p-value
Concerns about Vaccine Safety	50%	20%	< 0.05*
Lack of Perceived Need	30%	15%	< 0.05*
Fear of Needles	20%	10%	< 0.05*

*Statistically significant at p < 0.05.

Impact on Patient Outcomes

Secondary outcomes included the incidence of influenza or pneumococcal infections during hospitalization, length of hospital stay, and readmission rates within 30 days. The incidence of vaccine-preventable infections decreased from 10% pre-intervention to 4% post-intervention (p < 0.05). Additionally, the average length of hospital stay was reduced from 12.4 days (SD = 3.2) to 10.7 days (SD = 2.8) (p < 0.05), and the 30-day readmission rate decreased from 15% to 10% (p < 0.05). These findings are presented in Table 4.

Table 4. Impact of Pharmacist-Led Interventions on Patient Outcomes

Outcome	Pre-Intervention (n =	Post-Intervention (n =	p-value
	1,000)	1,000)	
Incidence of Vaccine-	10%	4%	< 0.05*
Preventable			
Infections (%)			
Average Length of	12.4 ±3.2	10.7 ±2.8	< 0.05*
Stay (days)			
30-Day Readmission	15%	10%	< 0.05*
Rate (%)			

*Statistically significant at p < 0.05.

Discussion

The results of this study provide strong evidence for the critical role that pharmacists play in promoting immunization within hospital settings. The significant increase in vaccination rates for both influenza and pneumococcal vaccines following pharmacist-led interventions highlights the effectiveness of these initiatives in addressing the challenges associated with vaccine uptake among hospitalized patients.

Increased Vaccination Rates

One of the most noteworthy findings of this study is the substantial increase in vaccination rates following the implementation of pharmacist-led interventions. The influenza vaccination rate increased from 45% to 75%, and the pneumococcal vaccination rate rose from 35% to 65% (p < 0.01 for both). These improvements are particularly significant given the historically low vaccination rates among hospitalized patients, who are often at higher risk for severe complications from vaccine-preventable diseases (Amodio et al., 2014). The success of these interventions underscores the importance of integrating pharmacists into immunization efforts, particularly in identifying eligible patients and ensuring that vaccines are administered efficiently and effectively.

Improved Patient Acceptance

Another key outcome of this study is the significant improvement in patient acceptance of vaccines. The rate of vaccine refusal decreased from 20% to 10% (p < 0.05) following pharmacist-led education and counseling. The primary reasons for vaccine refusal—concerns about vaccine safety, lack of perceived need, and fear of needles—were effectively addressed through targeted educational interventions. This finding aligns with previous research that has demonstrated the effectiveness of pharmacists in overcoming vaccine hesitancy and enhancing patient understanding of the benefits and safety of vaccines (Hurley et al., 2014). By providing personalized education and addressing individual concerns, pharmacists can play a pivotal role in increasing patient willingness to receive recommended vaccines.

Impact on Patient Outcomes

The study also found that pharmacist-led immunization efforts had a positive impact on patient outcomes. The incidence of vaccine-preventable infections decreased from 10% to 4% (p < 0.05), highlighting the protective effect of increased vaccine coverage. Additionally, the reduction in average length of hospital stay from 12.4 to 10.7 days and the decrease in 30-day readmission rates from 15% to 10% (p < 0.05 for both) suggest that improved immunization rates contribute to better overall patient health and more efficient use of healthcare resources.

These findings are consistent with the broader literature, which has shown that vaccination is an effective strategy for reducing the burden of infectious diseases, decreasing hospitalizations, and improving patient outcomes (Nichol et al., 2003; Moberley et al., 2013). The ability of pharmacists to enhance vaccine uptake in hospitalized patients not only benefits individual patients but also supports public health efforts to prevent the spread of infectious diseases within healthcare facilities.

Implications for Clinical Practice

The findings of this study have several important implications for clinical practice. First, they underscore the need for hospitals to actively involve pharmacists in immunization programs. Pharmacists are well-positioned to lead these efforts due to their expertise in medication management, their direct interactions with patients, and their ability to collaborate with other healthcare providers.

Second, the study highlights the importance of implementing systematic processes for identifying eligible patients and ensuring that vaccines are offered and administered as part of routine care. The integration of electronic health record (EHR) alerts, regular multidisciplinary rounds, and pharmacist-led education sessions were key components of the successful implementation of this initiative. These strategies can be adopted by other healthcare institutions to enhance their own immunization efforts.

Third, the study suggests that pharmacist-led immunization initiatives can lead to broader improvements in patient care, including reduced infection rates, shorter hospital stays, and lower readmission rates. These outcomes not only improve patient health but also contribute to cost savings and more efficient use of hospital resources.

Challenges and Opportunities

While the study demonstrates the effectiveness of pharmacist-led immunization efforts, it also highlights some challenges. For example, despite the significant improvements, a proportion of patients still refused vaccination. Addressing the remaining barriers to vaccine acceptance, such as deeply held misconceptions or cultural beliefs, will require ongoing education and communication efforts.

Additionally, the study was conducted in a single tertiary hospital, which may limit the generalizability of the findings to other settings. Hospitals with different patient populations, resource levels, or healthcare practices may experience different challenges and outcomes. Future research could explore the impact of pharmacist-led immunization efforts in a variety of hospital settings, including community hospitals and long-term care facilities.

Limitations

Several limitations of this study should be acknowledged. The study was conducted in a single tertiary hospital, which may limit the generalizability of the findings. Additionally, the reliance on self-reported data for reasons for vaccine refusal introduces the potential for reporting bias. Finally, the study focused on short-term outcomes; longer-term follow-up would be necessary to assess the sustained impact of increased immunization rates on patient health and hospital resource utilization.

Conclusion

In conclusion, this study demonstrates the significant impact of pharmacist-led interventions on promoting immunization among hospitalized patients. By increasing vaccination rates, improving patient acceptance, and enhancing patient outcomes, pharmacists play a critical role in supporting public health initiatives and improving the quality of care in hospital settings. As the healthcare landscape continues to evolve, the integration of pharmacists into immunization efforts will be essential for achieving higher vaccine coverage

and preventing the spread of infectious diseases within healthcare facilities. Further research is needed to explore the long-term impact of these interventions and to identify strategies for overcoming remaining barriers to vaccine acceptance.

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