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Assessing the Impact of a Pharmacy Provided Personalized Vaccination Recommendation on Immunization Rates of Adolescents

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Assessing the Impact of a Pharmacy Provided Personalized Vaccination Recommendation on Immunization Rates of Adolescents

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Abstract

Background: Adolescents should receive timely doses of recommended vaccinations. The coronavirus disease 2019 (COVID-19) vaccination approval for adolescents presented an opportunity for community pharmacists to address gaps in adolescent immunization schedules.

Objectives: The objectives of this research were to: (1) identify adolescent immunization gaps, (2) identify number of patients receiving recommended vaccination(s) at the community pharmacy, (3) determine how many vaccinations were administered after the intervention.

Methods: Three pharmacies conducted the prospective intervention. Adolescents 11-17 years old initiating the Pfizer COVID-19 vaccination series were eligible to receive a personalized vaccination recommendation (PVR) which included up to three other vaccinations. State immunization information systems were assessed after dose one of the COVID-19 vaccine to create the recommendation(s) and reassessed six months after providing the PVR for accepted recommendations. Patient demographics and number of vaccinations administered were assessed using descriptive statistics.

Results: Of 225 adolescents who received COVID-19 vaccine dose one, 74.7%, 75.1%, and 83.1% were indicated to receive tetanus, diphtheria, and acellular pertussis (Tdap), meningococcal conjugate (MenACWY), or human papillomavirus (HPV) vaccine, respectively. Thirty-three (14.7%) adolescents were up to date on all three vaccinations assessed. Of the 225 adolescents, 180 returned to the same location for COVID-19 vaccine dose two and received a PVR. Forty-two caregivers reported their adolescent previously received one or more of the recommended vaccinations indicating that state immunization information systems were inaccurate. Six months after the PVRs were given, 24 vaccinations had been administered.

Conclusion: A majority of adolescents presenting for a COVID-19 vaccine were indicated, according to state immunization information systems, to receive at least one additional vaccination. Following pharmacist-provided PVR and education, vaccine uptake occurred. Considering caregiver-reported inaccuracies, pharmacists should be cognizant of potential discrepancies when providing PVRs. Additionally, this study highlights the value of a state immunization information system.

Key Words: Adolescent, Immunization Schedule, COVID-19 Vaccines, Information Systems, Community pharmacy

Key Points:

What was already known:

- COVID-19 pandemic has impacted availability of in-person appointments in which adolescents may receive vaccinations
- Adolescent vaccination rates in Kansas and Missouri are lower than national averages and suboptimal for age-appropriate vaccinations recommended by the Centers for Disease Control and Prevention
- Immunization information systems are available resources for healthcare professionals to develop vaccination recommendations

What this study adds:

- Adolescent vaccine uptake was observed following a pharmacist-provided personalized vaccination recommendation with accompanying education material
- Pharmacists in the community setting are poised to promote vaccine uptake and capitalize on vaccination series for adolescents using individualized vaccine recommendations and education material

Abbreviations

Personalized vaccination recommendation (PVR)

Centers for Disease Control and Prevention (CDC)

Tetanus, diphtheria, and acellular pertussis (Tdap)

Meningococcal conjugate (MenACWY)

Human papillomavirus (HPV)

Coronavirus disease 2019 (COVID-19)

Background

In Kansas and Missouri, the vaccination rates amongst the adolescent population are suboptimal. As recommended by the Centers for Disease Control and Prevention (CDC), adolescents should receive timely doses of routinely recommended vaccinations.[1] In particular, adolescents are indicated to receive vaccinations that protect against tetanus, diphtheria, and acellular pertussis (Tdap), meningococcal conjugate (MenACWY), and human papillomavirus (HPV).[1]

Vaccination is important to reduce an adolescent's risk of disease and associated complications.[2] Tetanus results in about 30 cases annually in the United States, of which nearly all were an individual who did not receive recommended tetanus vaccinations.[2] Infection with tetanus can result in serious symptoms including inability to open the mouth and difficulty swallowing or breathing with the potential to have significant complications of laryngospasm, fractures, and infections.[2] Prior to available vaccinations, 100,000-200,000 cases of diphtheria occurred and approximately 14,000 deaths were reported annually.[3] Since vaccinations, diphtheria is no longer a leading cause of childhood death in the United States. The rare occurrence of tetanus and diphtheria is encouraging; however, pertussis remains a more frequent occurrence.[4] Data in the United States from 2013-2017 revealed 7,522 cases of pertussis in the adolescent population, in which hospitalization rate is approximately 0.8%.[5,6]

Despite this, in 2020, the estimated Tdap vaccination coverage in Kansas was 89% and 84% in Missouri which is below the HealthyPeople2020 goal and national coverage estimate of 90%.[5,7]

In 2019, 375 cases of meningococcal disease were reported in the United States. Fortunately this number is relatively low since even with treatment, meningococcal disease is fatal for 10-15% of individuals and up to 20% of survivors will suffer long-term disabilities.[8] Moreover, about one in 20 cases can lead to an outbreak which can negatively impact the affected population.[8] The MenACWY vaccine can help to protect adolescents from invasive meningococcal disease and any associated long term complications. Estimated vaccination rates against meningococcal disease in 2020 for Kansas was 83% and Missouri was 85% which are both less than the estimated national average of 89%.[7]

The vaccination to protect against HPV is a nine valent vaccine. From 2013 to 2016, 15% of individuals aged 20 to 34 were positive for one or more HPV types prevented by this available vaccine.[9] Yet, in 2020, up-to-date HPV vaccination coverage for male and female adolescents aged 13-17 years old in Kansas and Missouri was 53%, below the national average of 59%.[7] Both states are well below the HealthyPeople2030 goal for 80% of adolescents to be vaccinated against HPV.[10] HPV can lead to anal, cervical, oropharyngeal, penile, vaginal and vulvar cancer. Annually, there are an estimated 34,800 cancer cases resulting from HPV; increasing HPV vaccination rates can be impactful considering 92% of these cancer cases are preventable by vaccination.[11]

The reduction of in-person doctor office visits during the coronavirus disease 2019 (COVID-19) pandemic due to infection or risk of exposure was likely a contributing factor to the reduction in adolescents receiving age-appropriate vaccinations.[12,13] Data assessing vaccinations in the adolescent age group indicated a drastic decline in vaccinations in 2020, by as much as 84% when compared to 2018-2019.[14] Improving these vaccination rates can help to protect the adolescent population from contracting tetanus, diphtheria, pertussis, meningococcal disease, and human papillomavirus. Community pharmacists are accessible healthcare

professionals that can serve as vaccinating providers for this population. The 2021-22 influenza season highlighted the scope of pharmacists as vaccinators with 40.4 million individuals receiving an influenza vaccine at a pharmacy compared to 30.8 million at a physician's office.[15] Pharmacists are well equipped to provide vaccination services to the adolescent population in the community setting, in turn supporting pediatricians and other vaccinating providers.

A state immunization information system allows healthcare providers, including pharmacists, to access an individual's vaccination records. These state registries are designed to be a useful resource to increase transparency of administered vaccinations across different healthcare settings within the state to promote vaccination efforts. Documentation within a state immunization information system can prevent duplicate vaccination recommendations and can aid in timely administered vaccines. Community pharmacist review of state immunization information systems to produce vaccination recommendations can support other healthcare providers.

The COVID-19 vaccination authorization for adolescents aged 11-17 years old has presented a unique opportunity for community pharmacists to evaluate and address identified gaps in adolescents' vaccination schedules. This study sought to determine if a pharmacist-provided personalized vaccination recommendation (PVR) for Tdap, MenACWY, and HPV would result in increased vaccine uptake for the adolescent population as determined by immunization registry reporting.

Objectives

The primary objective of this research was to identify immunization gaps for adolescents receiving the COVID-19 vaccination based on immunization registry data. Following the pharmacist-provided PVR, other objectives were to identify the number of patients who received vaccination(s) in the community pharmacy setting and to determine how many vaccinations were administered to adolescents after the intervention altogether.

Methods

Study Site

A prospective intervention was conducted at three pharmacy sites operated by a grocery store chain located in the Kansas City metropolitan area. All three sites were Kansas pharmacies located within 25 miles of the Missouri border, so residents of both states comprise the patient populations at each site.

Inclusion and Exclusion Criteria

Adolescents 11 to 17 years old initiating the Pfizer COVID-19 vaccination series at any of the three study sites were eligible for a PVR. Anyone who received dose one of the COVID-19 vaccine prior to the start of the study did not allow for sufficient time for development of the PVR and was excluded. Additionally, anyone who did not return to the same site for their second COVID-19 vaccine dose was excluded from analysis.

Study Approach

Adolescents initiating the COVID-19 vaccine series between October 2021 and December 2021 were eligible to receive a PVR. Insurance information and the COVID-19 vaccination consent form containing the patient's name and date of birth were collected at COVID-19 vaccine dose one administration. Between dose one and dose two of the COVID-19 vaccine series, the information from the consent form was used to search the Kansas immunization information system “WebIZ” and Missouri immunization information system “ShowMeVax” to obtain immunization records. After assessing the state immunization information systems, a PVR for each adolescent was developed which included the vaccine(s) that were due to be administered based on CDC recommendations. For each recommended immunization, the associated copayments for pharmacy administration and a patient friendly vaccine education handout from the CDC were included. The PVR and vaccine education handout(s) were attached to the patient’s consent form used for both doses of the COVID-19 vaccine series. When the adolescent returned to the pharmacy for dose two of the COVID-19 vaccine, the community pharmacist or pharmacy intern retrieved the consent form, provided the

PVR, and gave the education handouts to the caregiver. When providing the PVR, the pharmacist presented the anticipated copayment(s) for vaccine administration of typically zero dollars to the caregiver and offered to administer the adolescent's recommended vaccination(s) at this time. If the caregiver declined the offered vaccination(s), the PVR handout instructed caregivers on how to schedule an appointment to receive the recommended vaccination(s) at the pharmacy and walk-in availability. Six months after the PVR was provided to the adolescent's caregiver at COVID-19 vaccine dose two, the immunization information systems were reviewed a second time to determine if the recommended vaccinations were administered.

Patient demographics, number of vaccination recommendations, and number of vaccinations administered were assessed using descriptive statistics. Data were evaluated using SPSS v.27. University of Kansas Medical Center Human Subjects Committee granted exemption for this project.

Results

A total of 225 adolescents were eligible for a PVR. The majority of adolescents were white, non-Hispanic, and 11 years old as seen in Table 1. Of the 225 adolescents, 168 (74.7%) were indicated to receive a Tdap vaccination, 169 (75.1%) were indicated to receive a MenACWY vaccination, and 187 (83.1%) were indicated to receive an HPV vaccination as seen in Figure A. Most adolescents 162 (72%) were indicated to receive three vaccinations, while four (1.8%) were indicated for two vaccinations, and 26 (11.5%) were indicated for only one vaccination. Thirty-three (14.7%) adolescents were up to date on all three vaccines.

Of the 225 adolescents, 180 (80%) returned to the same site to receive COVID-19 vaccine dose two and received their PVR and were therefore included in the analysis. When the PVR was given to the caregiver, 42 (23%) caregivers reported their adolescent previously received one or more of the recommended vaccinations.

Within six months after the 180 PVRs were provided to the caregivers, 13 (7.2%) unique patients received 24 vaccinations: six Tdap, six MenACWY, and 12 HPV vaccines. All

vaccinations were administered at a pediatrician's office according to the state immunization information systems.

Discussion

To our knowledge, this is the first study to examine pharmacists providing PVRs in coordination with the COVID-19 vaccination series. This study aimed to address any gaps in an adolescent's recommended immunization schedule after assessing Tdap, MenACWY, and HPV immunization status using WebIZ and ShowMeVax. Twenty-four vaccinations were documented six months post intervention indicating that barriers to adolescent vaccinations beyond awareness of needed vaccinations may exist.

Olusanya and colleagues assessed barriers to childhood and adolescent vaccination uptake in the United States in the context of the COVID-19 pandemic. Challenges identified which may have contributed to vaccine delay included parental education level, overwhelmed healthcare systems, and restrictions on in-person office appointments resulting in fewer opportunities for providers to encourage vaccinations. The authors recommended healthcare professionals work to increase personalized patient-provider interactions.[12] They also concluded patients should be receiving vaccinations at alternative immunization locations, such as community pharmacies to alleviate bottlenecks elsewhere in the healthcare system.[12]

The current study sought to overcome these obstacles, by leveraging contact with a healthcare professional in the community pharmacy to promote vaccine uptake by means of a PVR with education materials provided directly to caregivers. Other attempts made to increase childhood and adolescent vaccination rates have been assessed, primarily involving other healthcare educators including physicians, physician assistants, nurses, nurse practitioners, and medical assistants.[16] Our study focused on pharmacists, expanding existing knowledge of interventions to increase adolescent vaccination rates. Fourteen studies providing health education were reviewed by Oyo-Ita and colleagues, six of which focused on interventions either in the community directly or in a healthcare clinic. In the healthcare facility interventions,

parents were given verbal vaccine education and provided a PVR at time of clinic visit.[17] These studies concluded that this intervention may have improved the uptake of three doses of diphtheria-tetanus-pertussis vaccine for children.[17] Similarly, providing education and a PVR directly to the caregiver the day of another service and subsequent uptake of vaccines was seen in our study in the community pharmacy setting. While the patients in the Oyo-Ita studies were children, our study involved an adolescent population, indicating that providing education and a PVR to caregivers may improve vaccine uptake regardless of the child's age.[17] Another study focused on presenting HPV health education, including vaccine recommendations and an educational handout, to caregivers of nine to 12 year old females. This caregiver-directed health education intervention resulted in 11 (50%) unvaccinated females initiating the HPV vaccination series during the follow up period.[18] Our results align with this research as our study provided a PVR and educational handouts to each caregiver whose adolescent was indicated for the HPV vaccine; 12 HPV vaccinations were administered within six months of intervention.

After receiving the PVR, 42 caregivers reported one or more of the recommended vaccinations had been administered previously. This discrepancy indicates there may be a lack of reporting which is causing statewide immunization information systems to be inaccurate. In Kansas and Missouri, pharmacies are required to report all administered vaccinations to the state immunization information system.[19-21] Yet, other vaccination providers such as pediatrician's offices, health clinics, and health departments are not mandated to report administered vaccinations to these immunization information systems.[19-21] Only 58% of US states and territories require all vaccine providers to report to an immunization information system and less than half (39%) require reporting for all ages.[22] The optional reporting for some providers in Kansas and Missouri may have led to the immunization information systems not being up to date. With some providers reporting to the state immunization information systems voluntarily, the number of vaccinations needed in the PVR provided to the caregiver could have been falsely elevated due to the lack of required reporting.

During the six month follow up period, 24 vaccinations were administered, all of which were administered at a pediatrician's office. The low number of adolescents up to date on vaccinations may have also been due to an increase in telehealth visits due to the risk of exposure of COVID-19 during the peak of the pandemic. As doctor offices started to transition back to in-person appointments, the availability of an appointment may have been an additional factor.

On the other hand, after the pharmacist-provided PVR, the true number of vaccinations administered within the six month follow up period could have been higher than results show. If an adolescent received one of the pharmacist-recommended vaccinations from a provider who does not report to the state immunization information system, the data would not have been captured when reassessing the databases at the six month follow up time period. The study highlights the need for all immunization providers to upload records to the respective state immunization information system. This shift would improve the completeness of the immunization information systems; therefore, improving the accuracy of pharmacist-provided PVRs to the adolescent population.

Limitations

This study lacked diversity amongst the study population despite having three different study site locations. Further, lack of voluntary reporting to state immunization information systems may have impacted the completeness of the PVR and the accuracy of number of accepted recommendations.

Conclusions

Pharmacist-provided PVRs impacted vaccination rates amongst the adolescent population. Implementing PVRs allowed community pharmacists to deliver vaccination recommendations individualized for each adolescent directly to their caregivers. Additional studies surrounding increasing adolescent vaccination uptake in the community pharmacy setting and evaluation of state immunization registry regulations would be beneficial.

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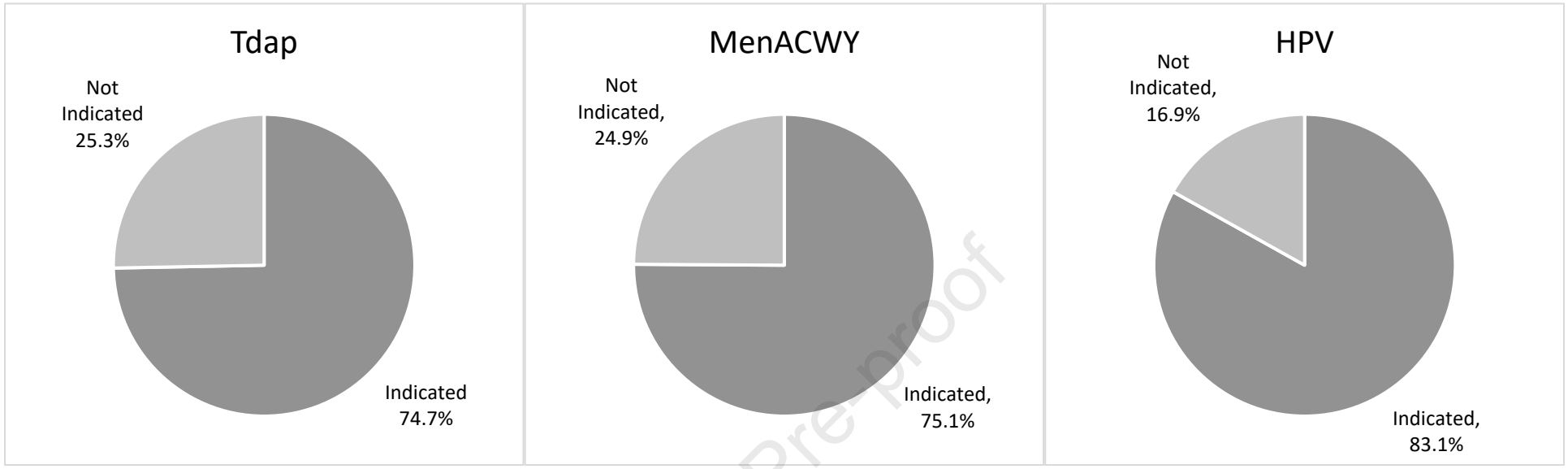
Table 1: Adolescent Demographics

Table 1: Adolescent Demographics	
Age (Years)	**n= 225 (%)**
11	167 (74.2%)
12	20 (8.9%)
13	9 (4%)
14	7 (3.1%)
15	6 (2.7%)
16	11 (4.9)
17	5 (2.2%)
Race	**n= 225 (%)**
White	140 (62.2%)
Black or African American	9 (4%)
Asian	4 (1.8%)
More than one race	20 (8.9%)
Other	11 (4.9%)
Not listed	41 (18.2%)
Ethnicity	**n= 225 (%)**
Hispanic	12 (5.3%)
Not Hispanic	144 (64%)
Not listed	69 (30.7%)

Figure A: Percentage of Adolescents Indicated to Receive the Following Vaccines (n=225)



Tdap: Tetanus, diphtheria, and acellular pertussis; MenACWY: Meningococcal conjugate; HPV: Human papillomavirus