Improving Patient Immunization Rates through Optimizing Pharmacy's Role in Providing Immunization Services

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Abstract

Purpose: To increase pneumococcal vaccinations among adults over age 65 and high-risk patients aged 2-64 with comorbid conditions at a regional community pharmacy chain in North Carolina.

Scope: Healthy People 2020 set target pneumococcal immunization rates at 60% for high-risk adults aged 18-64 years and at 90% for adults > 65 years old. Rates in North Carolina from the Behavioral Risk Factor Surveillance System (BRFSS) indicate that less than one third of the 10,205 patients surveyed received the pneumococcal vaccine. The pharmacy chain was selected as a pilot for educational interventions coupled with marketing and targeted patient screening to increase pneumococcal immunization rates.

Methods: The pharmacy staff of the fifty test stores participated in an online education curriculum regarding pneumococcal vaccinations. Pharmacy staff was trained to use a two-part screening tool to identify candidates for pneumococcal vaccination. Immunization rates were collected from test stores and compared to the 26 control stores who had not received education or utilize the screening tool. The intervention period lasted for sixteen months between September 2013 and January 2015.

Results: A total of 1908 pneumococcal vaccines, 1383 by test stores and 449 by control stores were administered from September 2013 to January 2015. Change in rates from baseline for test and control stores (2.23 $\pm$ 1.815 versus 1.54 $\pm$ 1.174 respectively, p=0.134) did not reach statistical significance. When the intervention tool was adopted in the last 6 months, test stores administered more pneumococcal vaccines per store (3.58 $\pm$ 2.963) compared to control stores (2.04 $\pm$ 1.506, p=0.034).

Key Words: immunization, pneumococcal vaccine, community pharmacy

I. Purpose

Educational initiatives and targeted screening within test stores was utilized to promote and increase pneumococcal vaccinations among adults over age 65 and high-risk patients aged 2-64 with comorbid conditions at a regional community pharmacy chain in North Carolina.

The key objectives included:

1. Increase pneumococcal immunization rates among high risk populations
2. Increase pharmacists' and pharmacy staff's knowledge and ability to identify appropriate candidates for the pneumococcal vaccine
3. Increase pharmacists' and pharmacy staff's comfort level in improving immunization awareness of the pneumococcal vaccination through direct patient interaction
4. Educate and train targeted pharmacists and pharmacy staff to provide immunization related clinical services

II. Scope

A. Background

Healthy people 2020 set target pneumococcal immunization rates at 60% for high-risk adults aged 18-64 years and at 90% for adults > 65 years of age.[1] According to the National Health Interview Survey (NHIS), pneumococcal vaccination coverage for adults ≥ 65 years and high-risk adults age 19-64 in the United States was 59.7% and 18.5% respectively in 2010.[2] Specifically within the state of North Carolina, the CDC's Behavioral Risk Factor Surveillance System (BRFSS) indicate that less than one third (30.2%) of the 10,205 patients surveyed received the pneumococcal vaccine.[3] This data indicates a gap in pneumococcal vaccinations at both the national and state level.

Kerr Drug, the regional community pharmacy chain originally targeted for this study, was responsible for 239,907 patients of which 22% or 52,834 patients were identified as over 65 years of age in 2012. Additionally, 1,140 patients would be turning 65 years old by 12/31/2012. Furthermore, 8,105 patients were identified within the chain's population as candidates to receive the pneumococcal vaccination due to a comorbid condition of diabetes mellitus or a respiratory disease as identified by prescription claims data. As a total, the target population for pneumococcal vaccinations within this regional community pharmacy chain alone was approximated at 62,000 patients.

There was a large gap, however, in the number of patients being immunized in this population at a store level. Despite the ability of pharmacists in North Carolina to administer pneumococcal vaccinations in addition to those for influenza and herpes zoster, only a small percentage of the target population received the vaccine from their Kerr Drug pharmacist. In 2010, 30% of the 76 pharmacy locations (23 stores) were active in vaccinating for pneumococcal disease, administering only 220 total pneumococcal vaccinations. This number increased to 41 pharmacy locations

administering 317 vaccinations in 2011. Despite an increase from 2010 to 2011 of 97 vaccinations, these numbers represent only 0.5% of the target population at the regional community pharmacy chain.

Since the pneumococcal vaccination is not a yearly vaccination, the number of patients that could be targeted on an annual basis would diminish as more patients receive the vaccine. It is also possible that many patients are receiving this vaccination at their primary care physician's office. However, there is still a large gap in coverage as reported by the CDC for this state and the country.

References:

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2. Centers for Disease Control and Prevention (CDC). Adult Vaccination Coverage-United States, 2010. MMWR. 2012;61:66-72.
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B. Setting

Kerr Drug was a regional community pharmacy chain located in North Carolina that provided comprehensive health and wellness offerings, including a robust immunization program. At the beginning of the grant period, the company consisted of 76 stores statewide and employed approximately 200 pharmacists and 400 pharmacy staff members. A typical staff included a range of two to eight members based on the volume and hours of the individual stores. Immunization initiatives at Kerr Drug have historically provided between 25,000 and 55,000 influenza vaccinations annually, although pneumococcal vaccinations have lagged behind.

In September of 2013, during the first few months of the data collection portion of the grant, it was announced that Walgreen Company (Walgreens), the largest drug retailing chain in the United States would acquire Kerr Drug. On November 8, 2013 when the sale was finalized, 20 of the Kerr Drug stores were closed leaving 56 stores as part of the grant population. The enduring stores continued to operate under the Kerr Drug name for the remainder of the 2013 fiscal year. During the first quarter of fiscal year 2014, many of these stores changed branding and operations to that of Walgreens, with elimination of the Kerr Drug name by May 2014. As a whole, the staff at these stores remained consistent during the transition, however, the regional and district management staff previously working with Kerr Drug left the company.

C. Participants

The Self-Assessment Program (SAP), given in April of 2013 to provide a marker of baseline knowledge surrounding the pneumococcal vaccination was targeted to the entire staff of the regional community pharmacy chain. The SAP was started by 427 participants and completed by 403 participants. Pharmacists accounted for 42% of these participants (169), with the remaining 234 participants being classified as pharmacy technicians. All pharmacists included in this population should have previously completed the American Pharmacists Association's (APhA) National Certificate Training Program on Pharmacy-Based Immunization Delivery. Additionally, some of the pharmacy technicians may also have been student pharmacists and therefore may have been trained through this program as well. Of the 227 participants that reported completing the APhA immunization certificate training program, the vast majority (81%) had completed this training within the last 5 years, including 120 (52.8%) who had been trained in the last 3 years. Only nine participants had received training more than ten years prior.

The targeted healthcare provider population for the educational intervention was pharmacists and pharmacy technicians at the 50 test stores within the regional community pharmacy chain. These 50 stores ranged in location around the state of North Carolina and were selected at random in a 2:1 ratio from the 76 total stores within the regional community pharmacy chain. Three education modules were created and participants employed at the test stores were given two months to complete all modules. All modules were completed by 153 participants and twelve additional participants only completed modules 1 and 2 related to indications for pneumococcal vaccinations and training on the screening intervention. Approximately 60% (99) of the participants who completed any or all of the educational modules were pharmacists.

Targeted patients for inclusion in this study were those patients who filled prescriptions and/or shopped in the test store group of the regional pharmacy chain. All patients aged 18 and older were eligible for screening and would be deemed a potential candidate for vaccination with the pneumococcal vaccine based on the Center for Disease Control Advisory Committee on Immunization (ACIP) guidelines.

III. Methods

A. Study design

Kerr Drug, a regional community pharmacy chain in North Carolina, held 76 stores at the time of the grant award. These 76 stores were randomly assigned to a test group and control group in a 2:1 ratio, respectively, yielding 50 test stores and 26 control stores at the time of randomization. All employees within the 76 stores were given a pre-test (SAP) to evaluate current knowledge of the indications for pneumococcal vaccinations, ability to screen for patients in need of pneumococcal vaccination and comfort in improving awareness of the pneumococcal vaccination. The SAP consisted of baseline questions related to confidence in identifying and educating patients regarding the pneumococcal vaccination and eight knowledge questions related to candidate identification, vaccine administration, interpretation of immunization schedules and patient education. Local community pharmacists were used to pilot these SAP questions for readability and validity. Results of the SAP helped refine the online educational curriculum content.

A multi-modular online educational curriculum was developed and delivered to the employees of the 50 test stores prior to the intervention period. The three modules focused on seven learning objectives related to indications for pneumococcal vaccinations, identification and characteristics of high-risk patients, utilizing immunization schedules, motivational strategies to promote immunizations, and patient education related to immunizations in addition to training staff on the intervention screening tools. These modules were intended to build upon the knowledge obtained previously by pharmacists during the APhA immunization certificate training program. Case based scenarios also provided learners with the opportunity to develop motivational strategies to promote vaccinations to patients. The three online modules were delivered through the online platform of RealCME and participants that successfully completed modules were awarded up to two hours of ACPE accredited CPE credits.

Beginning September 1, 2013, marketing to increase awareness of the pneumococcal disease and vaccination was placed in all stores of the test group. Multi-media in-store marketing within test stores was comprised of prescription bag label advertisements, signage located throughout the store, mailed patient flyers and phone advertisements (Appendix A).

Additionally, individual pharmacy locations within the test group were to begin to use the developed screening tool (Appendix B) to identify the target population for screening related to the pneumococcal vaccination. Both pharmacists and pharmacy staff were to identify those patients over age 65 and those patients age 2-64 who had a comorbid condition of diabetes mellitus or a respiratory disease (COPD or asthma) during the prescription filling process. When identified as a patient who has an indication for the vaccination, Part 1 of the screening tool was to be attached to the patient's prescription bag. At pick-up, the pharmacist or pharmacy staff member would approach the patient about the pneumococcal vaccination and use the skills developed during the online educational modules to provide the patient with brief education on the benefits of the pneumococcal vaccination. At this time, the pharmacist or pharmacy staff member would also gather information about the patient's previous vaccination history and record the outcome of the interaction (vaccination received or vaccination denied and reason). Any patient who requests a pneumococcal vaccination from the pharmacy without being identified through the prescription filling workflow, would need to have a screening tool completed and identify the reason for the pneumococcal vaccination request (i.e. marketing materials, referral from physician, etc.). Part 2 of the screening tool was to be completed at any time a pneumococcal vaccine was administered at the test store, regardless of how the patient was identified. All screening tools were to be collected at each store and sent to Shenandoah University for analysis.

The data collection period was scheduled to last for one year from September 1, 2013 to August 30, 2014. This time frame was extended through January 16, 2015 due to limited use of the grant screening tools. Management at the local level, re-emphasized the need to complete and submit screening tools in July 2014 and these were tracked for the last five months of the grant period.

This study was reviewed and approved by the Institutional Review Board at Shenandoah University.

B. Data Sources/Collection

Educational interventions were evaluated using questions mapped to seven learning objectives. Knowledge and application questions were asked of participants prior to the online educational modules as pre-test questions and then and again in post-tests to show a growth in knowledge. Additional pre-test and post-test questions were developed to evaluate practice domains related to confidence in identifying, screening and counseling candidates for pneumococcal vaccination.

Baseline pneumococcal immunization data was evaluated for fiscal year 2010 and 2011 in aggregate and by vaccinations administered per store per month prior to the start of the grant period. In 2010, test stores administered 82 pneumococcal vaccinations or 0.42 vaccines per month compared to 0.19 vaccines per month for a total of 25 vaccinations in control stores (p = 0.253). Immunization rates increased slightly in 2011 to 197 pneumococcal vaccinations administered by test stores compared to 0.19 vaccines per store per month and 0.10 vaccines per store per month for control stores in 2010 and 2011 (p=0.522), respectively. As there was no statistical difference between groups, the rates from 2011 were used as a baseline to show potential increases in immunization rates after the interventions.

Immunization rates were collected through the grant collection period to compare to this baseline data. Planned reporting of immunization rates by store was to occur on a monthly basis. With the change in leadership and organizational structure, aggregate per store data was available from September 1, 2013 through April 30, 2014. Beginning in May 2014, monthly immunization rates for pneumococcal vaccinations per store were reported by Walgreens to the investigators.

Information regarding the patient population was captured through the use of the two-part intervention tool. The staff at all target stores were trained on the use of these tools during the online educational curriculum and district management as well as investigators at Shenandoah University were available for questions regarding completion of the forms. A random sample of 25 completed screening forms was reviewed to determine if pharmacists were appropriately categorizing a patient as a candidate for pneumococcal vaccination. This review showed that all patients screened using this form had been appropriately categorized within the sample based on documented information.

C. Interventions:

Interventions for this study were directed at the target stores within the regional community pharmacy chain. Educational interventions included re-education on the principles of vaccination with the pneumococcal vaccine through an online multi-modular learning curriculum. Test stores also received marketing in store and sent to customers of those locations. Finally, screening tools were implemented in target stores to assist with identifying patients who may have indication(s) to receive the pneumococcal vaccine.

D. Measures:

Measures of education interventions were test score averages on questions mapped to the seven learning objectives. RealCME analyzed pre-test and post-test scores for each learning objectives for percent change. Population demographics were analyzed from screening tools using SPSS Software version 22. Immunization rates were measured by

store within test and control groups and analyzed using a student's t-test in SPSS Software version 22.

E. Limitations:

The educational intervention was completed similarly to as planned, however, there were limitations in access for the participants due to the intranet at the local Kerr Drug stores. Individual participants did not all have a unique email address accessible at the store that they could register with RealCME. This prevented us from administering the planned post-curriculum assessment to evaluate retention of knowledge eight weeks post completion. This data would have helped to see if knowledge and confidence changed with time. Additionally, RealCME was not able to provide us raw data to analyze differences in knowledge and confidence between pharmacists and pharmacy technicians.

One of the largest limitations faced during this study was the change in organizational structure. One of our early partners, RxAlly lost a member of their management team in June 2013 who had been the point person for this company. Subsequently, in August 2013, just prior to the intervention period, RxAlly ceased operations. The loss of this partner left a gap in oversight, as RxAlly was to assist in implementation and support of the grant efforts in North Carolina. With the investigators located in a different state then the test stores within the grant, we had to rely on the district management of Kerr Drug alone to facilitate the implementation of interventions.

To compound this issue, we found out in November that Walgreens was to acquire Kerr Drug. This change limited the focus of local Kerr Drug management and staff on the grant intervention efforts. Additionally, shortly after this acquisition, the management team that we had worked with at Kerr Drug has left the company. Thankfully, Walgreens recognized the benefits of the project and committed to full support of our efforts. It then took some time for the Walgreens management team to come up to speed with the project. These significant changes, led to lack of adoption of the screening tool until late in the intervention period. Therefore, the planned use of the screening tool was not implemented until July 2014. Although staff did not complete these tools as frequently as planned, test stores utilized the screening tool for an approximately six-month period from July 2014 to mid January 2015.

IV. Results

A. Educational Intervention

The SAP (see Appendix B for baseline knowledge questions) was delivered to 403 participants, 169 pharmacists and 234 technicians, in April 2013 and consisted of practice domain questions related to confidence in and the practice of identifying and educating appropriate candidates for pneumococcal vaccination or revaccination. Similarly, participants from test stores who completed the online educational curriculum were asked to evaluate their confidence in these skills. These questions were evaluated using a Likert scale and response rates are available in Table 1. Although, these responses were distributed across the scale, less than half of participants rated his/her confidence as Agree or Strongly Agree for most statements. Participants felt more comfortable in identifying a patient for vaccination in the 65 years and older category as opposed to those patients under age 65 and designated as high-risk. Only 48% of the participants (194) felt confident in educating about the benefits of the pneumococcal

vaccine at baseline, which would likely be a limitation for a successful immunization program. Going into the online educational modules, staff at the test stores had similar levels of confidence in identifying and educating pneumococcal vaccine candidates. Although, calculations for statistical significance are not available, there was an increase in average in all areas after completing the online educational curriculum. The largest increases were seen in participants reported frequency of identifying and screening patients during workflow.

Table 1: Confidence and practice of identifying and educating candidates for pneumococcal vaccination

Statement	SAP					Online Education Curriculum	
	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree	Pre-test average	Post-test average
I feel confident in identifying an individual over age 65 years of age as a candidate for the pneumococcal vaccination.	55 (13.7%)	40 (9.9%)	80 (19.9%)	117 (29.0%)	111 (27.5%)	3.63	3.87
I feel confident in educating an individual over 65 years of age about the appropriate timing of pneumococcal revaccination.	64 (15.9%)	64 (15.9%)	90 (22.3%)	90 (22.3%)	95 (23.6%)		
I feel confident in identifying a high-risk individual under 65 years of age as a candidate for the pneumococcal vaccination.	54 (13.4%)	67 (16.6%)	94 (23.3%)	123 (30.5%)	65 (16.1%)	3.12	3.65
I feel confident in educating high-risk individuals under 65 years of age about the appropriate timing of pneumococcal revaccination.	62 (15.4%)	78 (19.4%)	96 (23.4%)	105 (26.1%)	62 (15.4%)		
I feel confident in educating an individual about the benefits of receiving a pneumococcal vaccination.	57 (14.1%)	58 (14.3%)	94 (23.3%)	122 (30.1%)	72 (17.9%)	3.40	3.68
How often do you identify a pneumococcal vaccine candidate during routine pharmacy workflow? (1=Never, 5=Always)						2.18	3.10
Please rate how often you screen patients for the pneumococcal vaccination. (1=Never, 5=Always)						2.43	3.49
Please rate how often you counsel patients on the benefits of the pneumococcal vaccination. (1=Never, 5=Always)						2.61	3.41
Please rate your confidence in your ability to motivate an individual to receive the pneumococcal vaccination (1=Not at all confident, 5=Very confident)						3.08	3.58

The SAP also evaluated perceived barriers by participants related to the provision of pneumococcal vaccinations. Participants were asked to select all barriers from a list of 12. Response rates shown in Table 2 suggest that the participants felt that insurance coverage would be one of the most significant barriers. Additionally, participants identified incomplete immunization records, unwillingness of the patient to receive the pneumococcal vaccine, availability of time and local physician support as other significant barriers. The online education curriculum was intended to address some of the participants concerns over knowledge needed to provide pneumococcal vaccinations and motivation strategies to target patient unwillingness to receive the pneumococcal vaccination.

Table 2: Perceived barriers to provision of pneumococcal vaccinations (SAP)

Barrier	Number selected	Barrier	Number selected
Pharmacy Reimbursement	71 (17.6%)	Level of knowledge needed to provide pneumococcal vaccines	87 (21.5%)
Patient's insurance coverage	288 (71.5%)	Availability of a notification system to facilitate candidate identification	73 (18.1%)
Patient's unwillingness to receive the pneumococcal vaccine	192 (47.6%)	Company protocols	16 (4.0%)
Availability of time	136 (33.8%)	State Regulations	55 (13.6%)
Local physician support	137 (34.0%)	Incomplete patient immunization records	153 (38.0%)
Staff support	55 (13.6%)	I do not perceive barriers to the provision of pneumococcal vaccinations	35 (8.9%)

Finally, during the SAP, knowledge related to identifying candidates for vaccination and revaccination with the pneumococcal vaccine, administration of the pneumococcal vaccine, interpretation of immunization schedules and education points regarding the pneumococcal vaccine was evaluated. Two questions related to identifying high-risk patients aged 2-64 were given on the SAP. Overwhelmingly, participants were able to identify the need for screening a 50-year-old male taking Advair as a candidate for the pneumococcal vaccine, but on 73.9% of participants selected an appropriate candidate as needing pneumococcal vaccination based on age and a concomitant disease state. Revaccination scheduling was an identified area of concern for more than half of the SAP participants and 34.3% of these were unable to correctly select an appropriate revaccination schedule. Of those that answered incorrectly, 61 out of 105 participants did not realize the patient was a candidate for revaccination at all. Most participants (71.4%) were able to select the appropriate pneumococcal vaccine including volume and route of administration for an 18 year-old female with asthma, but on 49.1% of participants identified the appropriate pneumococcal vaccine for a 6-month-old boy. Although this is a concept taught in the APhA immunization certificate training program, the lack of involvement by pharmacists in administering and recommending childhood vaccinations may have influenced the responses to this question. The majority of participants (64.1%), however, were able to read a provided immunization schedule to identify appropriate vaccines for a 4-month-old girl. Finally, 68% of SAP participants correctly identified ACIP approved vaccine combinations for co-administration.

Based on the results of the SAP, seven learning objectives were identified for the three online educational modules. Some of these learning objectives were also uniquely tagged to the role that the participant played at the pharmacy (i.e. pharmacist versus pharmacy technician). The results of pre-test and post-test scores for each of the objectives are listed in Table 3. Of these learning objectives only that related to selecting the appropriate product, dose and route of administration was at a level higher than 80% correct. It was surprising that before completing the online educational modules that including training on the intervention tools, 77.5% of participants correctly answered questions related to these tools. It is possible that the ease of the intervention tool and its correlation to required knowledge surrounding screening for the pneumococcal vaccine led participants to answer correctly even before training. While

the pre-test scores were higher for this skill, there was still a significant increase in the post-test average after completion of the online modules. At the conclusion of the three module online educational curriculum, all post-test average scores had increase from baseline with no average score less than 82%.

Table 3: Knowledge related to pneumococcal vaccinations during online education modules

Learning Objective	Participants	Pre-Test Average Score	Post-Test Average Score	Percent Change
Identify pneumococcal vaccine candidates based on age, past medical history, medication profile, and/or social history	170	59.2%	88.7%	49.8%
Utilize current immunization schedules to recognize patient-specific vaccination needs	169	67.8%	86.3%	27.2%
Recognize a patient who is a candidate for revaccination with the pneumococcal vaccine	171	57.7%	82.5%	43.1%
Demonstrate effective use of intervention tools to identify high risk patients	166	77.5%	92.2%	18.9%
Implement motivational strategies to promote pneumococcal and other appropriate immunizations (pharmacists only)	166	50.8%	88.4%	74.1%
Assist with implementing motivational strategies to promote pneumococcal and other appropriate immunizations (technicians only)				
Identify the appropriate product, dose and administration of the pneumococcal vaccine (pharmacists only)	170	95.3%	100%	4.9%
Recognize the appropriate product, dose and administration of the pneumococcal vaccine (technicians only)				
Provide appropriate education related to the pneumococcal vaccine (pharmacists only)	166	42.8%	86.0%	100.81%
Assist with providing appropriate education materials related to the pneumococcal vaccine (technicians only)				

B. Patient Screening

Although the screening tool was intended to be a part of the intervention from the start of the data collection period of the grant, it was not fully integrated into workflow until the last 6 months of the grant period (July 2014 – January 2015). Part 1 of the screening tool (see Appendix B) was to be used for initial screening to determine if the patient was a candidate for the pneumococcal vaccine. Additionally, this tool allowed for collection of information regarding the interaction between the pharmacist and the patient including reasons the patient declined vaccination if applicable. Part 1 of the screening tool was completed for 182 patients. The second screening tool, Part 2 (see Appendix B) was used to track vaccine administration and methods by which the patient was identified. Part 2 was completed for 56 patients. Out of the 196 individual patients that were screened or identified during this period, 28.6% of these received the vaccine at the community pharmacy. It is clear, however, that not all patients who received the pneumococcal vaccine were captured using the screening tool as this represents only 5.3% of the 1060 total pneumococcal vaccines (797 PPSV23 and 263 PCV13) that were administered at test stores during this same time frame.

Based on Part 1 data, the patients screened were more frequently female and were a candidate for vaccination based on age of 65 years or older. When a concomitant disease was present, it was more frequently diabetes mellitus (22.5%). Of the 182 patients screened using Part 1 of the screening tool, 138 (75.6%) of the patients were

determined to be a candidate for a pneumococcal vaccination, with eight being identified as needing the PCV13. Table 4 provides additional demographic information gathered from Part 1 and Part 2 of the screening form.

Table 4: Demographics

Gender	Female 114 (58.2%)
Age	Mean 66 ± 13 years (16-95 years) Patients in the range of 60-69: 75 (38.3%) Patients in the range of 70-79: 54 (27.6%)
Disease state present	None present: 55 (28.1%) Diabetes mellitus: 31 (15.8%) Asthma: 11 (5.6%) COPD: 4 (2.0%)
Candidate for pneumococcal vaccine	Yes 138 (75.8%)

When patients were determined to be a candidate for the pneumococcal vaccine, results of the interactions with the pharmacist were also recorded on Part 1 of the screening tool. Out of 138 initial candidates, a small portion of these patients (18.8%) had already received the vaccine from another provider. Forty-four of the patients (31.9%) agreed to receive the vaccine after screening, with 38 patients (27.5%) being scheduled for same day administration. Thirteen patients reported he/she wanted to think about the vaccine before deciding and 65 patients (47.1%) reported that he/she was not interested in receiving the vaccination. Table 5 shows the reasons that patients reported they were not interested in the vaccine and indicates that many patients wanted to speak with their physician prior to vaccination.

Table 5: Reasons patients were not interested in pneumococcal vaccine

Reason	n = 65
Wants to talk to provider	22 (33.8%)
Wants to receive from provider	4 (6.2%)
Does not believe in vaccinations	12 (18.5%)
Cost	7 (10.8%)
Other	17 (26.2%)

In addition to screening through the study intervention, patients were identified for administration of the pneumococcal vaccine by patient request (32.1%), referral by provider (29.1%) and as an add-on to other vaccinations (10.9%).

C. Immunization Rates

Immunizations rates as obtained from store prescription records were compared between test and control groups to evaluate differences related to interventions. For the overall grant intervention period (Sept 1, 2013 – Jan 16, 2015) a total of 1908 pneumococcal vaccines were administered at the 76 original Kerr Drug stores. The vast majority of pneumococcal vaccines administered were PPSV23 with 380 PCV13 vaccines given after the ACIP guidelines changed in August 2014, recommending the use of PCV13 in patients who had previously received the PPSV23. Test stores during the grant period administered 1383 pneumococcal vaccines, while control stores were responsible for 449 of the total vaccines given.

To calculate average shots per month during the grant period, the 20 stores closed on November 8, 2013 were dropped from the sample. Additionally, the pneumococcal vaccines administered in the partial month of January 2015 were excluded from both test and control. Therefore, the number of pneumococcal vaccinations administered per month for test stores within the grant period (August 2013 – December 2014) 2.23 $\pm$ 1.815 was not statistically significant when compared to 1.54 $\pm$ 1.174 pneumococcal vaccinations per month for control stores (p=0.134). For the last 6 months of the grant period (July 2014 – December 2014), however, there was a significance difference between pneumococcal vaccines administered per month in test stores versus control stores (3.58 $\pm$ 2.963 versus 2.04 $\pm$ 1.506, p=0.034), respectively. When comparing the change in average pneumococcal vaccines administered per month to baseline of fiscal year 2011, there was no statistically significant change as test stores increased monthly rates by 1.81 $\pm$ 0.976 vaccines compared to an increase of 1.35 $\pm$ 0.559 in control stores (p=0.219).

D. Discussion

The results of this study show that knowledge levels concerning pneumococcal vaccinations potentially decrease as time passes from initial immunization training. Additionally, there is a potential lack of knowledge related to pneumococcal vaccinations by other pharmacy staff that has not completed previous immunization training. This knowledge deficit coupled with a lower level of confidence in identifying candidates and education patient about the benefits of pneumococcal vaccinations may contribute to lower than goal immunization rates. A targeted education intervention was successful at increasing knowledge, confidence and the rate of screening surrounding this vaccination in the community pharmacy. These increases showed trends in increased immunization rates as well. Additionally, active screening of patients during pharmacy workflow led to a significant difference in pneumococcal immunization rates between test and control stores. This shows that pharmacy staff must integrate screening for candidates of the pneumococcal vaccine into normal workflow if rates are to increase.

E. Conclusions

Given the small sample of pharmacies included in this study, the intervention was not able to increase rates to the level set forth by Healthy People 2020. These results, however, suggest a similar intervention replicated at all community pharmacy locations and by multiple community pharmacy retailers will make a large impact in the efforts to increase pneumococcal immunization rates. While pharmacists are not the only providers than can help diminish the immunization gap, the accessibility of pharmacists and their continued interaction with patients, allows them the unique opportunity to become advocates for the pneumococcal vaccine. Furthermore, educational interventions including recertification of immunizing pharmacists or an immunization certificate program for pharmacy technicians may provide additional benefits in the efforts to reach these population goals.

F. Publications and products

None

Appendix A: Select Marketing materials

Appendix B: Intervention Tool

PPSV23 Intervention Tool Date: _____ Kerr store number: _____
(Part 1: Screening)

Patient Name:_____ Phone number: _____
DOB/Age: _____ Payment: ☐Medicare ☐Private ☐Kerr Club ☐Cash

Vaccine(s) recorded in the patient profile:
☐Pneumococcal (PPSV23) if so, when: 1st (year): _____ 2nd (year): _____
☐Influenza ☐Zostavax ☐None recorded

Chronic condition(s): ☐diabetes ☐asthma ☐COPD ☐none of these

Is the patient a candidate for:
PPSV23? ☐No ☐Yes, why? ☐18-64 with diabetes
☐18-64 with COPD
☐19-64 with asthma
☐19-64 smoker
☐ ≥ 65 without previous vaccine
☐ ≥ 65 & previous vaccine received ≥ 5 yrs ago when < 65
Influenza vaccine? ☐Yes ☐No
Zostavax? ☐Yes ☐No

If patient is a candidate for vaccination or revaccination with PPSV23, please contact patient to discuss:
☐Indication(s) for PPSV23 and other vaccine(s)
☐Benefits of the vaccine(s)
☐Timing for initial vaccination and revaccination with PPSV23
☐Cost/coverage of the vaccine(s)

Results of the patient interaction (either in person or on the phone):
☐Appt scheduled Date: _____ Time: _____
☐Patient not interested in receiving vaccine at this time
Reason given:
☐Wants to talk to provider
☐Wants to receive from provider
☐Does not believe in vaccinations
☐Cost
☐Other: _____
☐Patient previously received vaccine(s)
☐PPSV23 if so, when/where: _____ ☐confirmed with provider
☐Influenza if so, when/where: _____
☐Zostavax if so, when/where: _____
☐Patient wants to think about it. Follow-up scheduled: _____

PPSV23 Intervention Tool Date: _____ Kerr store number: _____
(Part 2: Vaccine Administration)

Patient Name:_____ Phone number: _____

DOB/Age: _____ Payment: ☐Medicare ☐Private ☐Kerr Club ☐Cash

How was patient identified to receive PPSV23?

☐Screening (appt scheduled or patient notified in store)

☐Patient requested: how did they hear about it?

☐In store marketing ☐Direct mailer ☐Other: _____

☐Referred by provider

☐Add on to another immunization requested

☐Other: _____

Additional immunizations given today: ☐Influenza ☐Zostavax ☐Other:_____

Appendix C: SAP learning objectives and questions

Learning Objectives:

1. Identify pneumococcal vaccine candidates based on age, past medical history, medication profile, and/or social history (Q1,2,5)
2. Recognize a patient who is a candidate for revaccination with the pneumococcal vaccine (Q3)
3. Identify the appropriate product, dose and administration of the pneumococcal vaccine (Q4, 6)
4. Utilize current immunization schedules to identify patient-specific vaccination needs (Q7)
5. Recommend appropriate patient education related to the pneumococcal vaccine (Q8)

SAP questions (abbreviations were provided prior to all questions)

1. Which of the following patients is a candidate for PPSV?

    a. **A 26-year-old male with diabetes**
    b. A 12-month-old female with cochlear implants
    c. A 16-year-old male who smokes cigarettes
    d. An 18-month-old female with asthma

2. John is a 50-year-old man who presents to the pharmacy with a prescription for an Advair inhaler. John should be screened for the pneumococcal vaccine based on his age and medications.

    a. **True**
    b. False

3. A 64-year-old male received his first dose of PPSV when he was 62 years of age. Should he be revaccinated and if so, when should he receive the vaccine?

    a. Yes, he should be revaccinated at age 64
    b. Yes, he should be revaccinated at age 65
    c. **Yes, he should be revaccinated at age 67**
    d. No, he should not be revaccinated

4. An 18-year-old woman with asthma presents to the pharmacy for a pneumococcal vaccine. What is the recommended vaccine, dose and route of administration?

    a. PCV13 0.5 mL IM
    b. PCV13 0.25 mL SC
    c. **PPSV 0.5 mL IM**
    d. PPSV 0.25 mL SC

5. Which of the following pneumococcal vaccines would be appropriate to recommend for a 6-month-old boy?

    a. PCV7
    b. **PCV13**
    c. PPSV
    d. The patient is not a candidate for a pneumococcal vaccine

6. A 65-year-old man presents to the pharmacy for an inactivated influenza vaccine. According to ACIP guidelines, which of the following vaccine combinations may be administered at this visit, assuming the patient is an appropriate candidate to receive both vaccines?

    a. inactivated influenza + Tdap
    b. inactivated influenza + Zoster
    c. inactivated influenza + PPSV
    d. **All of the above combinations could be given.**

7. Lily is a 4-month-old girl who comes to the pharmacy with her mother. Her mother asks you which vaccinations she needs at this time. Lily's vaccination record indicates that she is up to date on all vaccinations as of 2 months of age. Using the immunization schedule provided, which of the following vaccines do you recommend?

    a. Hepatitis B
    b. Influenza
    c. **Pneumococcal**
    d. Measles, mumps, rubella

8. You identify a patient who is a candidate for PPSV revaccination. Which of the following education points is/are **TRUE** concerning the pneumococcal vaccine?

    a. The PPSV vaccination is effective in preventing infections such as pneumonia and meningitis.
    b. The PPSV vaccination is important due to antibiotic resistance to pneumococcal infections.
    c. The PPSV vaccination can prevent severe complications associated with influenza infection.
    d. **All of the above education points are true.**