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Implementing Pneumococcal Vaccination Recommendations for Adults Age 19 and Over in a Family Care Clinic

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IMPLEMENTING PNEUMOCOCCAL VACCINATION RECOMMENDATIONS FOR ADULTS AGE 19 AND OVER IN A FAMILY CARE CLINIC

by

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Abstract

Pneumococcal vaccines are essential to children and adults. Having pneumococcal vaccines not only prevents pneumococcal infections but can also potentially lessen the severity of the disease. There are many scholarly articles attesting the herd effect in adults who received pneumococcal vaccines. Therefore, the purpose of this quality improvement project was to raise awareness of the pneumococcal vaccine and increase the vaccination rate in a primary care clinic in Texas. The Centers for Disease Control and Prevention's pneumococcal vaccination schedule was utilized as guide for vaccine administration. The staff and provider were educated on screening, documenting, and administering the pneumococcal vaccine to patients. Electronic reminders were implemented to flag those who qualified, and patient education was provided, regardless of their decision on receiving the vaccine. Retrospective chart review was conducted between January and May of 2018, to compare the results between pre- and postintervention. SPSS was utilized for statistical analysis. The results showed that out of 362 patients, 53 qualified for the pneumococcal vaccine. Only 21 (39.6%) of those patients received the vaccine, while the remainder 32 (60.4%) refused to be vaccinated. However, a few patients who had initially refused agreed to receive their pneumococcal vaccine during their follow-up visit. In conclusion, there was an increased awareness regarding pneumococcal infections and an increase in total number of patients who received the pneumococcal vaccine between pre- and postintervention. The study suggests that it is vital for providers to educate their patients about vaccinations, and appropriate follow-up is required to increase compliance.

Keywords: pneumococcal vaccine, pneumococcal infections, pneumonia

Pneumococcal Infections and Pneumococcal Vaccines

Pneumococcal disease is common among young children. However, it is becoming progressively more prevalent in older adults, particularly those who are over the age of 65. According to the Centers for Disease Control and Prevention (CDC, n.d.a), there is an escalating number of individuals receiving the pneumococcal vaccine each year. From 1997 to 2016, the pneumococcal vaccination rate for adults who are 65 and older increased by 23.8%, from 42.4% in 1997 to 66.2% in 2016 (CDC, n.d.a).

The pneumococcal polysaccharide vaccine was introduced in the United States in 1977 (CDC, 2015a). The first pneumococcal vaccine contained purified capsular polysaccharide antigen from 14 serotypes of pneumococcal bacteria (CDC, 2015a). It was later replaced by the 23-valent polysaccharide vaccine (PPSV23), which was licensed and released in 1983 (CDC, 2015a). The "PPSV23 contains poly-saccharide antigen from 23 types of pneumococcal bacteria that cause 60-76% of invasive disease" (CDC, 2015a, p. 284).

In 2000, the first pneumococcal conjugate vaccine (PCV7) was licensed in the United States (CDC, 2015a). Once again, the older generation pneumococcal conjugate vaccine PCV7 was replaced by the 13-valent pneumococcal conjugate vaccine (PCV13) in 2010 (CDC, 2015a). According to the CDC (2015a), "it contains the 7 serotypes of *S pneumoniae* as PCV7 plus serotypes 1, 3, 5, 6A, 7F and 19A" (p. 284). Both PPSV23 and PCV13 are the most current pneumococcal vaccines available, and they are being used today in conjunction with one another.

Since pneumococcal disease is a severe health threat, preventive measures are in place to avert its complications. One of the preventive measures is receiving the pneumococcal vaccinations as recommended by the CDC. The PCV13 and PPSV23 have a common end goal but contain different vaccination schedules (CDC, n.d.b). Therefore, implementing a solid

structure of providing the appropriate pneumococcal vaccine to the suitable individual within the primary care setting is imperative to reduce disease contraction and comorbidity.

Statement of the Problem

Pneumonia Overview

Pneumonia is a lung infection that can occur across all age groups (Thompson, 2016). The most common signs and symptoms of pneumonia are cough, difficulty breathing, fever, chest pain, fatigue, and even confusion (Thompson, 2016). The level of severity differs among individuals, thus, making treatment vary between outpatient and acute inpatient. Pneumonia is also one of the costliest diseases. In 2013, the United States spent more than $16 billion in expenditures related to pneumonia, which included home visits, prescription pills, emergency room visits, hospitalizations, and outpatient visits (American Lung Association, 2015). Additional costs not accounted for included lost wages, disability, and unemployment.

Death Rates and Prevalence

Pneumonia is one of the deadliest diseases up to date. According to the National Vital Statistics Reports, influenza and pneumonia are the eighth leading causes of death in the United States (Kochanek, Murphy, Xu, & Tejada-Vera, 2016). In 2014, 2.6 million deaths were registered in the United States, of those over 50,000 deaths were related to influenza and pneumonia (Kochanek et al., 2016). The most prominent age groups affected by pneumonia are those under the age of 1 and those who are older than 65 (Kochanek et al., 2016). After the first year of life, the rate of death by influenza and pneumonia drops drastically. Death rates remain and stay dormant up until 25 years of age. From the age of 25, death rate by influenza and pneumonia rises significantly faster and escalates tremendously after the age of 65 (Kochanek et al., 2016).

Clinic Assessment

This quality improvement project was conducted in a primary care clinic in Texas. Approximately 80% of patients who visit the clinic are Asian American. Majority of the patients are from India, which accounts for approximately 50% of the patient population. The remaining 30% of the Asian-American patient population are from Middle Eastern countries, such as Pakistan, Iran, Turkey, and Saudi Arabia. The primary spoken language in the clinic is English. Other languages spoken include Urdu and Spanish.

The primary care clinic accepts all patients who are at least 5 years old or older. Approximately 75% of patients seen in clinic are 18 and over, with the mean age of 33. The most common reason for seeing the provider is for a physical exam. Common diagnoses made within the clinic are hypertension, diabetes, hypothyroidism, hyperlipidemia, anemia, and vitamin D deficiency.

The primary care clinic is relatively new, having been established in late 2016. The clinic consists of one medical provider and three medical assistants. Since opening its doors, the provider and staff have worked diligently to ensure the office is safe, functional, and cost-effective, and it adheres to national guidelines. Thus far, reports of missing documentations are printed every morning of the patients to be seen that day. The reports include missing data, such as date of previous colonoscopy, mammography, smoking cessation, depression screening, immunization, and so forth. During each patient's visit, the report is once again reviewed to ensure the missing data are gathered and updated to the patient's profile during the patient's exam. The generated reports include vaccination requirements, such as influenza, but do not include the pneumococcal vaccine, unless the patient is older than 65. Therefore, in most situations, unless the patient requests for the pneumococcal vaccine, the vaccine does not get

offered nor documented in the patient's chart. This in turn does not align with the recommendations from the CDC.

As previously stated, the primary care clinic is relatively new, which allows a considerable capacity for change. There have been several discussions between staff and provider regarding the methods of improving the quality of service provided in the clinic. The provider desires to the improve the overall quality of care, integrate new technologies into the clinic, expand primary preventive measures, and ensure missing data are recovered during each patient's visit.

Upon reviewing the CDC's recommendations for the pneumococcal vaccine, it was determined that the clinic was not in ordinance with the CDC's recommendations by neglecting to educate, offer, or document the administration or refusal of the pneumococcal vaccine. A closed discussion with the primary care provider took place to determine whether to implement the proper process in documentation and administration of the pneumococcal vaccine. The provider expressed an interest to cooperate and allowed the project to be conducted in her primary care clinic. The new process would allow for proper documentation, an increase in pneumococcal vaccine administration, compliance with the CDC's recommendations, and improvement of the overall quality of care. The provider greatly appreciated the positive input into enhancing the level of service and meeting quality measures.

Project Identification

Purpose

The purpose of the project was to increase the number of pneumococcal vaccines administered to patients using evidence-based practice, with the main focus on complying with

quality measures, raising awareness about the vaccines, increasing herd immunity, and improving the overall quality of care.

Objectives

1. Incorporate a sustainable tool to further assess the patient population. The tool would identify those who qualify for the pneumococcal vaccine based on the CDC recommended criteria.
2. Increase the percentage of patients who receive the pneumococcal vaccine by at least 60%, starting at 0% preintervention.
3. Increase patients' awareness of the pneumococcal vaccine by providing information regarding the pneumococcal infections for those who do not wish to receive the pneumococcal vaccine.

Anticipated Outcomes

By achieving this project's objectives, the primary care clinic would have an accessible and sustainable tool that helps each staff member identify individuals who qualify for the pneumococcal vaccine. The total number of pneumococcal vaccines administered would also increase due to the effective screening process. The patients who refuse the vaccine would have additional information provided, their electronic health record (EHR) reminder would remain until subsequent visits, and proper follow-up would be conducted. As a result, the clinic would increase the overall quality of care.

Summary and Strength of the Evidence

Several studies have shown the effectiveness of the pneumococcal vaccine in reducing the rate of hospitalization in relation to pneumonia worldwide. Among the studies found, there

are correlations between administration of pneumococcal vaccines and reduction in hospitalization related to pneumonia.

Reduction in Pneumonia Cases After the Introduction of PCV7 and PCV13

An extensive study was conducted between 2006 and 2014 at Chris Hani Baragwanath Academic Hospital in Soweto, South Africa. More than 26,000 children younger than 5 years old were admitted to the hospital for the diagnosis of pneumonia (Izu et al., 2017). Out of the 26,000, more than 3,000 were positive for HIV (Izu et al., 2017). In April 2009, the 7-valent vaccine (PCV7) was introduced into the South African public immunization program (Izu et al., 2017). In May 2011, the PCV7 was replaced with PCV13, and the children started to receive PCV13 instead of PCV7. The percentage of children who received the pneumonia vaccine also increased with time, from 10.4% in 2009 to 99% in 2012 (Izu et al., 2017). In 2014, the Chris Hani Baragwanath Academic Hospital estimated roughly 3,100 fewer cases of pneumonia hospitalizations among children younger than 5 years old due to the release of PCV7 and PCV13 (Izu et al., 2017).

Reduction in Pneumonia Cases After the Introduction of PCV7

Another study suggested that pneumonia and its complications were reduced after the introduction of the pneumococcal conjugate vaccine. The study "was conducted using the Indian Health Service direct and contract inpatient data to calculate hospitalization rates per 100,000 for AI/AN children <5 years of age" (Singleton et al., 2015, p. i155). Hospitalizations were considered if the primary diagnosis was pneumonia (Singleton et al., 2015). The children were administered PCV7 after the vaccine's introduction in 2000. The study found that there was a large reduction in the rate of pneumonia hospitalizations from 3,006 to 2,224 (26%) cases for American Indian/Alaska Native (AI/AN) children less than 2 years of age (Singleton et al.,

2015). The study also emphasized that the largest decline occurred from 1997 to 1999 and from 2001to 2006, after the introduction of PCV7 (Singleton et al., 2015). The hospitalization rate continued to decline for AI/AN children through 2010 and 2011, and children age 2 to 4 years old also experienced substantial declines in the decade after PCV7 (Singleton et al., 2015).

Reduction in Pneumonia Cases After the Introduction of PCV13

The findings of the studies previously discussed show the correlation between the introduction of the pneumococcal vaccine and the decline in hospitalization rates, mortality, and morbidity. The studies retrieved were in favor of the pneumococcal vaccine and its effectiveness in reducing the rate of hospitalization. One interesting study also found the herd effect of pneumococcal vaccines and the antibiotic susceptibility of *S. pneumoniae* strains isolated from both adults and children (Hays et al., 2017). The study found that 5 years after the release of PCV13, from 2009 to 2015, the total number of *S. pneumoniae* strains isolated in 2015 decreased in both children and adults (Hays et al., 2017). The PCV13 serotypes involved in acute otitis media also decreased significantly from 85.7% to 38.5%, and the serotypes were more susceptible to penicillin, amoxicillin, and cefotaxime (Hays et al., 2017). The introduction of PCV13 significantly decreased the number of *S. pneumoniae* strains isolated in both children and adults, which ultimately decreased the chance of individuals contracting pneumococcal disease. By expanding the susceptibility to antibiotics, individuals are more prone to treatment effectiveness, less likely to suffer from disease complications, and less likely to spread the infections to others.

Supporting Evidence From CDC

On a national level, the introduction of pneumonia vaccines directly affected the rate of hospitalization and mortality. According to the CDC, from 2000 to 2010, hospitalization “rate

decreased 30% among those aged 65–74 years, 31% among those aged 75–84 years, and 33% among those aged ≥ 85 years" (CDC, 2012, p. 657). Therefore, the implementation of PCV13 and PPSV23 inversely affects the rate of hospitalization, mortality, and morbidity.

Methods

Project Interventions

The implementation of the project was divided into three phases. The preintervention phase included preparing the clinic for the project, educating all staff on the purpose of the project, and updating the provider with pending changes. The implementing phase included applying the vaccination schedule into practice, utilizing the EHR, monitoring the number of vaccines administered, and ensuring patients were receiving adequate and appropriate information. Indication for the pneumococcal vaccine was assessed case by case to ensure that the correct pneumococcal vaccine was recommended and administered. The last phase included finalizing the data, reviewing patient charts, and analyzing pre- and postintervention data.

During the pre-intervention phase, staff members and the provider were introduced to the implementation, length, and overall goal of the project. Staff members were taught further on the use of the vaccination schedule, how to generate EHR reminder pop-up, and what information to provide if the patient refused the pneumococcal vaccine. The provider was instructed further on the EHR reminder pop-up and the specific vulnerable population, such as diabetics, alcoholics, smokers, and those who are immunocompromised. To ensure a smooth transition to the implementation phase, reminders about pneumococcal vaccine recommendations and procedures were also printed out and posted on each exam room door and at the front desk. The Doctor of Nurse Practice student was available to staff and provider if any questions arose during the implementation phase. The Doctor of Nurse Practice student also prepared an encrypted log via a

password protected computer to store the data. The patients were identified by case number, and no other identifiers could be linked to the patient. The password protected computer was kept in the provider's office in a locked cabinet.

During the implementation phase, patients were assessed specifically by case, age group, medical history, and past previous history of pneumococcal vaccine administration. The PCV13 and PPSV23 immunization schedule developed by the CDC was used as a tool to help identify those who qualified for the pneumococcal vaccine and which pneumococcal vaccine they qualified for. During the office visit, staff members screened the patient for eligibility of receiving the pneumococcal vaccine using the CDC vaccination chart. If the patient was eligible, the staff then generated an EHR reminder pop-up on the patient's chart. When the provider opened the patient's chart, the EHR reminder pop-up placed by the previous staff member would trigger and serve as a cue for the provider to offer and educate the patient about the pneumococcal vaccine. The patient was then provided with a vaccine information statement about the indicated pneumococcal vaccine, the pneumococcal vaccine schedule, and specific information as why the pneumococcal vaccine was indicated. The patient had the option of receiving the pneumococcal vaccine during the office visit, delaying the vaccine for a later date, or refusing the vaccine altogether. The administration of the pneumococcal vaccine was documented in the patient's chart. The reason for delaying and refusing the indicated pneumococcal vaccine was recorded for postintervention analysis. The EHR reminder pop-up remained in the patient's chart until the patient received the pneumococcal vaccine, or until it was cleared out by the provider.

During the postintervention phase, retrospective chart review was conducted to compare the percentage of patients who received, delayed, or refused their indicated pneumococcal

vaccine. The collected data were used to compare such patterns: received immunization/total sample size, delayed immunization/total sample size, and refused immunization/total sample size. The reasons for delaying or refusing immunization were also categorized and evaluated. Those who delayed or refused their indicated pneumococcal vaccine retained their EHR reminder pop-up so that both provider and staff members could follow up with those patients to ensure that they receive the vaccine at their next visit.

Ethical Considerations

The project proposal was submitted to the University of the Incarnate Word Institutional Review Board. The project was recognized as a quality improvement project and was approved for continuation and implementation of the project. All patient information was kept strictly confidential while adhering to the Health Information Portability and Accountability Act (HIPAA) privacy laws during data collection.

Results

The project was conducted over a 12-week period. Retrospective chart review was conducted between January and May of 2018, to compare the results between pre- and post-intervention. A total of 362 patients were seen in the clinic. The top indicators for pneumococcal vaccines were diabetes (72%), smoker (6%), and age greater than 65 (22%). Majority of the patients seen in the clinic were Asian (68%), followed by African American (13%), Hispanic (11%), and Caucasian (8%). Eighty-five percent of patients that qualified for the pneumococcal vaccine were less than or equal to the age of 65. The preferred method of payment was private insurance.

Out of 362 patients, 53 (14.6%) were indicated to receive the pneumococcal vaccine. A total of 21 (39.6%) patients accepted the vaccine, thus, making it a 39.6% increase in

pneumococcal vaccine administration postintervention as compared to preintervention. The remaining 32 (60.4%) patients refused the pneumococcal vaccine. The majority of patients who refused stated that they did not wish to receive the pneumococcal vaccine because they did not see the benefit of receiving the vaccine (48.4%). Other reasons for refusing the vaccine were (a) the patient had received the vaccine previously (22.6%), (b) the patient wanted to defer the vaccine to the next visit (22.6%), and (c) the patient had insurance or financial concerns (6.4%).

The first objective of the study was met. The CDC's vaccination guide was accepted as the primary tool in determining patients who were eligible for the pneumococcal vaccine. It was applied in every patient screening, and the provider applauded its user-friendliness. The second objective was not met. As previously stated, only 39.6% of patients received the vaccine throughout the duration of the study. However, it was a minor success in attempts to providing quality care, since no patients were screened nor were they offered the pneumococcal vaccine prior to the start of the study. The third objective was met. All 53 patients who were eligible for the pneumococcal vaccine were properly educated, provided with appropriate information, and followed up with if they refused the vaccine. A few of those patients who previously refused accepted the pneumococcal vaccine on their next visit.

Discussion

Not all objectives were met at the end of this quality improvement project, but the project offered new perspectives and action plans for the primary care clinic. The implementation of the CDC guidelines and electronic alerts as well as participation from adjunct staff and the provider were adequate to conduct the project successfully. The patients' level of adherence to the provider's recommendations was unpredictable. The process relied heavily on the provider to offer the patient the appropriate information in order for the patient to make an informed

decision. Patients were more likely to follow recommendations if the proposals were from the provider, rather than the clinic's staff. It was observed that patients often refused to listen to the staff; some patients stated, "the medical assistance is not my doctor, and I only listen to my doctor." Patients were unaware of the effectiveness of pneumococcal vaccines; therefore, they rightfully denied vaccine administration upon offering. Some patients declared, "pneumonia vaccines are for the old, and I don't need it." All patients who were eligible for the pneumococcal vaccine were properly educated upon their visit with the provider.

For some patients, their inability to pay was the main factor in refusing the pneumococcal vaccine. Because of the way health insurance works, if a previous provider used the procedure code for a pneumococcal vaccine given during an annual physical examination, the patient would have to pay out of pocket if the procedure code was used again in a subsequent visit. There was one case, for example, where the patient claimed to have never had received the pneumococcal vaccine; therefore, the provider proceeded to administer it as indicated. However, the provider did not get reimbursed from the patient's insurance because the patient had received the vaccine previously. In this situation, the patient either forgot that he or she had received the vaccine previously, or the previous provider had used the procedure code erroneously. After the incident, the primary provider was more reluctant to offer the pneumococcal vaccine. For each pneumococcal vaccine to be given, the medical staff had to verify eligibility with the patient and the insurance company, thus, lengthening the patient's time spent in the clinic.

Limitations

This quality improvement project was conducted during Spring of 2018, which was the main season for flu and pneumonia. Many eligible patients refused the pneumococcal vaccine due to their current diagnosis of flu, strep throat, pharyngitis, and upper/lower respiratory

infection. Each patient's symptoms and current medical conditions also hindered the provider's decision in offering the pneumococcal vaccine. Many of these patients wanted to receive their indicated pneumococcal vaccine, but the provider insisted that they should receive it during their well-check visit.

One other limitation was the duration of the study. Due to many deferments, many patients did not have follow-up appointments for their indicated pneumococcal vaccine, or their next visit was outside of the project's time window. Therefore, the patients who were seen more than once were those who had a short-interval follow-up or who were seen at the early start of the project. The short duration of the study limited the number of patients who could potentially receive the pneumococcal vaccine.

Lastly, medical staff had inadequate time per patient to ensure that patients were properly screened for the pneumococcal vaccine and for eligibility from their insurance company. The time it took for medical staff to receive an answer from an insurance company was about 15 minutes. It included holding time, speaking with an insurance representative, and verifying the patient's information. This process lengthened the duration of the patient's visit to about 60 minutes, instead of 30 to 45 minutes. Even though verifying with the insurance company was necessary, it was not favored by the provider. The process impeded patient flow, decreasing the number of patients seen during office hours, and it impacted patient satisfaction.

Recommendations

There are two recommendations for the clinic based on observations and the results of this project:

1. While medical staff can screen patients for eligibility of pneumococcal vaccine, the provider should be the only person in the clinic to offer and recommend the

pneumococcal vaccine to the patients. This recommendation was made due to the overheard comments and patients' preference.

2. The insurance verifying step should be done prior to the patient's appointment date. This will decrease wait time during the patient's visit and increase patient flow.

Implications for Practice

This quality improvement project increased patient awareness regarding pneumococcal infections and further protected patients through vaccination. Patient satisfaction and the clinic's level of compliance also increased as the result of this project. During the implementation phase, the project's success depended greatly on the compliance level of adjunct staff and the provider. Constant reminders and follow-up were keys to ensure that patients were screened and that the screening process was correctly done. For those without the ability to pay for pneumococcal vaccines, having community resources readily available should be a priority to accommodate those individuals. Moreover, a system of insurance verification should be implemented to assist and minimize the total time that patients must spend in the clinic.

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Appendix A

Pneumococcal Vaccination Schedule for Adults

Table 1. Medical conditions or other indications for administration of PCV13 and PPSV23 for adults

Medical indication	Underlying medical condition	PCV13 for ≥ 19 years	PPSV23* for 19 through 64 years		PCV13 at ≥ 65 years	PPSV23 at ≥ 65 years
		Recommended	Recommended	Revaccination	Recommended	Recommended
None	None of the below				✓	✓ ≥ 1 year after PCV13
Immunocompetent persons	Alcoholism		✓		✓	✓ ≥ 1 year after PCV13 ≥ 5 years after any PPSV23 at < 65 years
	Chronic heart disease†					
	Chronic liver disease					
	Chronic lung disease§					
	Cigarette smoking					
	Diabetes mellitus					
	Cochlear implants	✓	✓ ≥ 8 weeks after PCV13		✓ If no previous PCV13 vaccination	✓ ≥ 8 weeks after PCV13 ≥ 5 years after any PPSV23 at < 65 years
	CSF leaks					
Persons with functional or anatomic asplenia	Congenital or acquired asplenia	✓	✓ ≥ 8 weeks after PCV13	✓ ≥ 5 years after first dose PPSV23	✓ If no previous PCV13 vaccination	✓ ≥ 8 weeks after PCV13 ≥ 5 years after any PPSV23 at < 65 years
	Sickle cell disease/other hemoglobinopathies					
Immunocompromised persons	Chronic renal failure	✓	✓ ≥ 8 weeks after PCV13	✓ ≥ 5 years after first dose PPSV23	✓ If no previous PCV13 vaccination	✓ ≥ 8 weeks after PCV13 ≥ 5 years after any PPSV23 at < 65 years
	Congenital or acquired immunodeficiencies¶					
	Generalized malignancy					
	HIV infection					
	Hodgkin disease					
	Iatrogenic immunosuppression‡					
	Leukemia					
	Lymphoma					
	Multiple myeloma					
	Nephrotic syndrome					
	Solid organ transplant					

*This PPSV23 column only refers to adults 19 through 64 years of age. All adults 65 years of age or older should receive one dose of PPSV23 5 or more years after any prior dose of PPSV23, regardless of previous history of vaccination with pneumococcal vaccine. No additional doses of PPSV23 should be administered following the dose administered at 65 years of age or older.
†Including congestive heart failure and cardiomyopathies
§Including chronic obstructive pulmonary disease, emphysema, and asthma
¶Includes B- (humoral) or T-lymphocyte deficiency, complement deficiencies (particularly C1, C2, C3, and C4 deficiencies), and phagocytic disorders (excluding chronic granulomatous disease)
‡Diseases requiring treatment with immunosuppressive drugs, including long-term systemic corticosteroids and radiation therapy

NCIRDig410 | 11.30.2015 Pneumococcal Vaccine Timing for Adults | Page 3 Centers for Disease Control and Prevention

Note. From "Pneumococcal Vaccine Timing for Adults," by Centers for Disease Control and Prevention, 2015b. Copyright 2015 by Centers for Disease Control and Prevention. Reprinted with permission.

The CDC recommends both the PCV13 and PPSV23 for adults who are 19 years or older. The recommendation for either PCV13 and PPSV23 are exclusive per patient's medical condition. Both PCV13 and PPSV23 cannot be given during the same office visit, and their time lapse in between vaccination are also different. Tools proposed from other studies are not as specific and have less instructions than the vaccination schedule retrieved from the CDC. Therefore, the CDC pneumococcal vaccination became the vaccination schedule of choice.

Appendix B

Letter of Support

Tehmina Sami M.D., P. A.

Sugar Land Physicians

13440 University Blvd, Ste. 150

Sugar Land, Texas 77479

To whom it may concern,

I, Tehmina Sami, the primary owner and main primary care physician at Sugar Land Physicians, grant permission for Truc Le to access patient's medical record, conduct pre-intervention and post-intervention assessment based upon patient's medical record, and implement his Doctor of Nursing's project on pneumonia vaccine being conducted at my clinic. Truc Le will be under my direct supervision during his pneumonia vaccine implementation. Data collected will be discussed between Truc Le and I and will be kept strictly confidential.

Thank you,

Tehmina Sami M.D., P. A.