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Evidence-Based Best Practice Toolkit for Competency-Based Orientation in Integrating an Adult Pneumococcal Protocol to Improve Vaccine Rate: A Program Evaluation Review

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Abstract

Practice Problem: Low pneumococcal vaccine uptake among high-risk adults is partly due to underutilized or lack of nurse-driven vaccine protocols, limited understanding of vaccine intervals and indications by nurses, and lack of proper training. Currently, physician-driven orders are the only avenue for high-risk adults to obtain this vaccine in ambulatory sites.

PICOT: In adults 65 years or older within an ambulatory setting, does the use of an adult pneumococcal vaccine protocol, compared to a physician order (no vaccine protocol) impact the rate of vaccination over 2 months?

Evidence: Utilization of two or more interventions provided higher immunization rates. Interventions with stronger evidence rate include nurse-driven vaccine protocols, vaccine reminders, and use of electronic health system alerts. Review of programs and toolkits proved efficient interventions of vaccine programs based on CDC program evaluation framework.

Intervention: The program evaluation yielded best practices for adult pneumococcal vaccine compliance utilizing nurse-driven protocols based on CDC recommendations and a competency-based orientation toolkit to support staff members when working in ambulatory settings.

Outcome: A CBO toolkit was created to facilitate the ordering and administration of pneumococcal vaccines based on approved protocol to increase vaccine uptake. CBO toolkits offer nurses autonomy and increased competency with safe injection practices.

Conclusion: Adult vaccine programs with nurse-driven protocols in combination with other modalities, prove effective to increase pneumococcal vaccine rates among high-risk groups and expands access to preventive health services provided by nursing staff. A CBO toolkit increases competency of injection practices to nurses in ambulatory settings.

Evidence-Based Best Practice Toolkit for Competency-Based Orientation in Integrating an Adult Pneumococcal Protocol to Improve Vaccine Rate: A Program Review

Vaccine-preventable diseases (VPD) account for complications and infectious diseases with low vaccine rates among high-risk adults (Tan et al., 2020). Negative outcomes for preventable disease due to low immunization rates are strongly linked to hospitalizations or readmissions, disease complications, disabilities, income loss, and demise (Ozawa et al., 2016). According to public health institutions, 80% of the economic burden correlates to the unvaccinated population and longer life expectancy, especially among adults (Sauer, et al., 2021; Tan et al., 2020; Williams et al., 2016). Integration of effective adult immunization programs will support healthy aging and decrease the mortality and morbidity rates (Sauer et al., 2021). Evaluation of vaccine programs allow quality improvement committees to improve ineffective practices or develop new ones and improve adherence to vaccine guidelines (Pennant et al., 2015). Limited access to immunizations and underutilization of vaccines places communities at risk for susceptible diseases. To close the vaccine gap among this aging population, this program evaluation and development of a competency-based orientation (CBO) toolkit, will identify best practices on adult vaccine programs and a tool to orient nurses when on the assessment and administration of pneumococcal vaccines.

Significance of the Practice Problem

Low pneumococcal vaccine uptake among adults in the ambulatory setting yields poor health outcomes. Managing and treating infectious diseases among high-risk adults, especially those 65 years and older becomes challenging while dealing with comorbidities that potentially be exacerbated. Efforts to inoculate the population have been a burden by physicians alone in the

current vaccine era leading to innovative ways to improve the vaccination rate. The nursing staff must understand vaccine schedules and indication, disease prevention and treatment, as well as preventive measures and integrate them into the plan of care to recognize early signs of illness or deterioration (Jump et al., 2018). Lower respiratory infections like pneumonia and bronchitis are the leading cause of hospitalization among the geriatric population in the United States (Jump et al., 2018). Strong and consistent vaccine campaigns, hand hygiene protocols, surveillance, and control of disease outbreaks will help control infectious diseases (Center for Disease Control, 2016).

Currently, one clinical site for the organization revealed that only 88% (774/884) of eligible adults 65-years and older met the pneumococcal vaccine schedule, however, this percentage fell below the established organizational goal of 90% as recommended by the Healthy People 2030 benchmark. Low vaccine uptake in part is due to lack of nurse-driven protocols, limited understanding of vaccine intervals and indications, fear about the safety of vaccines, underutilization of best practice alerts in electronic health records (EHR) and access to services (Colmegna et al., 2021). Harris (2021) argued the importance of improving pneumococcal vaccination rates among immunosuppressed patients in ambulatory settings that are at a greater risk of developing respiratory tract infections by integrating best practices in the clinical setting.

Global and Regional Statistics

Vaccine-preventable diseases continue to impact populations worldwide. Over the last three decades, a cumulative disease burden of 25 million pneumococcal cases in the United States has been reported and a projected cost of 653 billion over the next 30 years to treat influenza and pneumococcal disease (Tailbird et al., 2021). The World Health Organization

(WHO) reported 1.5 million deaths each year because of vaccine-preventable diseases (2015). According to Healthy People 2030, an estimated 713.9 hospitalizations related to pneumonia infections per 1000,000 adults 65-years and older were recorded in 2016 (Healthy People 2030, n.d.). Approximately "…320,000 people get pneumococcal pneumonia every year, leading to 150,000 hospitalizations and 5,000 deaths, mostly among the elderly" (Centers for Disease Control, 2016, para. 1). Despite public health recommendations of two pneumococcal vaccine doses among adults 65 years and older, the pneumonia prevention vaccine rate was 61 % in 2014 in comparison to the Healthy People 2020 goal of 90% (Hughes et al., 2018). In 2018, California reported an estimate of 6,917 deaths related to lower respiratory infections among adults (National Center for Health Statistics, 2020).

Society and Population Impact

High-risk populations are the most vulnerable and account for most serious lower respiratory tract numbers leading to a financial burden on their retirement funds and overall healthcare costs of $1.8 billion annually (Huang et al., 2011). Inoculation of different populations prevents millions of vaccine-preventable diseases annually, interrupts disease transmission domestically and abroad, and reduces financial impact on communities (Vanderslott, 2018). Overall, unvaccinated adults account for $7.1 billion of economic burden and add up to approximately 2.3 million hospital days (CDC, 2014; Huang et al., 2011). Integrating adult vaccine programs in primary care and specialty settings will mitigate pneumococcal infections and complications among high-risk adults. These programs will improve uptake of vaccines and avoid wasting costly vaccines due to underutilization. Over the years vaccines have proven to be effective with mild to moderate side effects, adverse effects to vaccines are rare.

Purpose of the Program Evaluation Project

The purpose of this program review was to gather evidence to support a proposed Doctor of Nursing Practice (DNP) project. The guiding objectives of this program evaluation and subsequent competency-based orientation toolkit development were to: 1) Apply the CDC program evaluation framework in the appraisal of an adult pneumococcal vaccine program to identify best practice recommendations to increase vaccination rates in ambulatory settings within 10-weeks and 2) develop a competency-based orientation toolkit for nurse-driven adult pneumococcal vaccination programs for community-based practice settings to increase competency-based skillsets and improve vaccine administration practices within 10-weeks.

This program evaluation focused on best practices for an adult pneumococcal vaccine program utilizing nurse-driven protocols based on CDC recommendations and to elaborate a competency-based orientation toolkit to support staff members when working in ambulatory settings. Nurse-driven protocols facilitate the ordering and administration of pneumococcal vaccines based on approved policies of a health entity. Protocols can be embedded in electronic health systems to support clinical decision making. Knowledge-deficit among staff members for vaccine guidelines is among other barriers to vaccine protocols according to the U.S. Community Preventive Services Task Force [CPSTF] (2016). Other concerns that interfere with the implementation of vaccine protocols is the lack of training, concern for additional workload, team members hesitancy to administer vaccines without a physician's order, and concern that vaccines would interfere with other care services (CPSTF, 2016).

The use of a vaccine protocol is an evidence-based intervention adaptable to inpatient and ambulatory clinical settings and supports onboarding of the nursing team during orientation. A qualitative study revealed that a major set-back to a vaccine protocol integration is provider

acceptance of this process (Dempsey et al., 2015). During an informational session, clinicians would be provided the rational for the impact of integrating a vaccine protocol with workflow improvements, enhance access to preventive health services, and the collaboration of other team members like nurses to support them with the assessment and administration of vaccines to high-risk populations. In addition, the project leader provided periodic updates of the vaccine uptake numbers once the protocol in place compliance was ensured with the process. By the end of the PowerPoint session, staff had a better understanding of the pneumococcal vaccine criteria by providing feedback via a survey following the presentation. At the end of a two-week preceptorship period, the orientee was able to properly assess, recommend, administer, and document inoculation of the vaccine referencing the available toolkit to support use of the nurse driven vaccine protocol via direct observation of the preceptor. Volunteer preceptors within the clinical site were randomly assigned.

Program Problem Statement

The following clinical question has been formulated to guide this DNP project. In adults 65 years or older within an ambulatory setting, does the use of an adult pneumococcal vaccine protocol, compared to physician order (no standing order protocol) impact the rate of vaccination over 2 months? The population was focused on adults 65 years and older since they are considered a high-risk population. An intervention of a competency-based orientation toolkit on the use of a pneumococcal vaccine order protocol improved staff compliance on usage and improve access to preventive health services without the need to schedule a visit with a physician. The comparison to the intervention is a physician order needed to activate the vaccine in the system or missed opportunities to inoculate. The outcome of this evidence-based

intervention has proven to be effective in increasing vaccine uptake among under-immunized adults and familiarize staff members with underutilized vaccine protocols (Hurley et al., 2020).

A CBO toolkit was developed to guide adult pneumococcal vaccination programs and reduce the utilization gap of immunization protocols, familiarize nurses with vaccine guidelines, and increase job satisfaction. The evaluation of current adult vaccine programs identified best practices available that supported the uptake of immunizations to mitigate vaccine preventable diseases among high-risk populations, especially in adults 65 years and older.

Utility of Program Review

Integration of a nurse-driven adult pneumococcal vaccine program will contribute to enhance access to preventive health services for high-risk populations, increase vaccine uptake and mitigate missed opportunities, relieve burden on physicians alone of ordering the vaccine, maximize nurses' scope of practice, increase compliance with practice guidelines and organizational policy. The evaluation of existing adult immunization programs utilizing the CDC program performance and evaluation framework allowed insight on the effectiveness of such programs, the interventions, and analysis of their outcomes. Evaluating best practices through the scrutiny of available programs supported this project leader with the development of an effective adult pneumococcal vaccine program and CBO toolkit. Both will increase protocol utilization, improve vaccine rate, and ease the transitioning orientation for nurses new to the ambulatory setting. Potential for workflow improvements will enhance immunization programs and decrease the probability of VPD in high-risk groups in an array of settings like hospitals, long-term care facilities, and ambulatory settings. This objective will increase the rate of vaccination, reducing missed opportunities to inoculate, reduce hospitalizations rates and complications, and increasing

staff adherence to guidelines and institutional policy (CDC, 2019; Quinn et al., 2020; Sheth et al., 2021).

Supporting new hires to ambulatory practices will facilitate comfort when managing nurse schedules and improve their immunization assessment and administration skills. The utilization of AVP can easily be applied in settings that manage high-risk clients like rheumatology, endocrinology, and infusion centers, as well as other settings like pharmacies.

Analytical Framework

The following analytical model will guide this program evaluation. The Centers for Disease Control and Prevention (CDC) Program Performance and Evaluation Office (PPEO) is an effective framework offered to appraise immunization programs. This framework offered a systematic approach to effectively implement or improve best practices available while evaluating adult pneumococcal vaccine programs and its relation to key stakeholders. This program evaluation framework consists of six key steps focused on stakeholder engagement, program description, evaluation design, evidence credibility or strength, justification of conclusions, and sharing utilization of findings by ensuring use and sharing lessons learned (CDC, 2017). The John's Hopkins Evidence-Based Practice (JHNEBP) framework comprised of three steps focused on practice question, evidence, and translation, served as a foundational basis since its application follows a systematic approach like the PPEO. Both frameworks highlighted the integration of all team members vital to the development of a project through identification of a clinical inquiry or population of interest, planning or description of a program or intervention, appraisal and summary of best evidence gathered, and sharing findings with stakeholders (CDC, 2017; Dang & Dearholt, 2017). For this DNP project, the PPEO framework was utilized.

Step one and two of the CDCs PPEO framework aims to identify stakeholders invested and description of the program. Key team members identified are the nurses involved with the utilization of an adult pneumococcal vaccine program/protocol, physicians willing to share acceptance of nurses involvement with application of program, practice managers support of program implementation within clinical site, regulatory team involved with the results of program outcome to meet organizational quality metrics, informatics or analytics team to integrate other electronic health system functions to support program integration and data collection, and other ambulatory nurses compliance with program participation. For stakeholders to buy in, an informational session will be provided on the relevance of best practice applications to improve vaccination rates and integrate utilization of a nurse-driven pneumococcal vaccine protocol/program and review the workflow that integrate best practices. An explanation of the proposed workflow will include purpose of the program which aims to improve vaccination rates and facilitate the orientation or training for nurses with use the CDCs pneumococcal vaccine guideline road map and utilization of a CBO toolkit. The toolkit will provide access to institution policy, vaccination assessment checklist based on CDC guidelines, and handouts with related vaccine administration guidelines.

Step three of the program evaluation framework evaluates the design of the project. An outcome of this program evaluation was the creation of a CBO toolkit to guide onboarding nurses in an array of settings working with vaccine administration. Analysis of the toolkits effectiveness to support the nurses' orientation process will be appraised and need for revision. Step four focuses on the collection of the trustworthy evidence that supports the development of an APV program and CBO toolkit. Evaluation of toolkit utilization rate produced a tangible output of its usefulness. The application of clinical judgement, analysis and translation of

evidence summarizes step 5 of this system. Identification of themes on best practices provided a basis for the development of a CBO toolkit. The last step, number six, culminates with sharing the findings and recommendations of the evidence gathered to help sustain the program or need for revisions during scheduled quarterly meetings with use of PowerPoint presentations that include graphs and stakeholder feedback. A systematic approach will support the use of decision making when evaluating a programs sustainability and feasibility.

Evidence Search Strategy, Results, and Evaluation

A diligent literature review search was conducted in the following databases: CINAHL, OVID Medline, PubMed, and ProQuest. Articles published between January 1^{sts} 2005 and May 31st, 2021, were included. Key terms and subject headings searched were Pneumococcal disease, pneumococcus pneumonia, vaccine compliance, adult vaccine programs, nurse-driven protocols, inoculation practices, best practice alerts, and clinical protocols. Inclusion criteria: adults 65 years and older and geriatrics; quasi-experimental studies and systematic review; ambulatory or primary care; and publication date 2005 to present. Exclusion criteria applied: pediatric, and young adults. During the search process of literature in several databases, a total of 100 results were generated by the search. The database Cumulative Index of Nursing and Allied Health (CINAHL) produced 53 citations using the mentioned keyword; the Ovid Medline yield 3 articles; PubMed database generated 23 articles and ProQuest resulted in only 1, while Google Scholar outputted 20 citations.

Evidence Search Results

After screening the titles and abstracts, a sum of ten studies remained for this project and included in a PRIMSA diagram (see Figure 1). One of the ten articles was a systematic review with a level II of evidence and B grade of evidence based on the Johns Hopkins EBP model.

Seven of ten articles yield a level II of evidence with four B and three a level A grade of evidence. Three of the articles revealed a III level of evidence. Overall, the grade and level of evidence support the effectiveness of the use of vaccine standing order protocols within a multimodal approach.

The Johns Hopkins EBP model was utilized to determine each article's level and strength of evidence (Dang & Dearholt, 2017). Table 1 provides the articles found and is organized by levels and grades according to the John's Hopkins EBP tool. Appendix A and B provide details for each article that summarizes each finding.

Evidence Evaluation

The Advisory Committee of Immunization Practices (ACIP) offers the CDC advice and guidance on the most current pneumococcal vaccine recommendations which are published in the Morbidity and Mortality Weekly Report (MMWR). The ACIPs role is to develop vaccine recommendations that include age-appropriate timelines for vaccine administration, interval between recommended doses, frequency of doses, and precautions and contraindications to guide professionals practice (CDC, 2019). As of October 2021, ACIP recommends new doses, a 15-valent PCV and a 20-valent PCV for adults 65 years-old or older and for those between 19-64 years with high-risk conditions with no prior history of a PCV (Kobayashi, 2022). The implication for public health practice is based on the simplification of the vaccine guidelines. Studies with effective APV programs recommended computerized reminders or best practice alerts based on CDC guidelines to support vaccine administrators in addition to nurse-driven protocols (Capitano et al., 2018; Tan et al., 2020; Trick, 2009).

The CDC along with the National Vaccine Advisory Committee (NVAC) have created a set of standards to improve adult immunization practices and increase vaccine uptake rates by all

healthcare professionals and mitigate missed opportunities (NVAC, 2014). A four-step approach to assess, recommend, administer or refer, and document, offers a model to all healthcare professionals along the care spectrum (CDC [NVAC], 2016). The CDC PPEO framework highlights the importance of stakeholder engagement to the success of any program. This recommendation provides a pathway to stakeholders that administer vaccines and to those that do not immunize but can refer patients to professionals that do so. Assessment of the patients' vaccine status by informed professionals along with integrated protocols and up-to-date policies ensure inoculation at every visit. Once the patient is agreeable, health professionals will proceed to administer the dose or refer to a site where vaccines are offered. The last practice of standard is the effective documentation of the vaccine received by the patient whether in an electronic health system or an immunization registry. Ensure that the patient leaves with an appointment reminder if an additional dose is required to complete a series. These standards offer effective practices that support the effectiveness and guidance to improve adult immunization programs.

Ensuring the health of communities through preventive services is at the core of the U.S. Community Preventive Services Task Force [CPSTF]. This is an independent and nonfederal agency established by the U.S. Department of Health and Human Services in 1966. The CPSTF offers evidence-based interventions across many health topics applicable to an array of settings that contain approaches that improve health, disease preventive strategies, healthcare policies and system changes, to improve the delivery of services (Guide to Community Preventive Services Task Force [CPSTF], 2016). Recommendation of strong evidence interventions found in systematic reviews by the CPSTF to implement adult vaccination programs include the use of provider reminders, provider assessment and feedback, client reminder and recall systems, home

visit vaccine programs, reducing client out-of-pocket costs, standing orders, and a health care system-based interventions implemented in combination (CPSTF, 2014).

Evaluation of these programs point out effecting interventions found in scholarly articles reviewed by this author. Articles that mention adult vaccine programs and the use strategies that improve access to health services with the integration of vaccine protocols and proven effective on improving vaccination rates in health care settings among adults 65 years-old and high-risk populations.

Critical Appraisal of the Evidence with Themes

After a close review and synthesis from the collected literature, the use of an adult pneumococcal vaccine program in ambulatory settings improved patient outcomes and staff compliance to inoculate. Higher immunization rates among high-risk adults were evident especially when paired a second intervention like clinical support tools embedded in electronic health systems, best practice alerts. The literature revealed effective correlation of increased vaccines rates with the use of effective adult vaccine programs integrated to daily workflows in primary and tertiary settings. Previsit planning to identify individuals in need of a vaccine was included in workflows recommended. Many of the scholarly articles reviewed were performed in tertiary settings and few in primary care and long-term care sites. Five of ten articles were carried out in primary care settings within the United States. One of the ten reviewed the use of pharmacist-driven pneumococcal immunization protocols in 56 inpatient acute settings and 38 outpatient areas. The following themes were identified during the literature appraisal.

Single Interventions

In single intervention studies, written or electronic vaccine standing order versus the use of immunization flow sheet post-immunization policy implementation did not yield a significant

change in vaccine rates (Gamble, 2008; Goebel, 2005). Vaccine champions, yearly staff education, and effective computerized monitoring systems were recommended post-implementation of vaccine programs with protocols to maintain the success of vaccine programs in any setting (Capitano, 2018; Gamble, 2008; Goebel, 2005; Tan 2020). Gamble's (2008) single intervention study revealed a statistical increase in vaccine rate but not significant when evaluating the use of a standing order policy in three primary care sites pre- and post-implementation (38% versus 13%). Although vaccine rate was improved, a factor influencing rates was the clinicians' hesitancy to recommend inoculation leading to missed opportunities. Capitano (2018) emphasized higher patient compliance with vaccine uptake when physicians educate on the importance of health promotion and disease prevention with strong vaccine recommendations. In this study, 80% (45 of 56) of inpatient settings used pneumococcal immunization protocols in comparison to 50% (19 of 38) of outpatient settings. Computerized standing orders for pneumococcal inoculation among adults were 51% effective compared to 31% when using electronic physician reminders as referenced in Table 2 (Capitano, 2018).

Multi-Modal Interventions

Most articles reported that multimodal interventions versus single interventions provided statistically significant results as evidenced by Loskutova (2020), Lau (2012), Trick (2009), Smith (2011), Kim et al. (2014), and Bond (2009). These studies highlighted the factors that contributed to the success and effectiveness of adult immunization programs when utilizing vaccine protocols in conjunction with a computerized generated provider and patient reminders, immunization flow sheets, checklists, and patient outreach. Loskutova (2020) focused on adults that met the criteria for inoculation in a large primary care setting implementing a multimodal intervention in comparison to the use of a clinician reminder system. Post-intervention, vaccine

rates increased by 18% in contrast to the comparison group, 16% as noted in Table 2. Although vaccine rate was improved, a factor influencing rates was the clinicians' hesitancy to recommend inoculation leading to missed opportunities. Capitano (2018) emphasized higher patient compliance with vaccine uptake when physicians educate on the importance of health promotion and disease prevention. In this study, 80% (45 of 56) of inpatient settings used pneumococcal immunization protocols in comparison to 50% (19 of 38) of outpatient settings. Computerized standing orders for pneumococcal inoculation among adults were 51% effective compared to 31% when using electronic physician reminders as referenced in Table 2 (Capitano, 2018).

Pharmacy-Driven Protocols

Pharmacy-driven vaccine programs that integrated protocols were identified during the literature review as effective interventions to improve vaccination rates. Articles revealed that the use of pneumococcal immunization protocols (PIPs) supported recommendations from the Advisory Committee on Immunization Practices (ACIP). A cross-sectional study of 94 surveys for inpatient and outpatient pharmacy settings within the United States, concluded that 56% (45 inpatient settings) followed PIP and only half of the outpatient sites had pneumococcal protocols in place. Common barriers identified to the implementation of PIPs were outdated protocols, lack of knowledge to ACIP vaccine recommendations and lack of staff accountability (Capitano, 2018; Hurley et al., 2020). Additionally, the Immunization Action Coalition (IAC) exhorts all licensed health care professionals who see adults to appraise, recommend, and inoculate or refer for needed vaccines to mitigate missed opportunities and increase vaccination rates (Hurley et al., 2020). Expansion of adult vaccine programs integrate settings like pharmacies to facilitate access and accommodate payor requirements.

Clinical Practice Recommendation

These studies yielded higher vaccine rate uptake by adults. Based on the scientific evidence from the synthesized literature, adult vaccine programs that include nurse-driven vaccine protocols in combination with other modalities proved effective towards increase pneumococcal and influenza vaccination rates among elderly and adults 18 years of age and older. Consistent use of adult vaccine programs and patient reminders correlated with higher vaccine rates in ambulatory settings in comparison to hospital settings (Capitano, 2018). Evaluated vaccine programs and practice standards strongly recommended the integration of adult vaccine programs that included standing orders or protocols since they help expand access to vaccines by including ancillary staff like nurses and pharmacist to mitigate missed opportunities.

Program Review Recommendation Statement

Integration adult pneumococcal vaccine programs in ambulatory settings allows expansion of preventive health services through nurse clinic services without the need of a physician order. Changing the current culture of immunization practices within any organization promotes accountability, increase ease to recommend vaccines, and improves vaccines administrators' skills and ineffective practices, "cultural norms define what is encouraged, discouraged, accepted, or rejected within the group" (Groysberg et al., 2018, p.4). Evidence-based projects or quality improvement assignments enhance vaccine compliance culture in any organization and contributes to implementation of cost-effective vaccine programs. This APV program will reduce the time needed to seek a signed order from a clinician, close the gap for delivery of services, and improve the patients' experience with the delivery of care. Synthesized evidence supports the integration of adult vaccine programs to free up clinicians from minor assignments, shift tasks to trained licensed personnel to aid with inoculation, improve clinical

workflow, and mitigate missed opportunities. Additionally, activating best practice alerts in electronic systems to guide patient care, will support the clinical decision making when recommending missing vaccines. Instituting workflows that support clinical staff, will reinforce vaccine practice guidelines, vaccine practice standards, and pneumococcal vaccine recommendations to identified patients.

Implementing a CBO toolkit will enhance the nursing team's knowledge with vaccine indications and guidelines, administration practices and vaccine adverse effects management and reporting, effective documentation practices, and use of best practice alerts in electronic health systems. As improvements in vaccination rates are established, the project can be disseminated among other primary care settings that would benefit from this intervention like specialty clinics that service high-risk adults in need of pneumonia prevention vaccines. The use of a nurse-driven protocol provided clinical significance that answered the PICOT question since its use contributes to the reduction of the public health concern related to morbidity and mortality of VPD such as pneumococcal infections among high-risk and under-immunized individuals.

Program Analysis and Evaluation Plan

After careful evaluation of the literature evidence, nurse-driven protocols are considered an evidence-based intervention with effective program outcomes to increase vaccination rates (Capitano, 2018). Nurse-driven protocols utilized in adult vaccine programs expands access to vaccines (NVAC, 2014). Patients can easily schedule an appointment with a nurse for an immunization assessment without a required primary care physician order. Adding nurse schedules to clinical practices expands access to vaccines outside of the doctor visit norm. Applicability of vaccine protocols extends to other health settings like pharmacies, urgent cares, specialty, and retail clinics. The utilization of nurse-driven protocols or vaccine standing orders

is highly advised by governmental and independent health agencies as an effective tactic to improve vaccine administration practices and improve workflows. Inclusion of best practices in the development of an adult vaccine program (AVP) along with a competency-based orientation (CBO) toolkit, will guide nurses in ambulatory settings to improve vaccination uptake and increase their awareness on best vaccine practices (Guide to Community Preventive Services Task Force, 2016).

Applicability and Implementation Strategy

The CBO toolkit will be utilized as a training tool in an internal medicine ambulatory setting by nursing staff. A registered nurse will be assigned as vaccine champion and program facilitator to support existing staff and new hires when working in the nurse clinic. Review of the toolkit will be part of the orientation phase for onboarding nurses and annual review is recommended to assess competency. Formative assessment can be attained through monthly chart audits on staff performance and impact of vaccine program, see (Appendix D). This strategy will provide practice feedback, reinforcement on best practice, and corrective actions as needed. Summative assessment can be evaluated with an annual competency review of the nurse workflow and quiz of the AVP, (Appendix E). The AVP will include the National Vaccine Advisory Committee tool that integrates Standards for Adult Immunization Practice. A recommendation to create a template for nurse visits will be proposed to include these four standards to improve the assessment of immunization status for the nurse workflow, (see Appendix F). Review of the vaccine program is located in (Appendix G).

The program will increase demand for vaccination by sending reminders when vaccines are due or recall of missed vaccine appointments with support of electronic health system support tools. The adult vaccine program will decrease the number of missed opportunities due

to missing provider orders and the utilization of a nurse-driven protocol to identify eligible adults. Workflow improvements can enhance immunization programs and decrease the probability of VPD in high-risk groups.

Selection of Best Practices

The inclusion of best practices for this adult vaccine program was synthesized by the review of three health organizations that recommended vaccine guidelines and offered evidence-based interventions focused on improving vaccine practices and optimizing preventive health measures that mitigate vaccine preventable diseases like pneumonia, see summary in Table 3. The CDC program evaluation model offered a guide to appraise each entity and toolkits described in this project, highlighting key stakeholders (nurse, manager, patients, medical director, CNO) and their association with program goals and objectives, and linking metrics that justify recommendations. Agencies such as the CDC, NVAC, and CPSTF, are aligned with their recommendations to improve vaccination rates, improve the health of at-risk populations, mitigate missed opportunities to inoculate, integrate vaccination information systems, recommendation of new vaccine policies, and enhance performance feedback (CDC, 2019; Kobayashi, 2022; NVAC, 2014). These organizations support best immunization practices for all healthcare professionals in different clinical settings when considering vaccine initiatives. The toolkits identified that follow the CDC program evaluation model are the Kaiser Permanente Covid19 vaccine equity toolkit and the Adults Immunization Toolkit for Clinicians.

For this vaccine program evaluation, the use of nurse-driven vaccine protocols is strongly recommended by two of the reviewed organizations, ACIP and NVAC. Tools to support nurse-driven protocols are found in these websites which provide a guide for implementation and resources that highlight the impact of protocols to change policy (see Table 4). The CDC

represents a reputable and recognized entity for vaccine guidelines and recommendations. Additionally, the National Vaccine Advisory Committee guides the recommendations published by the CDC when following best practices for the adult pneumococcal vaccine. Both agencies set the standards for vaccine administration and guidelines to follow when health professionals advise patients. All three organizations follow most of the CDC program evaluation model's standards and steps as depicted in Table 3. They clearly identify similar key stakeholders, provide a succinct program description with defined goals, an outline of focused design to increase vaccine rate and practices, summary of evidence-based interventions that support best vaccine practices, and strong recommendations to stakeholders. The toolkits reveal relevant metrics to improve vaccine practices and offer strong interventions underutilized during nurse visits. For the proposed AVP and CBO toolkit, this framework provides a broader understanding of key elements vital to its formulation. The logic model presents a flow of multiple actions required to implement the program and improve current workflows (see Table 5). Anticipated budgetary expense for vaccine expansion over an eight-week timeline is outlined in Table 6. Expenses entail purchase of vaccines by the health institution with an approximate amount of $2,000 per month. Staffing will not create an additional expense since an RN and LVN are already part of the clinical site team.

Program Evaluation Discussion and Recommendations

Adult vaccine programs with integrated nurse-driven vaccine protocols, support clinical workflows in ambulatory settings by expanding access to preventive services and reducing the rate of vaccine preventable disease among adults (Harris, 2021). After the appraisal of the toolkits and adult immunization programs, findings revealed that the use of more than one evidence-based intervention are more effective at increasing immunization rates than single-led

interventions. Practices with nurse-driven vaccine protocols offer vaccinators autonomy to assess, recommend, and inoculate under-immunized adults in a variety of settings. Additionally, ensuring services are delivered in an equitable form by including interpreting services for non-English speakers, extended hours of nurse schedule to accommodate working families, and access to schedule appointments by phone, patient portal, and on a walk-in basis.

To evaluate staff performance on the utilization of nurse-driven vaccine protocol policy, the nurse champion will perform monthly chart audits with the use of an audit tool (see Appendix D). This tool will support data collection on nurse performing assessment, whether the immunization history was reviewed, and if the patient was immunized or not. To assess knowledge retention, every vaccine administrator will complete an annual assessment by completing a four-question quiz. Opportunity to remediate will be available after nurse meets with nurse champion to review topic. To sustain the adult vaccine program with best practices identified, the nurse champion and/or nurse preceptor will use the Immunization Action Coalition (IAC) checklist to evaluate the workflow in place. This tool will help identify areas for improvement and a plan of action to support the vaccinator. With the support of the analytics or informatics team, weekly vaccine rates will be gathered by running reports specific to the clinical site and shared during staff meetings and/or huddles meets. Vaccine rates can be posted on the daily engagement board to provide a visual aid and feedback on success or challenges of the program.

Recommendation to survey new hires two months post mentorship program is ideal to identify any barriers or suggestions about the program. This will allow them the opportunity to voice any concerns regarding the orientation process and experience with preceptor. Potential limitations to this adult vaccine program are the impact of the Covid19 pandemic on the nurse

clinic accessibility due to staffing shortages and stocking of vaccines due to shipment delays. Acceptance of new practice by current staff nurses is a concern since it poses risk of scrutiny of their current practice. Colmegna et al. (2021) identified personal beliefs and vaccine experiences as barriers to increase immunization rates. Implementation of an adult pneumococcal vaccine program that integrates best practices (nurse-driven protocol policy, patient reminder system, and standardized workflow) recommended by this project, will improve vaccine rates among adults 65 years and older. It will also provide a guide to help orient new hires in ambulatory settings coordinating preventive health services like vaccines. The tools gathered will support nurse champions and mentors with the orientation process and performance evaluation.

The developed CBO toolkit (Appendix H) is designed to help orient new nurse hires execute proper vaccine needs assessment of an electronic health record, decrease missed opportunities, advise adults on the pneumococcal vaccine, and increase pneumococcal vaccine uptake. This toolkit is intended for an audience of healthcare professionals, nurses, and quality improvement nurses that seek to enhance immunization practices in their clinical setting. It outlines glossary of terms, an implementation strategy, key stakeholders involved with the implementation process, and tools that support nurse instruction and patient engagement handouts.

This program evaluation has gathered evidenced-based interventions (see Appendix H) that support the success of an adult pneumococcal vaccine program and development of an extensive competency-based orientation toolkit. Based on the CDCs program evaluation framework, this CBO toolkit outlines the benefits of investing resources to engage key stakeholders (patients, nurses, manager, physicians) with the improvement of immunization processes to mitigate vaccine preventable diseases, especially among high-risk adults. Clinical

sites can obtain baseline data with the support of the electronic health system to run reports and by the utilization of an audit tool and measure the process outcome and vaccine rate post intervention. Data will reveal current adult pneumococcal vaccine status to serve as a base to compare numbers post implementation of this CBO toolkit. This toolkit meets criteria described in the CDCs framework for a successful vaccine program. Collected data can support informed decision-making for stakeholders to determine the need to stock vaccines that reduce the likelihood of pneumococcal disease among high-risk adults, increase their quality of life, and decrease hospital admissions related to community acquired pneumonia. Additionally, the CBO toolkit is designed to ease new nurse hires orientation process when working immunization clinics, empower them with resources that support their skill set, and sustain evidence-based practice in nursing. Limitations of this project is the utilization of nurse-driven protocol policy to licensed nurses only, excluding medical assistants. Another limitation is the vaccine expense by smaller private practices with a small adult population aged 65 years and older.

Dissemination Plan

Upon conclusion of this adult vaccine program evaluation and CBO toolkit, findings will be shared with clinical site members during a general staff meeting with the use of a PowerPoint presentation as a visual aid with graphs. The use of a PPT can be posted on the ambulatory services intranet site for reference and easy access. Updating the clinical site team will provide a deeper insight of the application and utilization of the CBO to improve a staff orientation and safe preventive health services. A quicker response to the toolkit use can be obtained post presentation by allowing time for question-and-answer session. At an organizational level, this health entity holds professional development committee meetings every other month and allows the opportunity to share findings during one of these scheduled sessions. These sessions can be

arranged with the support of the assistant nursing director and committee members.

Dissemination at this level, reaches other ambulatory nurse leaders and potential for them to adopt the findings. Additionally, staff members of the population health services and education department working directly with meeting immunization metrics and new employee orientation, can appreciate the application and utilization of the toolkit and advantage of an adult vaccine protocol. At a national level, an abstract of the results will be submitted for a poster presentation at the annual nursing conference hosted by the National Association of Hispanic Nurses. This manuscript will be published on the University of Saint Augustine for Health Sciences institutional scholarship and open access repository (SOAR). A written manuscript will be submitted to the Journal of *American Academy of Ambulatory Care Nursing* and *Hispanic Health Care International Journal* for publication consideration.

Conclusion

The purpose of this adult vaccine program evaluation and development of a competency-based orientation toolkit was to improve the quality of health among high-risk adults from preventable vaccine diseases by increasing vaccine uptake and support the delivery of safe injection practices in ambulatory settings by nurses. Implementation of an adult vaccine protocol in ambulatory settings, as proposed by the Immunization Action Coalition, enhanced access to preventive services and adds nurse autonomy to inoculate adults. Deaths correlated to pneumonia disease among the geriatric population remain a public health concern related to under-immunized adults. Integrating a nurse-driven protocol to adult vaccine programs has a direct correlation with increase pneumococcal vaccines rates among high-risk populations. An extensive CBO toolkit offers new nurse hires and nurses transitioning to ambulatory settings a broader understanding of safe injection practices and vaccine indications when managing a nurse

schedule. It offers autonomy and a higher level of competency when performing immunization assessments. Further quality improvement projects need to assess the association of competency in licensed vocational nurses and toolkit utilization to expand delivery of services by other licensed staff members.

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Table 1

Evidence Table

Author/Year	Study Design	Level of Evidence	Grade of Evidence
Bond (2009)	Cross sectional study	II	B
Capitano (2018)	Cross Sectional study	III	B
Gamble (2008)	Quasi-experimental	II	B
Goebel (2005)	Meta-Analysis of 81 CT	II	A
Kim et al. (2014)	Nonexperimental descriptive study	III	B
Lau (2012)	Systematic Review/Meta-Analysis of RCT and Non RCT	II	B
Loskutova (2020)	Quasi-experimental/non RCT	II	A
Smith (2011)	Quasi-experimental/Control Trial	II	A
Tan (2020)	Nonexperimental descriptive study	III	A
Trick (2009)	Clinical Control Trial	II	B

Table 2

Synthesis Table

I: intervention.
C: comparison

Author/Year	Intervention Favored	Setting/Population	P value		Comparison	Best Outcome
Loskutova, 2020	Multimodal Intervention: Standing Order, reminder, & visual aid.	Large Primary setting. Adults: >= 18 yrs	Intervention P < 0.0001 (increased by 18.4%)	Control: P <0.0001 (Increased by 16.7 %)	MD reminder system	I: 81.4% pneumococcal vaccine rate uptake. C:72.7 % pneumococcal vaccine rate uptake.
Goebel, 2005	Verbal or written Flu vaccine standing order.	Primary setting. Elderly: 65 yrs or older			Standard Care	I: 576 (63%) of the 912 were inoculated. C: only 38 % were vaccinated.
Lau, 2012	Multimodal Intervention: Team change: nurse order; pharmacist order, ER tech order	Primary setting. Adults and high-risk adults.	Interventions associated w/improvements: Odd ratio (OR) = 1.61, 95 % CI. Flu: OR =1.46, 95% CI. Pneumococcal: OR 2.01; 95% CI		Standard care: MD reminders; patient outreach; financial incentives; case management.	Team changes were more effective to improve pneumococcal and influenza vaccination rates in association with personal contact. SOP and face to face interaction. Patient incentives also proved effective.
Trick, 2009	Multimodal intervention: Written policy for MD w/CDS was favored over the RN standing order with clinical decision support (CDS) tool.	Tertiary setting. Adults >= 18 yrs	MD intervention effectiveness: 12%. RN intervention effectiveness: 6%.		Standard care.	RN order with CDS proved ineffective. MD with CDS proved more effective.
Bond, 2009	Standing order protocol	Primary setting Adults	Intervention: Flu vaccine rate 18%.		MD order	PPV & Hep B vaccine rates

	or facility wide order proved more effective than MD order alone.		Hep B vaccine rate 22%. Pneumococcal rate 34%		were greater with SOP or FWO and preprinted orders. Flu vaccine rate increased with MD order and SOP but not significant.
Smith, 2011	Multimodal intervention: Nursing screening tool, nursing education, electronic vaccine order protocol, automated dispensing cabinets and vaccine tracking system.	Tertiary setting: 2 internal medicine units. Adults 65 yrs and older.	Multimodal intervention vs pre-implementation: 74.2% vs 19.1 %, P < 0.001.	MD order	I: 74.2 % inoculated eligible patients of 300 participants. C: 19.1 % inoculated pre-intervention implementation. A multimodal approach was associated with improved pneumococcal vaccination rates. Protocol changes easily implemented. Process can be adapted in other settings.
Tan, 2020	Multimodal intervention: Standing Order Protocol, electronic medical record, vaccine champion, staff education, walk in services, patient reminders, and vaccine tracking system.	Primary setting. Five primary care clinics. Four were primary care and one OBGYN. Adults >= 18 yrs.	Multimodal intervention. Pneumococcal vaccine rate increased after intervention in comparison to baseline (24% to 60%).	MD order	All 5 sites reported increase in vaccination rates. Implementation of SOPs provided successful integration of adult immunizations into office routines. A multimodal approach is more successful than a single intervention at increasing

					vaccine rates (17% vs 4%).
Capitano, 2018	Pneumococcal immunization protocols (PIP). Pharmacist driven protocol.	Primary/tertiary setting. 67 clinical pharmacists were surveyed from 50 states. n=56 inpatient sites. n=38 outpatient sites.	Inpatient sites: 45 (80 %) of 56 used written standard order protocols. Outpatient sites: 19 (50%) of 38 reported use of a written PIP. Only 36% (34/94) of clinical sites have adopted PIP following ACIP 2012 recommendations. Computerized standing orders vs electronic physician reminders (51% vs 31 %, P< 0.001)	MD order Electronic physician reminders.	Successful maintenance programs. Champions lacked. Poor knowledge of national immunization recommendations by staff. Computerized standing orders was most effective. Physicians to recommend inoculation promotes vaccine uptake.
Gamble, 2008	Standing order immunization policy. Immunization flow sheets.	Three primary care setting. Adults > = 65 yrs	Increase in immunization rate but not statistically significant. Hypothesized goal: 15% Pneumococcal baseline: 35% of vaccine uptake pre-implementation. Post intervention: 13%. Use of flow sheets were inconsistent.	Usual practice: no SOIP and flow sheet.	Standing order immunization policy found to be most effective strategy for increasing immunization rate. Staff behavior must change for intervention to be successful. Flow sheets support success of SOIP. Monitoring process is critical for an effective newly implemented policy.
Kim et al, 2014	Multimodal and single intervention. Physician computerized reminders, checklists,	Tertiary setting. Adults >= 65 yrs. Review of 35 studies.	Twenty one of 35 studies used SOP in tertiary settings.	Physician reminders. Preprinted orders.	Standing orders had higher statistically significance 78% in comparison to other interventions.

	and standing orders.		Provider reminders: 74%. Pre-printed orders 42%. Multimodal interventions were most successful.

Table 3

Summary Table

CDC Evaluation Program	Advisory Committee on Immunization Practices (ACIP)	National Vaccine Advisory Committee (NVAC)	U.S. Community Preventive Services Task Force (CPSTF)
1. **Engage Stakeholders**	• Centers for Disease Control • Clinicians • Health Organizations	• Healthcare Professionals • Vaccinators • Non-vaccinators • Public health professionals	• Healthcare Professionals • Department of Public health and Human Services
2. **Describe the Program**	• Program Aim: Advice and guide on current pneumococcal vaccine recommendations with age-appropriate timelines, interval, number of doses, precautions, and contraindications. • Describes goals and objectives. • Program describes specific metrics collected for analysis (PPSV23 and PCV13). • Organization provides overview of current vaccine practice and guidelines. • Identifies effect of program: Impact on public health practice simplifies guideline to improve clinician recommendation rate and decrease confusion. • Identifies barriers to vaccine recommendation (confusing guidelines). • Outlines recent findings in RCT for new recommendations: PCV15 and PCV20 safety and immunogenicity in comparison to previous practice.	• Committee Aims: Recommend tactics to optimize preventive measures that lead to infectious diseases through vaccine development and strategies to prevent adverse effects. • **Program goals and objectives** outlined: studies and advises strategies to encourage vaccine stock in a safe and effective manner; recommends research findings that enhance the safety and efficacy of vaccines, and adviser to public health officials that streamline service. • Organizational vision: The U.S> will be a place where VPD are eliminated through safe and effective vaccination over the lifespan. • Organizational goals: The Vaccine Plan establishes 5 goals w/objectives: **G1**-	• Organizational Aim: offers evidence-based interventions on many health topics to improve health, disease preventive tactics, and health policies to improve delivery of services. • Tools: Vaccination Program focused on health care system-based interventions implemented in combination. • Metrics: provider performance, vaccine access, utilization of standing order protocol, vaccine rate among adults, and missed opportunities. • Program Effects: improve patient health outreach through reminder systems, increase vaccine rates, increase client-based education on immunizations, increase access to vaccinations, reduce out-of-pocket

	• Outline offers future research and monitoring priorities: continue to assess safety of new recommended vaccines, monitor impact of new policy implementation, assess postimplementation vaccine effectiveness and update vaccine guidelines as needed. • Acknowledgements: ACIP.	**Foster innovation** by supporting the development of innovative, safe, and effective vaccines to prevent ID of PH significance; support the development and uptake of technologies to improve vaccine storage, distributions, and delivery mechanisms. **G2**- Maintain the highest possible levels of vaccine safety by Minimize preventable vaccine related adverse events; improve timely detection and assessment of vaccine safety signaled to inform PH policy and clinical practice; increase awareness, understanding, and usability of the vaccine safety system. **G3-** Increase knowledge of and confidence in routinely recommended vaccines. **G4-** Increase access to and use of vaccines in a variety of settings. **G5-** Protect the health of the nation by supporting global immunization efforts by supporting research. • **Tools:** Standards for Adult Immunization Practice. • **Metrics:** vaccine access and use by	expense, integrate standing order, and measure vaccinator performance (benchmarks). • **Analytical framework:** Findings of EB interventions gathered by systematic review of most effective outcome. • **Identifies problem:** Highlights gaps in immunization practices.

		identified population. Staff utilization of standard practice every time to mitigate missed opportunities. • **Program effect:** integration of vaccines to various clinical settings to improve access, promote vaccine safety and prevention and reporting of adverse effects. Mitigate VPD. Improve clinical practice. Increase awareness of vaccine utilization. Protect the nation's health. Support global immunization. • **Identifies problem:** under immunized patients, clinical staff has poor understanding of immunizations for adults, under-recommended vaccines by clinicians, and missed opportunities.	
3. **Focus Evaluation Design**	• Organization provides evidence-based findings to guide healthcare professionals on recommending pneumococcal vaccines based on their safety and antibody response with simplified guidelines to mitigate the prevalence of pneumonia among high-risk adults. • Organization provides cost-effectiveness of new policy compared to	• Program aims to increase access to vaccine uptake at a variety of clinical settings by providing a tool that improves clinical practice. • Tool: Practice Standards aims to integrate a workflow to clinical practice that identifies gaps in health	• Program aims to improve immunization practices in a range of clinical settings and client populations with the use of strongest evidence-based interventions found by performing a systematic review.

	existing recommendations. • New policy aims reduce pneumococcal disease prevalence in adults aged 65 years and older and in those 19-64 years with high-risk conditions. • Ongoing monitoring of new recommendation practices, vaccine effectiveness, and update guidelines as needed.	maintenance and strongly recommend vaccines if stocked, otherwise recommends referring patients to settings that inoculate. Once identified, tool advises to immunize and document in EHR or state's immunization registry. • Tool recommendations: follow up with patients when referred to other settings and update health system. • Tool recommends clinicians to stay informed.	• Program aims to increase vaccinations rates within a targeted population. • Multi-intervention approach revealed highest effect on vaccination rates.
4. **Gather Credible Evidence**	• Provides summary of public health impact on new policy to reduce pneumococcal disease prevalence in adults aged 65 years and older and in those 19-64 years with high-risk conditions based on immunogenicity and safety in RCT.	• Standards for Adult Immunization Practice tool is considered an EB intervention that proves effective to increase vaccine uptake, improve vaccine access, mitigate myths or barriers that prevent immunization, minimize missed opportunities to vaccinate, and increase access to immunization status by participating in	• Program only recommends interventions that yield best evidence-based outcome. • Program recommendations are based on systematic reviews on most effective interventions to improve vaccination rates. • **Indicators:** vaccine rates, performance feedback, use of standing order protocol, decrease

		state's immunization registry. • **Indicators:** vaccine uptake rate, percentage of missed opportunities.	out-of-pocket expense, increase access to vaccination services, and vaccination outreach.
5. **Justify Conclusions**	• Recommendation to clinicians is the review of package insert prior to administration of new vaccine policy. • Indicates reporting of adverse effects after inoculation to VAER system to ongoing monitoring of vaccine safety. • Revision/simplification of guidelines enhance vaccine recommendation by clinicians. • New policy recommendation reveals comparable outcomes against existing guidelines. • Practice guidelines help support vaccine uptake among high-risk adults.	• Organization provides tools to integrate best immunization practices in health settings that vaccinate and in those that do not but can identify population in need and refer them to ones that do. • Strongly recommends safe injection practices by staying informed on recommended vaccines for adults through CDC site. • Organization encourages integration of protocols and policies that vaccine status is routinely assess. • Organization encourages patient vaccine reminders. • Website offers multiple tools to support patient and staff education,	• Evidence-based interventions supported higher vaccination rates. • Program is applicable in an array of settings. • Program recommends a multi-modal or combination use of interventions versus single intervention approach to maximize impact of project outcome. • Recommends strongest standards of practice based on research.

6. **Ensure Use and Share Lessons**	• Design (evaluation design): Informative. Aims to deliver new evidence for clinical practice. • Preparation (planning steps for use of evaluation findings): Makes recommendations of cost-effective practice, encourages use of safe vaccines, and encourages reporting of any adverse effects. • Feedback: Reports continuous monitoring of new vaccines. Provides email address to communicate concerns. None clearly identified. • Follow-up (support to users): non identified. • Dissemination: Findings delivered in the Morbidity and Mortality Weekly Report on CDC website; available to health professionals.	• Design (evaluation design): Informative. Evidence-based strategies to reduce missed opportunities and improve vaccine rates. Design is in alignment with organizational vision and goals and governmental organizations focused in VPD and improving immunization practices. • Preparation (planning steps for use of evaluation findings): Clearly identifies barriers and provides recommendations to overcome barriers with use of tool: Standards for Adult Immunization Practices. Integrating integration of standing orders to authorize nurses, pharmacists, and other ancillary staff to expand access to vaccine administration. Add patient reminders when vaccines are due. Application of immunization information systems to support assessment of	• Design (evaluation design): Outlines evidence-based interventions in alignment to program goal: increase demand for vaccinations increase access to vaccination sites, utilization of immunization information systems to integrate clinical support tools, standing orders, and assess performance feedback. • Preparation (planning steps for use of evaluation findings): Provides strategies to integrate each intervention and evidence that supports recommendations. • Feedback: utilization of information systems to trace and provide performance feedback. • Follow-up: non identified. • Dissemination: tool easily accessed on organization website by healthcare

		vaccines, reminders, and recall interventions, as well as provider assessment and feedback. • Feedback: recommends chart audits, patient surveys, and electronic systems for tracking. • Follow-up: integrate a policy that includes vaccine champions. Design of tool is user friendly and applicable to integrate in notes/templates. • Dissemination: Tool found on organization website for easy access and replication at various clinical sites.	professionals and public.

Table 4

Summary of Toolkits

CDC Evaluation Program	Kaiser Permanente Covid19 vaccine-equity Toolkit. Covid-19 Vaccine Equity Toolkit	Program alignment with CDC program evaluation framework.	Adults Immunization Toolkit for Clinicians Adult Immz Toolkit for Clinicians
1. **Engage Stakeholders**	• At risk population • Vaccine administrators • Local agencies • State agencies • Other health entities • Health plans	• Clearly identifies stakeholders in each tool and role. • KP: Identifies gap in access to covid19 vaccine within high-risk population. • Toolkit identifies the need to improve vaccine rate among adults.	• Adults • Clinicians • Health care centers • Collaborating agencies: CDC and Immunization Action Coalition (IAC).
2. **Describe the Program**	• KP framework for equitable administration of Covid19 vaccines. • Metrics measured: vaccine equity and impact. • Toolkit contains strategies to enhance vaccine administration approach. • External links to leading practices and resources	• Includes a statement of need. • Describes goals and objectives. • Program describes specific metrics collected for analysis. • Identifies purpose toolkit.	• Clearly outlines components of the toolkit in its table of contents. • Provides an overview of the problem, barriers for vaccine uptake, and purpose of the toolkit to improve vaccine rates among adults. • Toolkit aims to improve vaccine rated by providing resources and recommendations for clinicians (statement of need). • Toolkit components focus on increasing vaccine awareness, integrating safety practices, utilization

			of audit tools, and practice change model (AWV and standing orders). • Quality metrics identified: Merit-based Incentive payment system (MIPS) and Minimum Data Set (MDS), flu and pneumococcal vaccine rate. • Tool: 10 Steps to Implementing Standing Orders, outlines the process to integrate into practice, resources needed, and stakeholders.
3. **Focus Evaluation Design**	• Meet or increase vaccination rates within communities in the 25% most vulnerable geographies. • Support equitable distribution and administration of vaccines beyond geographic need (inclusiveness) • Metrics: age, high-risk designation, race/ethnicity, geography, and health/equity indices. • Standards of Performance: Social vulnerability index (SVI), Neighborhood Deprivation Index (NDI), and others outlined. • An agreement is identified at the end of the toolkit (simple memorandum of understanding).	 • Clearly identifies they purpose of the tool. • Clearly identifies outcomes measured by each tool included. • Identifies different uses of data.	• Identifies the purpose of the tool. • References organizations with standards of best practice with delivery of vaccines. • Toolkit output measures vaccine rate for the PPSV23 and PCV13. Offers a tipsheet to guide coding practices and vaccine criteria. • Toolkit outcome aims to improve the health of adults and decrease incidence of disease with preventive health services like vaccines. • Recommends use of MDS and MIPS to gain data collection for ongoing of program improvement. Describes each metric and source (EHR, registry, CMS web, claims). • Toolkit is aligned with standards of safety practices and vaccine schedules by the CDC. • Improve practice model to decrease missed opportunities. • Update program with CDC guidelines as needed.

			• Improve access to vaccine services with utilization of standing orders. • Tools promote process improvement to meet organizational goals by improving vaccine rates
4. **Gather Credible Evidence**	Measured data includes: • Age categories to meet vaccination criteria. • Vaccination rates within high-risk groups defined by the CDC. • Racial and ethnic vaccination rates. • Demographics • Program aligns with state-approved indices as a best practice to integrate and capture degree of vulnerability and deprivation in specific geographic areas.	 • These indicators are appropriate to the design of the program and aligned with the purpose of the indices utilized. • Criteria for indicator is clear and provides purpose. Answers why it was selected. • Sources of evidence are outlined.	• Recommends best standard of practice to integrate adult vaccinations as part of the workflow to improve staff performance. • Measured indicators: vaccine data (PPSV23 and PCV13) among adults provides overview of program effectiveness. • Sources of evidence gathered from electronic health systems and immunization registries. • Utilization of toolkit aims to improve the overall health of adults. • Toolkit offers guidelines to implement new policies and practices by integrating standing orders to improve workflows and vaccine access.
5. **Justify Conclusions**	• Recommendation for each state to align to the applicable state-approved index. • Tools for equity application is situational to improve vaccine equity. • Tool can support QI projects or enhance outreach. • Tool can support overall vaccine uptake among identified vulnerable populations.	 • Recommends alignment of local state index or contact information to monitor indicators. • Tools highlighted are aligned with indicators	• The toolkit offers different evidence-based strategies that improve vaccine rates among adults recommended by state and federal agencies. • Toolkit resources offer strategies to implement new workflows that improve immunization practices. • Toolkit resources offer tactics to improve vaccine administration safety and

	• Case studies that reveal the usefulness of equity tools to enable access to the Covid19 vaccine. • Strategies identify help support the vaccine uptake and enhance equity. • Tool with Evidence-Based strategies for increased community trust for Covid vaccination.	being measured. • Indicators selected will help identify themes in results. • Tools help identify need to allocate vaccine resources. • Case studies reveal utilization in different populations. • EB toolkit reveals tactics to improve vaccine uptake based on indicators (improves patient outcomes).	infection control practices. • Toolkit resources offer best practices found in scholarly articles to improve vaccine rates. • The utilization of this toolkit offers visual aids to support different learning and teaching styles when educating key stakeholders. • The toolkit makes strong recommendation of interventions that offer strong evidence to improve immunization uptake in adults and integrate tactics that identify eligible adults for inoculation. • Recommends promotion of vaccine confidence: wearing stickers, buttons, and referencing organizations when messages/reminders are sent. • Toolkit offers an audit tool to track vaccine uptake with basic information: client identifier, vaccine administration date, and met or not criteria to inoculate.
6. **Ensure Use and Share Lessons**	• Equity tool design is applicable to organizations focused on vulnerable populations for vaccine access. • Additional tools are guides to identify and communicate logistics and operation of vaccination equity facilitators.	• Tools identify stakeholders involved with program. • Tools support transparency of program. • Program provides	• Toolkit design includes useful and credible resources that support vaccine program enhancements to improve immunization rates among adults. • Toolkit offers strong recommendations to enhance vaccine awareness with use of posters in exam rooms.

	• The design of the program provides multiple tools for health entities to tailor equitable vaccine administration based on physical, operational, education and cultural enablers. • Case studies provide leading practices on the utilization of the tools facilitate vaccine equity.	clears understanding of utilization to identify a community need and close the gap. • The design of the program categorizes organizational areas of opportunity to enhance vaccine programs.	• Toolkit offers a Covid19 status communication toolkit, but none for pneumococcal vaccines. • Toolkit offers strategy to provide equitable vaccine access to those unable to visit a health center like mobile vaccination teams. Recommends extension of nurse schedule hours to accommodate working adults, offer interpretation services, and access to schedule appointments in various forms (online scheduling, face-to-face, and telephone). • Toolkit includes link (see link above) to online continuing education resources with vaccine focused courses. Contributes to professional development of team.

Table 5

Adult Pneumococcal Vaccine Program Logic Model

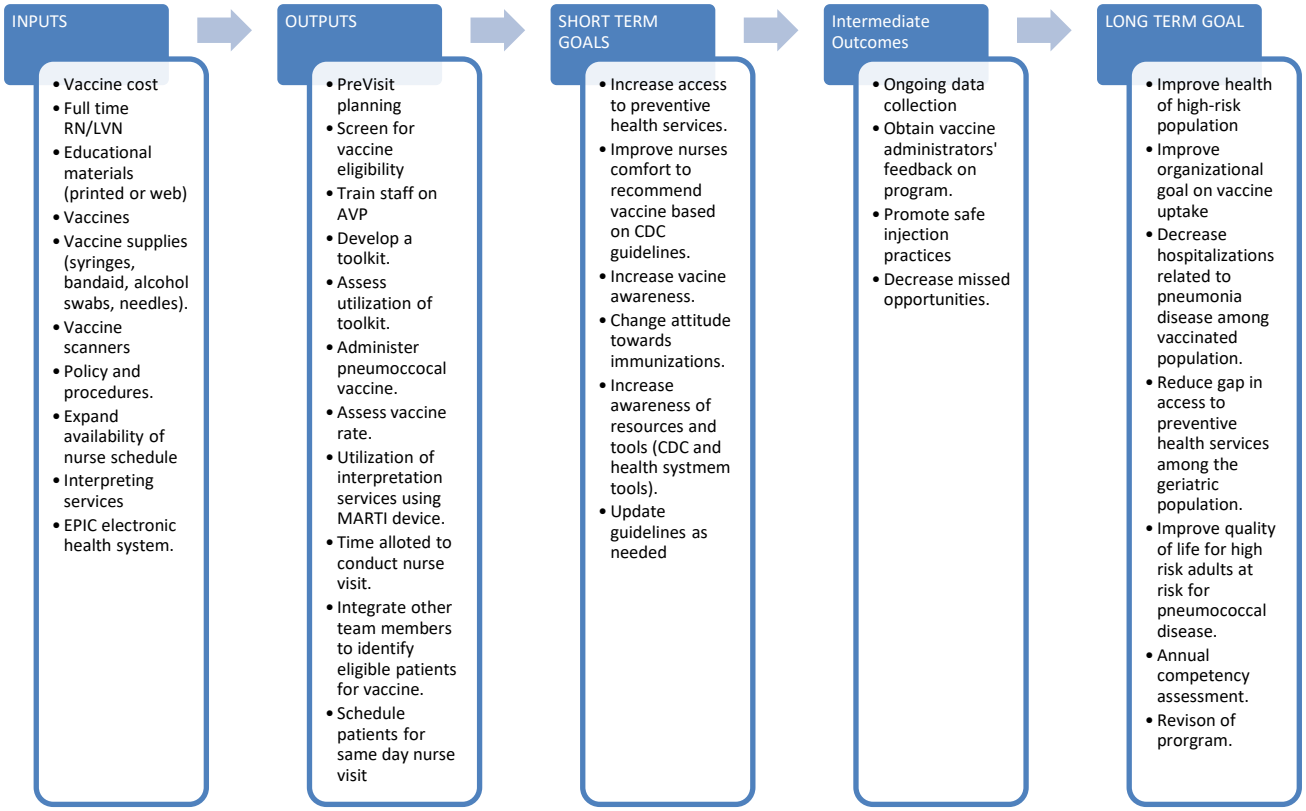
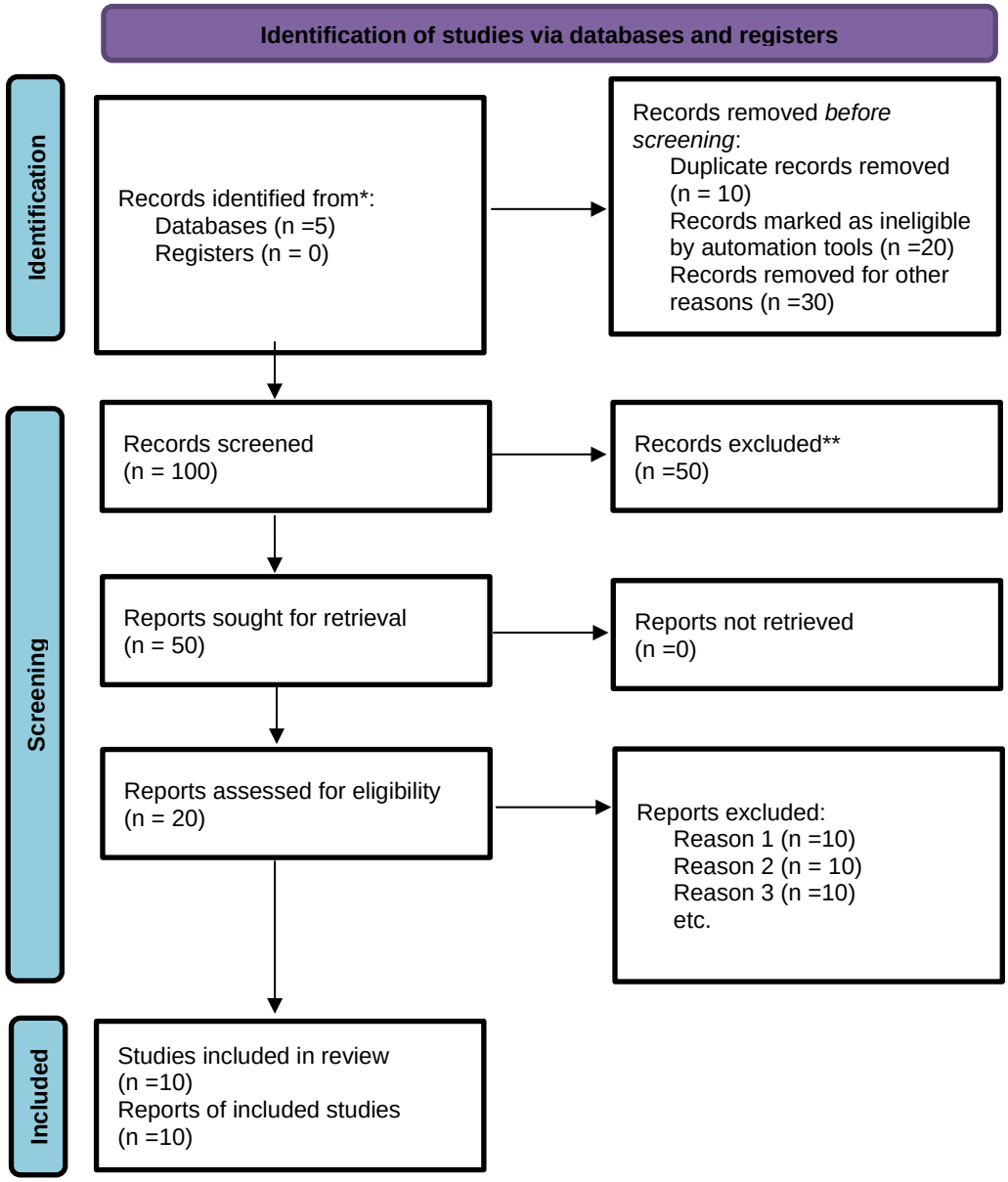


Table 6

Budget for 8-week Project.

EXPENSES		**REVENUE**	
Direct		Billing: Already part of the workflow.	
Salary and benefits: No additional expense. Clinical staff will support project.		Grants. 0.00	
Supplies: $300.00/month Vaccines: $2,000.00/month		Institutional budget support. 100%.	
Services: $0.00 copay for nurse visit.			
Statistician: 0.00			
Indirect			
Overhead 0.00			
Total Expenses: $4,600.00		Total Revenue: unknown.	
Net Balance			

Figure 1
PRISMA Flow Diagram



Note. Prisma flow chart diagram from "Preferred Reporting Items for Systematic Reviews and Meta-analyses: The PRISMA Statement," by D. Moher, A. Liberati, J. Tetzlaff, & D. G. Altman, 2009, *Annals of Internal Medicine, 151*(4), p. 267 (http://dx.doi.org/10.7326/0003-4819-151-4-200908180-00135). Copyright 2009 by The American College of Physicians.

Figure 2

Adult Immunizations Toolkit for Clinicians

Visit [Adult Immunizations Toolkit for Clinicians] to access full document.

Figure 3

Kaiser Permanente Covid-19 Vaccine Equity Toolkit

Visit KP Covod-19 Vaccine Equity Toolkit to access full document.

COVID-19 Vaccine Equity Toolkit

As of March 12, 2021

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Appendix A

Summary of Primary Research Evidence

Citation	Design, Level Quality Grade	Sample Sample size	Intervention Comparison (Definitions should include any specific research tools used along with reliability & validity)	Theoretical Foundation	Outcome Definition	Usefulness Results Key Findings
Loskutova, 2020	Quasi-experimental/non RCT Grade: A Level: I	Large Multi-specialty healthcare organizations. Adults. N= 44 ambulatory groups	Regression models were used to examine the relationship between vaccination rates and predictor variable: group assignment and baseline vaccination rates. 20 providers were in the comparator group.	Prospective interventional before and after non-randomized study.	Pneumococcal rates increased from 62.8 to 81.4 % in older adults.	Vaccination rates in this study were comparable to the national benchmarks early in the study and exceeded the national rates in both groups afterwards.
Goebel, 2005	Grade: A Level II	N= 912 elderly patients aged 65 years and older. Ambulatory setting.	Retrospective analysis of influenza vaccine usage over 4 years. Verbal or written standing order to nurses.	Meta-Analysis of 81 Control Trial	A standing order delegated to the nurse for identifying vaccine eligible patients and administering the vaccine, is one	Standing orders accounted for a significant higher flu vaccination rate in each study year. Most studies were conducted in tertiary settings.

			Electronic reminders. Telephone call reminders. Mail reminders. Education. Performance feedback. Rates of influenza vaccination of 912 patients of two physicians who used standing orders were compared with vaccination rates of 884 patients of two physicians who did not use standing orders**.**		form of organizational change that improved vaccinations rates. When data from all 4 fiscal years were combined, physicians who used standing orders had a significantly higher rate of influenza vaccination (63%) than physicians who did not (38%).	The results of this study provide evidence that standing orders for the administration of influenza vaccine are associated with higher immunization rates in an ambulatory setting. Several previous studies have shown that standing orders increase vaccine usage in the hospital. In a study in six community hospitals, standing orders more effectively increased vaccination (40.3%) than did chart reminders (17%) or physician education (7%).
Trick, 2009	Grade: B Level: II	Inpatient setting. Internal medicine patients at Chicago County hospital. Sample characteristics: Median age 52 years. Diverse Sample: African Americans.	Clinical Control Trial that evaluated 3 influenza vaccination strategies. Physicians and staff are assigned to 1 of 3 teams. Admitted patients are sequentially	Clinical Control Trial	Our best vaccination rates occurred when we presented physicians with opt-out orders that popped up in the computer record at the time of patient discharge; physicians usually accepted the order, and there was a significant	The success of the standing order policy depends on the setting and on the implementation strategy. Written standing order with electronic reminder for nurses revealed nonsignificant increase in rate.

		White. Hispanic. Asian. Females > males.	assigned to a team. Team 1 sample: 69. Team 2 sample: 66. Team 3 sample (control team): 69. Initial Sample size: 210. Excluded: 6. Actual sample size: 204. 8 febrile patients were not vaccinated. Team One: standing order combined with electronic prompts to nurses. Team Two: Written policy combined with pop-up order to physicians. To determine vaccination rates, a retrospectively review of random sample of patient		increase in the patient vaccination rate. Team 2 yield the most effective strategy. Standing orders alone proved ineffective in large hospitals, yielding vaccination rates of less than 10%. Hospital settings have unique challenges; physicians focus on acute issues rather than preventive measures. Success may be easier achieved in smaller settings.	

			files after discharge was conducted over a 4-month period. Control team: no intervention.			
Bond, 2009	Grade: B Level: II	Of 1,052 dialysis facilities considered, 683 returned the survey, reported vaccination rates for 2005 to 2006, and had 20 or more patients.	Standing-order policy of the dialysis facility, categorized as: facility-wide orders and preprinted admission orders for each patient (chart orders). Measurement: Patient vaccination, given at or outside the center. Comparison: physician-specific orders and individual orders.	Cross sectional study.	Outcome: Vaccination rates for influenza, hepatitis B (full or partial series), hepatitis B, and pneumococcal vaccine. Existing facility-wide or chart-based order programs may be effective in promoting vaccination against hepatitis B and pneumococcal disease.	Compared with individual orders, facility-wide standing orders and chart orders were not associated with greater vaccination rates for influenza but associated with greater vaccine rates for Hep B full or partial series and pneumococcal vaccine.
Tan et al., 2020	Grade: A Level: III	Five sites participated in the study and submitted	Study sites provided immunization services in	Non-experimental descriptive study.	Sites generally sustained modest gains in coverage rates (4%-8% increase) after	Standing orders provide a starting point for improving adult immunization coverage.

		complete datasets.	accordance with ACIP recommendations and clinical standards for care. Each site determined the adult vaccines for which they would implement SOPs. Site champions and clinic personnel determined their adult vaccination SOP implementation dates. Baseline vaccination rates were calculated for the year prior to SOP implementation. Vaccination rates were tracked for 1 year after SOP implementation. During the intervention year, cumulative vaccination rates were calculated every quarter. Reports with comparison data		SOP implementation, but greater success was found in practices that used SOPs as a foundation on which additional interventions were built. In general, end-of-intervention-year vaccination rates were higher than baseline rates with a 4%-8% increase for most vaccines at most sites. Sites that integrated a program clinical decision support into its EMR for risk-based recommendations for pneumococcal vaccinations (PCV13 and PPSV23) impacted their rates. The baseline immunization rate for PPSV23 high-risk patients was 24%; it increased to 60%.	Sustaining higher adult immunization rates needs intervention beyond standing order. Prioritization of adult immunization is challenging without incentives. Better integration of clinic and state data may increase adult immunization rates. Challenges to increasing coverage rates included prioritization of acute and chronic conditions over adult vaccination, Medicare Part D reimbursement policies, electronic medical record issues related to data reporting and programming. The implementation of SOPs provided critical infrastructure and successfully integrated adult immunization into office routines. Studies have found that standing orders alone resulted in a 16% increase in vaccination rates. A comprehensive immunization alerts (age, time, and risk-based) for eligible adult patients incorporated into

			were provided to each site to support their internal initiatives.			the clinics' EMRs increase efficiency and may be more effective than ad hoc administration of adult vaccines.
Capitano et al., 2018	Grade: B Level: III	Sixty-seven clinical pharmacists participated in the survey, completing a combined total of 94 surveys, and representing 61 distinct institutions. Evaluable surveys were completed for 56 inpatient and 38 outpatient sites. Participating practice sites were located across 29 states, most of which were in the Midwest, Northeast, and Mid-Atlantic regions of the continental United States.	Assess existing pneumococcal immunization protocols (PIPs) to determine: (a) whether protocols exist for high-risk adults across diverse clinical settings; (b) whether the existing protocols were concordant with the 2012 ACIP recommendations at the time of the study; and (c) to identify additional strategies to improve ACIP recommendation implementation in adults. Completion of the survey	Cross sectional study. Non-experimental Descriptive study. This was a multicenter, cross-sectional survey of clinical pharmacist members of the American College of Clinical Pharmacy Practice-Based Research Network (ACCP PBRN) conducted from September 2014 to May 2015.	Fifty percent (19/38) of outpatient sites reported their pneumococcal immunization program to be an alternative practice or nonstandardized approach to immunization whereby patients are assessed for and receive a pneumococcal vaccine independent of a standardized protocol or process. Our study demonstrates that only 36% (34/94) of all clinical practice sites providing care for adults at high-risk	Assessment whether pneumococcal immunization protocols (PIPs) exist for high-risk adults across diverse clinical settings, determined protocol concordance with the 2012 ACIP recommendations, and identified tactics to improve ACIP recommendation implementation. Twenty-five of the 45 inpatient PIPs (56%) were concordant with ACIP recommendations. Half of the outpatient sites did not have a standardized, written PIP in place. Of the 17 evaluable outpatient PIPs, 9 (53%) were concordant with ACIP recommendations. The most common perceived barriers to ACIP recommended immunization in adults were a lack of knowledge regarding national recommendations, a lack of accountability for recommendation

		Most inpatient sites were private, nonprofit teaching institutions as were most outpatient clinics which were likely affiliated with the inpatient institutions	required pharmacist respondents to access and obtain institutional, outpatient clinic, and/or health system related information from electronic resources, as well as through conversations with multiple parties involved with vaccines at the local level. The survey was administered using REDCap (Vanderbilt University, Nashville, Tennessee).8 Data were analyzed using descriptive statistics, stratified by inpatient or outpatient setting, using IBM SPSS Statistics v.22 (IBM Corp., Armonk, New York)		of pneumococcal disease had adopted the 2012 ACIP recommendations into standard immunization practice 2 years following the publication of these recommendations. The authors concluded that the implementation of computerized standing orders was most effective as significantly more patients received pneumococcal immunization compared with electronic physician reminders (51% vs 31%, respectively, $P < 0.001$). Another effective strategy for enhancing immunization rates is a recommendation from a health care provider,	implementation, and outdated PIPs. Only 36% (34 out of 94) of the clinical sites had adopted the ACIP recommendations. A gap clearly exists in the implementation of national immunization recommendations to prevent pneumococcal disease in high-risk adults

					including patients with a negative attitude toward vaccines	
DeHart, 2005	Grade: B Level: III	Short policy survey was sent in 1999 and 2001 to all Washington State nursing homes; In 1999, 269 facilities received the survey, and in 2001, 257 facilities received it. Facilities that had closed were removed from the lists. Sample: residents aged 65 years and older. Year 2000 = 17,500 residents (random sample). Year 2002 = 1,487 (random sample). Descriptive statistics were used to	Survey was faxed back after mailed to facility administrator. Survey included questions about standing order or guidelines for administration of PPSV23 vaccine, barriers to inoculation, staff members involved with vaccine compliance and policy. Samples were selected from nursing home residents listed in the Centers for Medicare & Medicaid Services (CMS) required Minimum Data Set (MDS). Assessments are conducted	Non-experimental descriptive study. Cross sectional survey (1999-2001).	Response rates for the policy assessment surveys were 99.6% and 100% for 1999 and 2001, respectively. In 1999, 58.2% of the nursing homes reported having either standing orders or written guidelines for administering pneumococcal vaccine to their residents. This percentage rose to 72.0% in 2001, a statistically significant difference (χ^2 = 10.9, $P < .001$). There was a significant increase in the percentage of residents who had	Those most often responsible for overseeing policy compliance at facilities that reported using standing orders or written guidelines were the infection control practitioner (56%), the director of nursing (37%), and other licensed nursing staff (20%). Abstraction forms with pneumococcal vaccination information were received for 1444 of the sampled residents in facilities that remained open in 2000 and for 1092 residents in 2002 for response rates of 80% and 73%, respectively. The use of standing orders or other written guidelines by nursing homes in Washington State increased 14% from 1999 to 2001. At the same time, the pneumococcal vaccination coverage rate for residents of those facilities also increased 14%. The increased use of standing orders/written policies has

		characterize nursing home policies and practices and residents' vaccination status. Chi-square tests were used to compare percentages of standing orders/guidelines and vaccination status between the time periods. We used logistic regression to assess whether the presence of standing orders was associated with number of beds per facility. Odds ratios showing the association between facilities' standing orders/guidelines and residents' pneumococcal vaccination status were calculated using logistic regression-based	regularly by the facilities and compiled into the MDS quarterly.		received pneumococcal vaccination in 2002 compared with 2000 (χ^2 = 48.86, P < .0001). In both 2000 and 2002, the odds of a resident receiving a pneumococcal polysaccharide vaccine (PPV) in a nursing home having standing orders or other written guidelines are estimated to be two-and-a-half times greater than for residents in facilities without any PPV guidelines (2000: OR = 2.59; 95% CI, 1.54–4.34; 2002: OR = 3.19; 95% CI, 1.68–6.01).	contributed to higher rates of pneumococcal vaccination in Washington State nursing homes. It is hoped this will, in turn, lead to lower risks of death from pneumonia in this vulnerable population.

		generalized estimating equations with an exchangeable correlation structure, logit link, and binomial error distribution. All data analyses were done using SAS System for Windows, Release 8 (SAS Institute Inc., Cary, NC).				
Gamble, 2008	Grade: B Level: II Design: control trial.	Sample: 3 primary care outpatient clinics for adults 65 years and older.	Focus: Describe one experiment to minimize the costs of adopting and implementing an SOIP in several outpatient clinics. Clinic criteria included a caseload of at least several hundred patients aged 65 years or older; the absence of a formal, written SOIP for influenza or pneumonia, and a	Nonrandomized Quasi- experimental.	Pneumovax immunization rates were substantially lower than the influenza immunization rates in the baseline period, with 13% to 35% in the study clinics. There were no statistically significant changes from the baseline to the postintervention period.	Systematic review strongly suggests that systems interventions, especially standing order immunization policies (SOIPs), whereby a nurse or other health care provider is authorized to administer vaccinations according to an institution- or physician-approved protocol, are among the most effective and efficient ways to increase immunization rates for pneumococcal. Research has also shown SOIP to be effective in a variety of settings including hospitals, emergency rooms, nursing homes, and outpatient clinics.

			willingness to adopt and implement such a policy. Strategy: -Initial meeting with lead physicians and nurses who would support the policy change to discuss strategies for implementation unique to each setting. Sharing a model SOIP with the clinics to facilitate their own adoption of a written policy. ● Ensure that clinics have immunization flow sheets for vaccination recording and share model forms with them if necessary. ● Provide lunch to staff, especially nurses, at the beginning of the program and explain		To assess the efficacy of the flow sheets, we compared the immunization rates of patients with and without flow sheets. The flu immunization rate for those who had a flow sheet in their medical chart was quite high in both time periods, ranging from 93% to 100% (Table 2). For eligible patients without flow sheets, the comparable rate was 9% for all the clinics in both time periods. Slight increases in the immunization rate from the baseline to postintervention periods were not statistically significant.	The introduction and adoption of an SOIP can be an important step to increasing immunization rates, but the results from this study highlight the critical importance of the entire implementation and monitoring process in making this policy effective.

			program objectives and procedures, answer questions, and assess any unexpected barriers. ● Conduct a final interview with the head nurse in each clinic at the end of the program period to learn how the policy was implemented, monitored, and followed during the year. To measure the change in immunization rates before and after the SOIP implementation, a chart review for the year before the intervention (1999) was compared with a similar review for the year of the intervention (2000).			

Smith, 2011	Grade: A Level: II Design: Quasi- experimental	Sample: random selection of 300 patients. Adults 65 years and older. Setting: hospital.	Intervention: multifaceted pneumococcal vaccine protocol. Eligibility determined by CDC guidelines and medical hx. To determine the impact of a multifaceted intervention on pneumococcal vaccine screening and administration rates in eligible patients according to the CDC recommendations who were admitted to an internal medicine unit of a tertiary care teaching hospital.	Quality improvement project. Descriptive statistics. The project's primary quality measure compared pneumococcal vaccine administration in eligible patients admitted to 2 internal medicine units before and after implementation of the vaccine initiative. A pre-test/post-test study using electronic medical record review was conducted retrospectively for randomly selected adult patients admitted to 2 internal medicine units at the study	The rate of pneumococcal vaccine administration in eligible patients significantly improved post-implementation compared with pre-implementation (74.2% vs. 19.1%, respectively, P= 0.203.	Implementation of vaccine protocol changes was associated with improved pneumococcal vaccination rates in eligible patients. Protocols were easy to implement in a large institution, and a similar approach may be implemented in other settings as an effective way to improve vaccination rates.

				institution during the specified study periods.		
Nace et al., 2017	Grade: B Level: III Design: Non-experimental - Descriptive	Discussion of importance of pneumococcal vaccination for adults, recommendations for vaccination practices, procedures, and guidance for effective implementation of pneumococcal vaccine policies.	Survey of practitioners at post-acute and long-term centers. Promotion of standing order programs. Promulgating immunization standards. Transparent reporting of pneumococcal vaccine rates. Survey protocol for pneumococcal vaccination. Tools to support providers in efforts to improve pneumococcal vaccination rates: a pneumococcal vaccination guidance, a pneumococcal vaccine coverage guide, a resident	Qualitative research.	Barriers to vaccination: poor access to vaccines, lack of education, healthcare workers behavior and attitudes, cultural factors, and cost. Surveyors reported skepticism to benefits of vaccine. Frailed patients could be attenuators of vaccine response. Strong recommendations to establish and maintain a pneumococcal vaccination program according to ACIP guidelines. Ongoing assessment of established vaccine program to monitor if	Research reveals standing order programs to be effective in improving immunization rates in a variety of settings however not widely adopted leading to rates below targets. Low targets triggered CMS to set new immunization standards in post-acute and long-term centers. PPSV23 not as effective in geriatrics, it still provides significant health benefits. Facilities should enhance ways to obtain accurate vaccine history before discharge. Pneumovax is covered by Medicare recipients as a part B benefit.

			pneumococcal vaccine assessment note via use of a template.		vaccine rates fall below U.S. Department of health Human Services goals. Tools developed are free of cost and found online.	
Sebald et al., 2018	Grade: B Level: II Design: Quasi experimental.	Setting: community-based internal medicine resident clinic. Sample: 50 patients. Aim: QI project aimed to develop and test a systematic vaccination review and ordering protocol aimed to increase the percentage of assessed clients under pneumococcal practice by 5%.	Vaccination assessment protocol by reviewing EHR. Phase I involved initial estimate of the overall baseline vaccination assessment rate in the resident clinic, the authors randomly selected a sample of 50 random patient encounters and reviews of their pneumonia vaccination status was determined. Phase II: implementing an internally developed pneumococcal vaccination assessment and	Quality improvement-Prospective interventional before and after non-randomized study.	Outcome: Based on initial results, our pneumococcal vaccination protocol may have helped facilitate improved adherence to the national CDC guidelines. Unfortunately, it appeared to be difficult to maintain staff and physician compliance with our protocol.	Identification of clients needing a pneumococcal vaccine increased by 10%. This study group found that automatically generated physician orders were much more effective in increasing pneumococcal vaccination rates than EHR reminders to order a pneumococcal vaccination.1 EHR-generated order set for the pneumococcal vaccination might have been more successful to prompt provider assessment of patients' pneumococcal vaccination status

			ordering protocol, this vaccination assessment rate was again measured from another random sample.			

Appendix B

Summary of Systematic Reviews (SR)

Citation	Quality Grade	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Usefulness/Recommendation/ Implications
Lau, 2012	Grade: B Level: II	Aim: Reviewed effectiveness of QI interventions for increasing the rates of influenza and pneumococcal vaccinations in adults (elderly primary care patients).	Systematic Review of RCT and non-RCT and Meta-Analysis	Community dwelling adults or high-risk nonelderly patients. Settings: primary care practices (41 studies), community practices (21), managed care organizations (13), Medicare affiliated organizations (11) and Veterans Affairs medical centers (8). There were 48 comparisons from 35 studies included in the Meta-analysis. Primary setting. Adults and high-risk adults.	Authors results: (1) shifting vaccine administration from physicians to members of the primary care team (nurses) with clear responsibilities for chronic and preventive care and (2) activating patients through personal outreach may stand the best chance of improving vaccination rates in community dwelling adults. Interventions associated w/improvements: Odd ratio (OR) = 1.61, 95 % CI. Flu: OR =1.46, 95% CI. Pneumococcal: OR 2.01; 95% CI	Nurse autonomy to administer vaccines with standing orders would impact vaccine rates. Studies that considered posters alone in waiting and examination rooms were not significantly associated with vaccination rates. Team changes were more effective to improve pneumococcal and influenza vaccination rates in association with personal contact. SOP and face to face interaction. Patient incentives also proved effective	Interventions featuring clinician reminders, team change, and patient outreach had the highest ratios. Clinician education and case management also yield improvements in pneumococcal vaccination rates. Office brochures at the point of care were 3.87 times more effective than mailed reminders for pneumococcal vaccines. we found that having nurses assume responsibility for administering vaccinations was effective, whereas interventions in which nurses or pharmacists assessed patients

Citation	Quality Grade	Question	Search Strategy	Inclusion/ Exclusion Criteria	Data Extraction and Analysis	Key Findings	Usefulness/Recommendation/ Implications
							and reminded physicians, but did not themselves administer vaccinations, were ineffective.

Legend:

Appendix C

Project Schedule
Project Title: Adult Pneumococcal Vaccine Program and Competency-based orientation.
Project Leader: Magda Angel, MSN, RN, PHN

	NUR7801								NUR7802								NUR7803							
Activity	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15
Meet with preceptor	x																							
Project identification	x																							
Prepare project proposal		x	x	x	x	x																		
Literature Review	x	x	x	x	x	x																		
SWOT analysis		x	x																					
Attend EBP workshop		x		x		x																		
Stakeholder determination		x																						
EPRC approval									x															
IRB determination										x														
Education Session with staff (30 min). Quiz pre-presentation											x													
Post PowerPoint presentation competency quiz												x												
Run weekly report on pneumococcal vaccines administered in EHR dashboard.												x	x											
Weekly data collection													x											
Weekly EHR data collection														x	x	x								
Run weekly report on pneumococcal vaccines administered in EHR dashboard.														x	x	x								
Revision of alternative Project																	x							
Analyze results of new evidence																		x						
Appraisal of Evidence, recommendation statement																		x						

	NUR7801								NUR7802								NUR7803							
Activity	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15	Week 1	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13	Week 15
Program Analysis and evaluation plan																			x					
Preview of Toolkit																			x					
Activity program analysis																				x				
Program evaluation discussion and recommendations																				x				
Review manuscript submission																					x	x		
Archival to SOAR																							x	
Presentation																								x

Appendix D

Chart Audit Data Collection Form

Subject ID (Unidentified code)

Retrospective Data

Demographics
Age:

a) 19-64 years
b) 65 years and older

Gender:

0. Female
1. Male
2. Nonbinary

Ethnicity

0. White/Caucasian
1. African American/Black
2. Hispanic
3. Asian
4. Other

Pneumococcal vaccine assessment performed during nurse visit?

a) Assessed
b) Not assessed

Patient inoculated with PPSV23 or PCV13 using nurse driven protocol?

a) Vaccinated
b) Refused vaccination

Nurse conducting nurse visit

1. Nurse A
2. Nurse B
3. Nurse C

Appendix E

Annual Competency for Nurses of Adult Vaccine Program

1) Where can you reference the latest update of the adult pneumococcal vaccine guideline:

- **a)** Centers for Disease Control and Prevention
- **b)** Health entity portal
- **c)** Doctors note

2) What are the four standards to improve vaccine administration recommended by the CDC's Standards for Adult Immunization Practice:

- **a)** Assess, recommend, administer, and document
- **b)** Assess, not administer, set reminders, refer to outside provider
- **c)** I don't know

3) In case of an Adverse Reaction, who do you submit a report to:

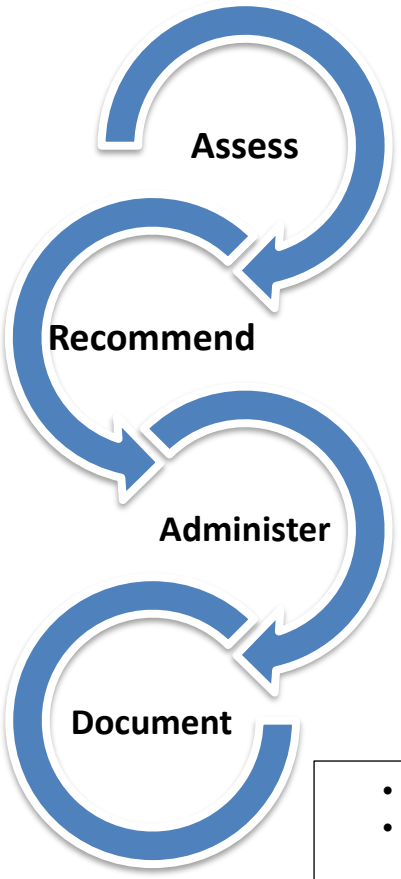
- **a)** CDC Vaccine Adverse Event Reporting System
- **b)** Internal Reporting system
- **c)** Document in the electronic health system

4) After assessment of the electronic health system, you identify the need for a pneumococcal vaccine, how do you obtain the order for the vaccine?

- **a)** Ask the doctor to sign the order
- **b)** Have the patient return a different day until the doctor signs the order.
- **c)** Order the vaccine using the nurse-driven vaccine order policy then administer proceed to inoculate.

Appendix F

Nurse Visit Workflow



- Review Vaccine status
- Reconcile vaccines as needed
- Run Immunization registry

- Strongly recommend vaccine
- Address any questions or concerns in lay terms
- Share professional and personal positive experiences
- If agreeable, provide vaccine information sheet (VIS) for review

- Order pneumococcal vaccine using nurse driven protocol
- Follow standard hand hygiene
- Scan vaccine if device available
- Administer vaccine
- Monitor patient for 15 min for adverse reaction per CDC recommendations

- Document vaccine in electronic health record
- Provide a written document with vaccine information (record)
- Schedule appointment for next dose if applicable

Appendix G

Proposed Policy: Nurse-Driven Pneumococcal Vaccine Protocol
POLICY STATEMENT/SCOPE:

To reduce morbidity and mortality from pneumococcal disease by vaccinating all eligible adults using a nurse-driven vaccine order to patients who meet the criteria established by the Centers for Disease Control and Prevention (CDC) and the Advisory Committee on Immunization Practices (ACIP).

I. DEFINITIONS:

a) Shared clinical decision-making (SCDM)- recommendation made based on the patient's risk for exposure to PCV13 serotypes and the risk for pneumococcal disease for that person because of underlying medical conditions.

II. POLICY:

All eligible nurses (i.e., RN and LVNs) may vaccinate eligible adults in ambulatory settings using this standing order who meet the criteria below.

III. PROCEDURES AND RESPONSIBILITIES:

a) Identify adults in need of inoculation with pneumococcal conjugate vaccine (PCV13) or pneumococcal polysaccharide vaccine (PPSV23) based on criteria (see **Attachment A and B**).
   - **a.** PPSV23 is recommended for all adults aged 65 years and older with no or unknown history of prior receipt of PPSV23.
   - **b.** PPSV23 is recommended for all adults aged 65 years and older received PPSV23 before age 65 years.
   - **c.** PPSV23 is recommended for adults 19-64 years with no or unknown history of prior receipt of PPSV23 and any of the conditions outlined in the table (see **Attachment A and B).**
   - **d.** PCV13 is no longer routinely recommended for all adults. Shared clinical decision making is recommended (see **Attachment A and B**).
   - **e.** PCV13 is recommended for adults 19-64 years with no or unknown history of prior receipt of PCV13 and any of the conditions outlined in the table (see **Attachment A and B).**

b) Screen all patients for contraindications and precautions to pneumococcal vaccine and refer any of these or other issues to a physician for further evaluation. **Do not give PCV13 and PPSV23 at the same time**.
   - **a. Severe allergic reaction** (anaphylaxis or any symptoms other than hives) after a previous dose of PCV13 or PPSV23, or to a vaccine component.
   - **b. Moderate or severe** acute illness with or without fever
   - **c. Syncope** (fainting) can occur in association with administration of injectable vaccines.

c) Provide patient with the most current Vaccine Information Statement (VIS) from the CDC in a written or electronic form.
Pneumococcal Polysaccharide Vaccine Information Statement | CDC (see Appendix H)
Pneumococcal Conjugate Vaccine Information Statement | CDC (see Appendix I)

Centers for Disease Control and Prevention. (2021, May 27). *Use of agency materials.* https://www.cdc.gov/other/agencymaterials.html

d) Input order as standing order in patients' electronic health record (EPIC).
e) Use scanning device to auto populate vaccine lot number, expiration date and VIS date.
f) Administer pre-filled vaccine to deltoid muscle.
g) Notify physician of any adverse reactions post administration.
h) Report all adverse reactions following administration to the Vaccine Adverse Event Reporting System (VAERS). Reports can be submitted to VAERS online or fax. For assistance, please email infor@VAERS.org or call 1-800-822-7967.

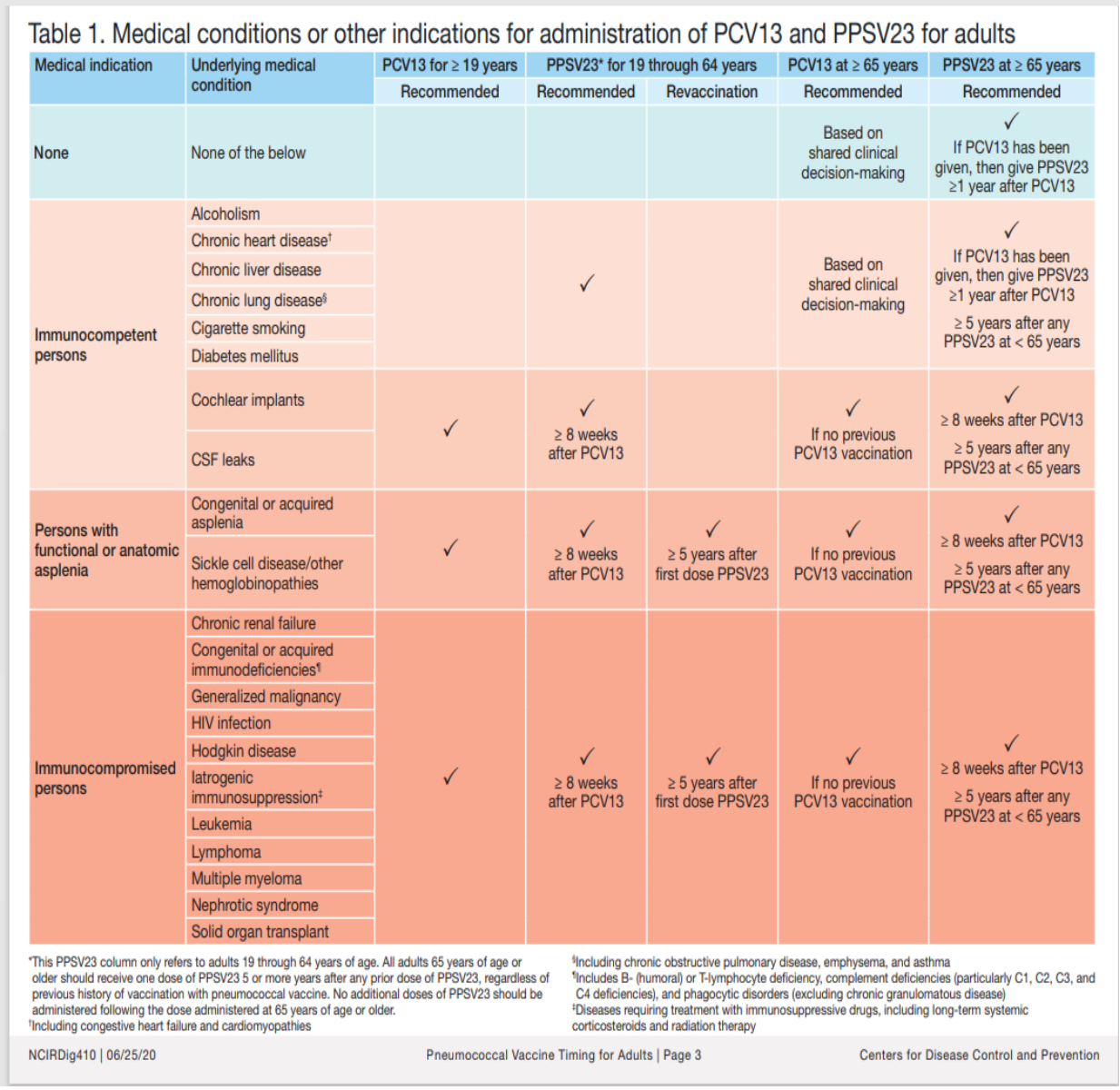


Table 1. Medical conditions or other indications for administration of PCV13 and PPSV23 for adults

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				Based on shared clinical decision-making	✓ If PCV13 has been given, then give PPSV23 ≥1 year after PCV13
Immunocompetent persons	Alcoholism		✓		Based on shared clinical decision-making	✓ If PCV13 has been given, then give PPSV23 ≥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 | 06/25/20 Pneumococcal Vaccine Timing for Adults | Page 3 Centers for Disease Control and Prevention

Centers for Disease Control and Prevention. (2021, May 27). *Use of agency materials.* https://www.cdc.gov/other/agencymaterials.html

Appendix H

Competency Based Orientation Toolkit

Purpose Statement

This CBO toolkit is designed to help orient new nurse hires execute proper vaccine needs assessment of an electronic health record, decrease missed opportunities, advise adults on the pneumococcal vaccine, and increase pneumococcal vaccine uptake.

Audience

This CBO toolkit is intended for the following audiences in mind:

- New nurse hires orienting in vaccination clinics.
- Nurses interested in quality improvement projects that enhance immunization services.
- Ambulatory health care professionals interested in improving vaccine administration services.
- Nurse vaccine champions

Definitions/Glossary

- AVP: Adult Vaccine Program
- CBO: competency-based orientation
- EHR: Electronic health record
- PPSV23: Pneumococcal Polysaccharide Vaccine 23-valent
- PCV13: Pneumococcal Conjugate Vaccine 13-valent
- VPD: Vaccine Preventable Disease
- Nurse-driven vaccine protocol: approved protocol policy that allows qualified nurses to order and administer vaccines based on CDC guidelines.
- VAERS: Vaccine Adverse Effects Reporting System
- SCDM: Shared clinical decision-making: recommendation made based on the patient's risk for exposure to PCV13 serotypes and the risk for pneumococcal disease for that person because of underlying medical conditions.
- RN: registered nurse
- LVN: licensed vocational nurse

Implementation Strategy

The following is an overview on how adult vaccine programs using nurse-driven protocols can increase pneumococcal vaccine uptake among adults 65 years and older. Integration of nurse-driven protocols and following a standard immunization practice reduces the rate of missed opportunities to vaccinate. The Centers for Disease Control and Prevention (CDC) support the use of evidence-based interventions that increase the rate of vaccine rates during clinical visits.

- Integrate a nurse-driven pneumococcal vaccine protocol to the AVP.
- Recommend a nurse template to guide nurse visit. Template to include CDCs Standards for Adult Immunization Practice.
- Train and educate staff on CDCs pneumococcal vaccine guideline.
- Review nurse visit workflow (Appendix F)
- Review health policy on nurse-driven vaccine (Appendix G)
- Partner new hire nurse with a preceptor for 2 weeks.
- Review best practices on injection safety and administration.
- Review appropriate use of hand hygiene.
- Review how to report a VAERS report

Staff

The following key stakeholders are vital for the implementation and sustainability of the AVP. See role and responsibility:

- Nurse preceptors: responsible of new hires orientation.
- Clinical practice manager: to support the implementation of the program and facilitate available resources to sustain program.
- Nurse vaccine champion: to coordinate adult vaccine program and update vaccine guidelines as needed. Support preceptors and new nurse hires during the orientation process and life of the adult vaccine program.
- Medical Director: to revise, approve, and update vaccine policy as needed.
- Informatics/Analytics: will support with data reports to show vaccine rates.

Evaluation strategy and tools

- Nurse vaccine champion to perform monthly chart audits (Appendix D)
- Nurse champion to perform annual competency assessment (Appendix E)
- Collect baseline data and report to team monthly rates during staff meetings.
- Update huddle board weekly with data (vaccine rates).
- Nurse preceptor to utilize Immunization Action Coalition skills checklist to support new hire with performance evaluation Skills checklist

Stakeholder engagement and analysis tools

- Patients Handouts: provide the vaccine information sheet and vaccine fact sheet to support decision making
- Nursing staff: provide the CDCs Standards for Adult Immunization Practice Standards for Adult Immunization Practice
- Increase awareness on adult immunization programs Overview on Adult Immunization Practice
- Report vaccine rates and percentage of nurse-driven protocol utilization during staff meetings.
- Provide baseline data on pneumonia infection rates among adults 65 years and older currently hospitalized for selected health system.
- Display organization goal for pneumococcal vaccine rate.

Communication planning tools

Vaccine champion will inform all staff about the adult pneumococcal vaccine program and CBO toolkit. Discuss the purpose of the program, impact of workflow, and resources available to support nurses. Possible formats of communication:

- Email
- Staff meetings
- Huddles

- Microsoft Teams
- Informal communication during rounds.

Policy/purpose statement:

To reduce morbidity and mortality from pneumococcal disease by vaccinating all eligible adults using a nurse-driven vaccine order who meet the criteria established by the Centers for Disease Control and Prevention (CDC) and the Advisory Committee on Immunization Practices (ACIP). See Appendix G for detailed policy.

- This order authorizes registered nurses (RNs) and licensed vocational nurses (LVNs)with active licenses in California to order and administer pneumococcal vaccines.

Education Materials

These forms are periodically updated and you should verify if you have the most current. Below is a list of the forms and links to the most current:

Staff/clinicians:

- Review the CDCs injection safety checklist Injection Safety Checklist
- Safe Injection Practices- How to Do it Right [YouTube video] Safe Injection Practices
- How to submit a VAERS report online VAERS report
- CDC Pneumonia website CDC Pneumonia
- Hand Hygiene [YouTube video] Proper Handwashing
- Medical management of vaccine reactions in adults in a community settings Management of vaccine reactions
- Screening checklist for contraindications to vaccines for adults Screening for contraindications
- Vaccine Administration: Intramuscular (IM) Injection Adults 19 years of age and older You Call the Shots
- Nurse Visit Workflow (Appendix F)

- Pneumococcal ACIP Vaccine Recommendations Morbidity and Mortality Weekly Report (MMWR)
- Steps to Improve Adult Immunization Practices Vaccine Needs Assessment

Patient/client/support member

- CDC Pneumonia website Pneumonia Can Be Prevented - Vaccines can help
- Vaccine Information Sheet Pneumococcal Conjugate Vaccine VIS
- CDC Handout Pneumococcal Disease in Adults and the Vaccines to Prevent It
- Alliance for Aging Research [YouTube] Our Best Shot: The Importance of Vaccines for Older Adults

Evaluation Tools/CBO document

- Injection Safety Checklist Injection Safety Checklist
- Immunization Action Coalition Skills Checklist Skills checklist
- Nurse vaccine champion to perform monthly chart audits (Appendix D)

Scenario Examples of Process in use.

	Virginia Department of Health (VDH)	**California Department of Public Health**
Source	Virginia Department of Health. (2022, January 14). *Standing order for dispensing and administering Covid-19 vaccine.* https://www.vdh.virginia.gov/content/uploads/sites/134/2021/04/COVID-Vaccine-Standing-Order.pdf	California Department of Public Health. (2019, October). *Recommendations for the Prevention and Control of Influenza in California Skilled Nursing Facilities (SNF). https://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/RecommendationsForThePreventionAndControlOfInfluenzaNov2018_FINAL.pdf#search=pneumococcal%20vaccine%20standing%20order*
Nurse-Driven and/or	• Registered nurses (RNs) and licensed practical nurses (LPNs} actively licensed in Virginia	• Obtain standing vaccination orders from providers for each resident before influenza season begins.

Pharmacist-Driven Vaccine protocol.	who are in good standing to practice in Virginia per the Virginia Board of Nursing to administer FDA authorized COVID-19 vaccines at community vaccination events • Pharmacists actively licensed in Virginia who are in good standing to practice in Virginia per the Virginia Board of Pharmacy to dispense and administer FDA-authorized COVID-19 vaccines.	• Obtain standing order for pneumococcal vaccine for residents. • Vaccinate residents. • HCP: healthcare personnel to administer vaccines using standing order.
Purpose	To reduce morbidity and mortality from COVID-19 (SARS-CoV-2) by vaccinating persons who meet the criteria authorized by the Food and Drug Administration (FDA) Emergency Use Authorization (EUA) and in accordance with the Centers for Disease Control and Prevention's (CDC} Advisory Committee on Immunization Practices (ACIP) recommendations. This order is intended to supplement existing authorization under the Public Readiness and Emergency Preparedness (PREP) Act.	The document includes specific guidance for SNF leaders to develop a plan for an effective influenza prevention program in advance of the influenza season (October 1-March 31) and for evaluating a season's experiences upon completion of influenza season.
Process/ Procedure	• Screen for any vaccine precautions and contraindications using an appropriate pre-vaccine questionnaire before administering the vaccine. • Provide vaccine recipient with copy of current fact sheet. • Provide with v-safe information sheet to recipient. • Obtained informed consent of the patient or parent, guardian. • Answer all questions. Educate on about where, how, and when to obtain the additional Covid-19 vaccination. • Appropriate medical treatment and clinical staff able to manage immediate allergic reactions in the event of adverse reaction. • Administer vaccine intramuscularly. • Monitor post-vaccination for at least 15 minutes. • Report any vaccine administration errors to VAERS system.	• Educate about impact of influenza on residents and importance of preventing illness, complications, and outbreaks. • Develop or update the influenza vaccination plan for residents according to ACIP recommendations. • Schedule additional doses of pneumococcal vaccine as needed. • Track each resident's vaccination status and room location. • Calculate vaccination rates.

	• Record vaccination in the pharmacy or medical record within 24 hours and to the Virginia Immunization Information System. • Provide vaccine recipient with a personal vaccine record. • Schedule next dose before individual leaves the site.	

Forms

Skills Checklist for Vaccine Administration

During the COVID-19 pandemic, the CDC recommends additional infection control measures for vaccination (see www.cdc.gov/vaccines/pandemic-guidance/index.html).

The Skills Checklist is a self-assessment tool for healthcare staff who administer immunizations. To complete it, review the competency areas below and the clinical skills, techniques and procedures outlined for each area. Score yourself in the Self-Assessment column. If you check **Needs to Improve**, you indicate further study, practice, or change is needed. When you check **Meets or Exceeds**, you indicate you believe you are performing at the expected level of competence, or higher.

Supervisors: Use the Skills Checklist to clarify responsibilities and expectations for staff who administer vaccines. When you use it to assist with performance reviews, give staff the opportunity to score themselves in advance. Next, observe their performance as they administer vaccines to several patients, and score in the Supervisor Review columns. If improvement is needed, meet with them to develop a Plan of Action (see bottom of page 3) to help them achieve the level of competence you expect; circle desired actions or write in others.

The video "Immunization Techniques: Best Practices with Infants, Children, and Adults" helps ensure that staff administer vaccines correctly. (View at www.youtube.com/watch?v=WsZ6NEijlf1 or order online at www.immunize.org/dvd.) Another helpful resource is CDC's Vaccine Administration eLearn course, available at www.cdc.gov/vaccines/hcp/admin/resource-library.html.

		Self-Assessment		Supervisor Review		
COMPETENCY	CLINICAL SKILLS, TECHNIQUES, AND PROCEDURES	NEEDS TO IMPROVE	MEETS OR EXCEEDS	NEEDS TO IMPROVE	MEETS OR EXCEEDS	PLAN OF ACTION
A Patient/Parent Education	1. Welcomes patient/family and establishes rapport.					
	2. Explains what vaccines will be given and which type(s) of injection(s) will be done.					
	3. Answers questions and accommodates language or literacy barriers and special needs of patient/parents to help make them feel comfortable and informed about the procedure.					
	4. Verifies patient/parents received Vaccine Information Statements (VISs) for indicated vaccines and has had time to read them and ask questions.					
	5. Screens for contraindications (if within employee's scope of work).					
	6. Reviews comfort measures and aftercare instructions with patient/parents, and invites questions.					
B Medical and Office Protocols	1. Identifies the location of the medical protocols (e.g., immunization protocol, emergency protocol, reporting adverse events to the Vaccine Adverse Event Reporting system [VAERS], reference material).					
	2. Identifies the location of epinephrine, its administration technique, and clinical situations where its use would be indicated.					
	3. Maintains up-to-date CPR certification.					
	4. Understands the need to report any needlestick injury and to maintain a sharps injury log.					
	5. Demonstrates knowledge of proper vaccine handling (e.g., maintains and monitors vaccine at recommended temperature and protects from light).					

CONTINUED ON THE NEXT PAGE ▶

Adapted from California Department of Public Health, Immunization Branch

IMMUNIZATION ACTION COALITION Saint Paul, Minnesota • 651-647-9009 • www.immunize.org • www.vaccineinformation.org | www.immunize.org/catg.d/p7010.pdf • Item #P7010 (2/21)

Immunization Action Coalition. (2022, March 14). *Immunization action coalition disclaimer*. https://www.immunize.org/iacadmin/disclaimer.asp

Overview

A Series on Standards for Adult Immunization Practice

In 2014, the National Vaccine Advisory Committee updated the Standards for Adult Immunization Practice to reflect the critical need for ALL healthcare professionals—whether they provide immunization services or not—to take steps to ensure that adult patients get the vaccines they need.

Patients trust you to give them the best advice on how to protect their health.

Make adult vaccination a standard of care in your practice.

Why should adult immunization be a priority for your practice?

1. **Your patients are probably not getting the vaccines they need.** Even though most private insurance plans cover the cost of recommended vaccines, adult vaccination rates in the United States are extremely low. Each year, tens of thousands of adults needlessly suffer, are hospitalized, and even die as a result of diseases that could be prevented by vaccines.
2. **Your patients are likely not aware that they need vaccines.** Although adults do believe immunization is important, many don't know which vaccines are recommended for them throughout their lives. Many also report not receiving vaccine recommendations from their healthcare professional.
3. **You play a critical role in ensuring that your patients are fully immunized.** Clinicians are the most valued and trusted source of health information for adults. Your patients rely on you to inform them about the vaccines they need. Research shows that a recommendation from their healthcare professional is the top predictor of patients getting vaccinated.

2014 U.S. Adult Vaccination Rates

Only 20% of adults 19 years or older had received Tdap vaccination. More than 18,000 cases of whooping cough were provisionally reported in 2015. About five in 100 adults with pertussis are hospitalized and others may have complications, which could include pneumonia. Adults can also spread pertussis to infants, who are at most risk for severe illness and death from this disease.

Only 28% of adults 60 years or older had received zoster (shingles) vaccination. Nearly 1 million Americans experience the condition each year, and about half of all cases occur in adults 60 years or older. Older adults are also most likely to experience severe pain from the disease and have postherpetic neuralgia.

Only 20% of adults 19 to 64 years at high risk had received pneumococcal vaccination. While coverage among adults 65 years or older is better, there are still many adults left unprotected. About 67 million adults at increased risk for pneumococcal disease remain unvaccinated.

Only 44% of adults 18 years or older had received flu vaccination during the 2014-2015 flu season. On average, more than 200,000 people are hospitalized each year from influenza-related complications.

Sources: NHIS 2013, NHIS 2014 (MMWR 2016; 64(4)), BRFSS 2014-2015 (www.cdc.gov/flu/fluvaxview)

DON'T WAIT. VACCINATE!

CDC U.S. Department of Health and Human Services Centers for Disease Control and Prevention

Information Series for Healthcare Professionals
www.cdc.gov/vaccines/adultstandards

Centers for Disease Control and Prevention. (2021, May 27). *Use of agency materials.* https://www.cdc.gov/other/agencymaterials.html

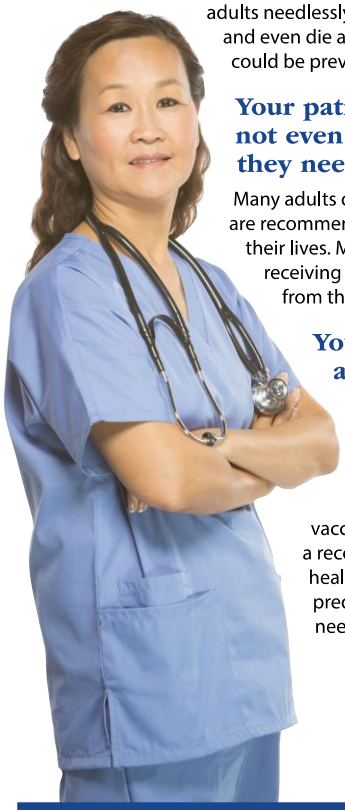
Immunizing Adult Patients:
Standards for Practice

Your patients trust you to give them the best advice on how to protect their health. Vaccine-preventable diseases can result in serious illness, hospitalization, and even death.

Make adult vaccination a standard of care in your practice.

Your patients have probably not received all the vaccines they need.

Even though most insurance plans cover the cost of recommended vaccines, adult vaccination rates in the U.S. are extremely low. Each year, tens of thousands of adults needlessly suffer, are hospitalized, and even die as a result of diseases that could be prevented by vaccines.



Your patients may not even realize that they need vaccines.

Many adults don't know which vaccines are recommended for them throughout their lives. Many also report not receiving vaccine recommendations from their healthcare professional.

You can make a difference.

Clinicians are the most valued and trusted source of health information for adults. Research shows that most adults believe vaccines are important and that a recommendation from their healthcare professional is a key predictor of patients getting needed vaccines.

Make Immunization a Standard of Patient Care In Your Practice:

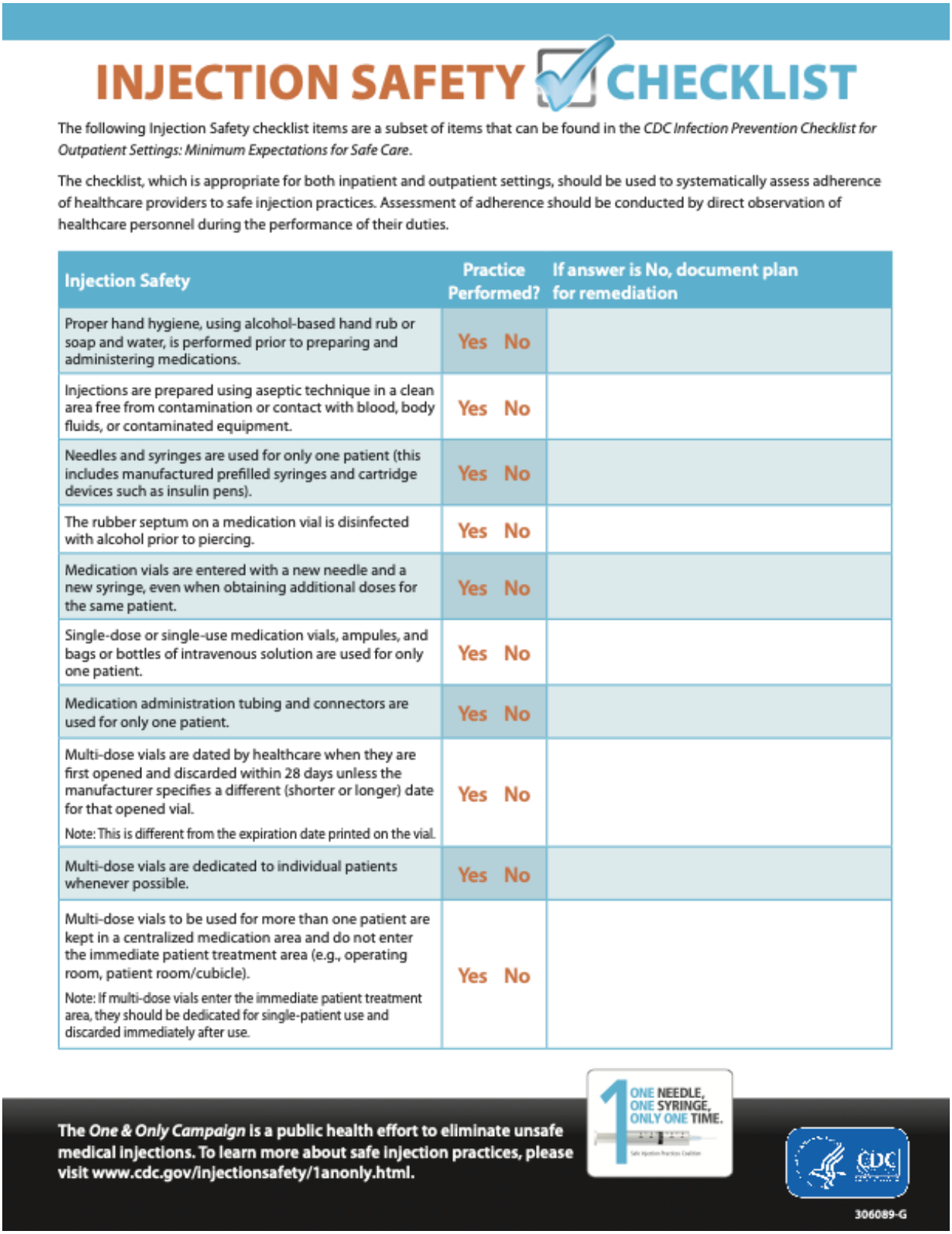
1. **ASSESS the immunization status of all your patients at every clinical encounter.**
   - Stay informed about the latest CDC recommendations for immunization of adults.
   - Implement protocols in your office to ensure that patients' vaccine needs are routinely reviewed and patients get reminders about vaccines they need.
2. **Strongly RECOMMEND vaccines that your patients need.**
   - Address patient questions and concerns in clear and understandable language.
   - Highlight your positive experiences with vaccination (personal or in your practice).
3. **ADMINISTER needed vaccines or REFER your patients to a vaccination provider.**
   - For vaccines that you stock, make vaccination services as convenient as possible for your patients.
   - For vaccines that you don't stock, refer patients to providers in the area that offer vaccination services.
4. **DOCUMENT vaccines received by your patients.**
   - Participate in your state's immunization registry to help your office, your patients, and your patients' other providers know which vaccines your patients have had.
   - Follow up to confirm that patients received recommended vaccines that you referred them to get from other immunization providers.

Standards for Adult Immunization Practice emphasize the role of ALL healthcare professionals—whether they provide immunization services or not—in ensuring that adult patients are fully immunized. These standards are published by the National Vaccine Advisory Committee and supported by the Centers for Disease Control and Prevention as well as a number of national medical associations.

DON'T WAIT. VACCINATE!

CDC U.S. Department of Health and Human Services Centers for Disease Control and Prevention

Centers for Disease Control and Prevention. (2021, May 27). *Use of agency materials.* https://www.cdc.gov/other/agencymaterials.html



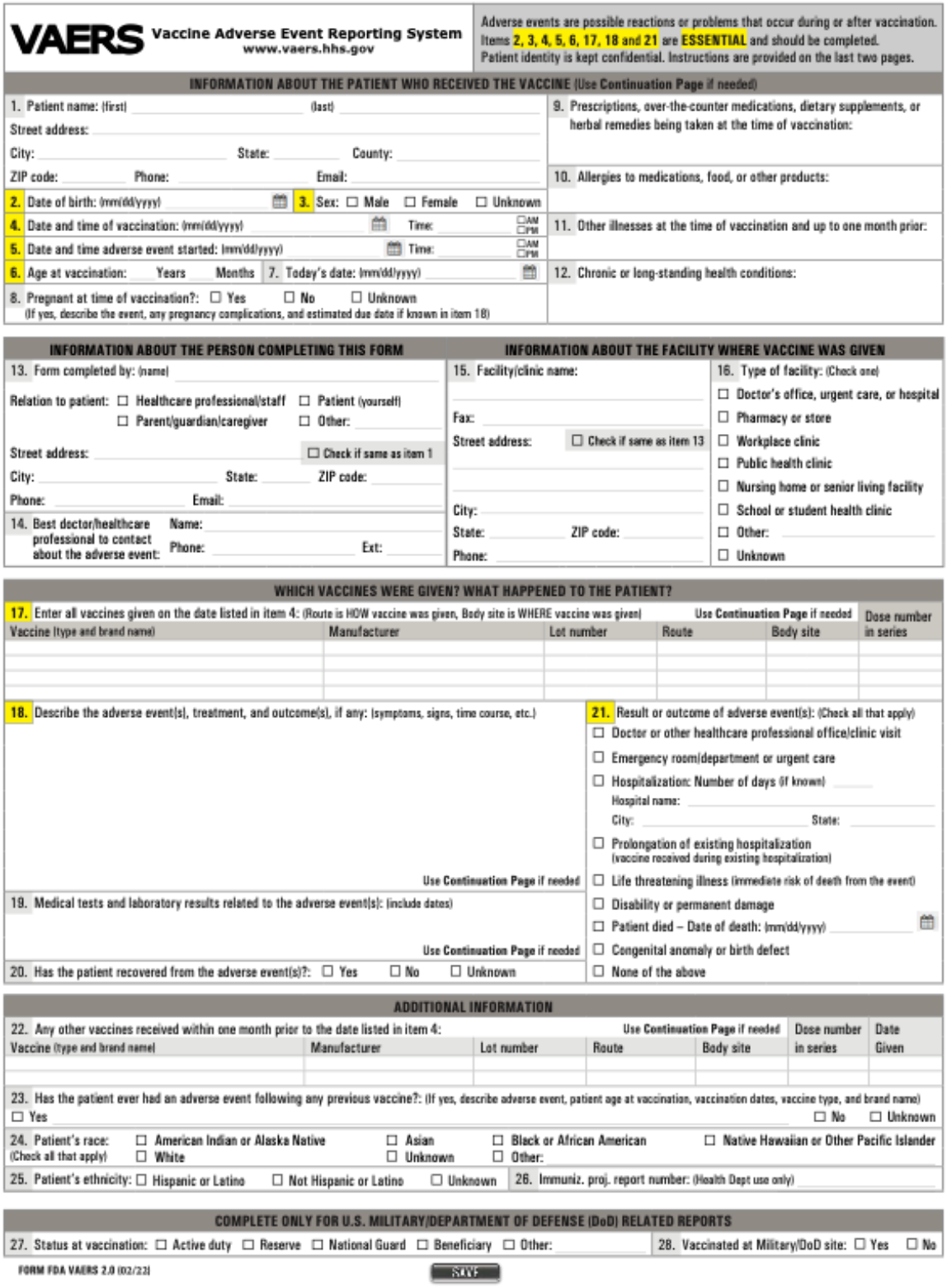
INJECTION SAFETY CHECKLIST

The following Injection Safety checklist items are a subset of items that can be found in the *CDC Infection Prevention Checklist for Outpatient Settings: Minimum Expectations for Safe Care*.

The checklist, which is appropriate for both inpatient and outpatient settings, should be used to systematically assess adherence of healthcare providers to safe injection practices. Assessment of adherence should be conducted by direct observation of healthcare personnel during the performance of their duties.

Injection Safety	Practice Performed?	If answer is No, document plan for remediation
Proper hand hygiene, using alcohol-based hand rub or soap and water, is performed prior to preparing and administering medications.	Yes No	
Injections are prepared using aseptic technique in a clean area free from contamination or contact with blood, body fluids, or contaminated equipment.	Yes No	
Needles and syringes are used for only one patient (this includes manufactured prefilled syringes and cartridge devices such as insulin pens).	Yes No	
The rubber septum on a medication vial is disinfected with alcohol prior to piercing.	Yes No	
Medication vials are entered with a new needle and a new syringe, even when obtaining additional doses for the same patient.	Yes No	
Single-dose or single-use medication vials, ampules, and bags or bottles of intravenous solution are used for only one patient.	Yes No	
Medication administration tubing and connectors are used for only one patient.	Yes No	
Multi-dose vials are dated by healthcare when they are first opened and discarded within 28 days unless the manufacturer specifies a different (shorter or longer) date for that opened vial. Note: This is different from the expiration date printed on the vial.	Yes No	
Multi-dose vials are dedicated to individual patients whenever possible.	Yes No	
Multi-dose vials to be used for more than one patient are kept in a centralized medication area and do not enter the immediate patient treatment area (e.g., operating room, patient room/cubicle). Note: If multi-dose vials enter the immediate patient treatment area, they should be dedicated for single-patient use and discarded immediately after use.	Yes No	

Centers for Disease Control and Prevention. (2021, May 27). *Use of agency materials.* https://www.cdc.gov/other/agencymaterials.html



VAERS Vaccine Adverse Event Reporting System
www.vaers.hhs.gov

Adverse events are possible reactions or problems that occur during or after vaccination.
Items **2, 3, 4, 5, 6, 17, 18 and 21** are **ESSENTIAL** and should be completed.
Patient identity is kept confidential. Instructions are provided on the last two pages.

INFORMATION ABOUT THE PATIENT WHO RECEIVED THE VACCINE (Use **Continuation Page** if needed)

1. Patient name: (first) (last)
Street address:
City: State: County:
ZIP code: Phone: Email:
2. Date of birth: (mm/dd/yyyy) 3. Sex: ☐ Male ☐ Female ☐ Unknown
4. Date and time of vaccination: (mm/dd/yyyy) Time: ☐AM ☐PM
5. Date and time adverse event started: (mm/dd/yyyy) Time: ☐AM ☐PM
6. Age at vaccination: Years Months 7. Today's date: (mm/dd/yyyy)
8. Pregnant at time of vaccination?: ☐ Yes ☐ No ☐ Unknown
(If yes, describe the event, any pregnancy complications, and estimated due date if known in item 18)

9. Prescriptions, over-the-counter medications, dietary supplements, or herbal remedies being taken at the time of vaccination:
10. Allergies to medications, food, or other products:
11. Other illnesses at the time of vaccination and up to one month prior:
12. Chronic or long-standing health conditions:

INFORMATION ABOUT THE PERSON COMPLETING THIS FORM

13. Form completed by: (name)
Relation to patient: ☐ Healthcare professional/staff ☐ Patient (yourself) ☐ Parent/guardian/caregiver ☐ Other:
Street address: ☐ Check if same as item 1
City: State: ZIP code:
Phone: Email:
14. Best doctor/healthcare professional to contact about the adverse event: Name: Phone: Ext:

INFORMATION ABOUT THE FACILITY WHERE VACCINE WAS GIVEN

15. Facility/clinic name:
Fax:
Street address: ☐ Check if same as item 13
City:
State: ZIP code:
Phone:

16. Type of facility: (Check one)
☐ Doctor's office, urgent care, or hospital
☐ Pharmacy or store
☐ Workplace clinic
☐ Public health clinic
☐ Nursing home or senior living facility
☐ School or student health clinic
☐ Other:
☐ Unknown

WHICH VACCINES WERE GIVEN? WHAT HAPPENED TO THE PATIENT?

17. Enter all vaccines given on the date listed in item 4: (Route is HOW vaccine was given, Body site is WHERE vaccine was given) Use **Continuation Page** if needed

Vaccine (type and brand name)	Manufacturer	Lot number	Route	Body site	Dose number in series

18. Describe the adverse event(s), treatment, and outcome(s), if any: (symptoms, signs, time course, etc.)
Use **Continuation Page** if needed

19. Medical tests and laboratory results related to the adverse event(s): (include dates)
Use **Continuation Page** if needed

20. Has the patient recovered from the adverse event(s)?: ☐ Yes ☐ No ☐ Unknown

21. Result or outcome of adverse event(s): (Check all that apply)
☐ Doctor or other healthcare professional office/clinic visit
☐ Emergency room/department or urgent care
☐ Hospitalization: Number of days (if known)
Hospital name:
City: State:
☐ Prolongation of existing hospitalization (vaccine received during existing hospitalization)
☐ Life threatening illness (immediate risk of death from the event)
☐ Disability or permanent damage
☐ Patient died – Date of death: (mm/dd/yyyy)
☐ Congenital anomaly or birth defect
☐ None of the above

ADDITIONAL INFORMATION

22. Any other vaccines received within one month prior to the date listed in item 4: Use **Continuation Page** if needed

Vaccine (type and brand name)	Manufacturer	Lot number	Route	Body site	Dose number in series	Date Given

23. Has the patient ever had an adverse event following any previous vaccine?: (If yes, describe adverse event, patient age at vaccination, vaccination dates, vaccine type, and brand name)
☐ Yes ☐ No ☐ Unknown

24. Patient's race: (Check all that apply) ☐ American Indian or Alaska Native ☐ Asian ☐ Black or African American ☐ Native Hawaiian or Other Pacific Islander ☐ White ☐ Unknown ☐ Other:

25. Patient's ethnicity: ☐ Hispanic or Latino ☐ Not Hispanic or Latino ☐ Unknown

26. Immuniz. proj. report number: (Health Dept use only)

COMPLETE ONLY FOR U.S. MILITARY/DEPARTMENT OF DEFENSE (DoD) RELATED REPORTS

27. Status at vaccination: ☐ Active duty ☐ Reserve ☐ National Guard ☐ Beneficiary ☐ Other:

28. Vaccinated at Military/DoD site: ☐ Yes ☐ No

FORM FDA VAERS 2.0 (02/22)

SAVE

Centers for Disease Control and Prevention. (2021, May 27). *Use of agency materials.* https://www.cdc.gov/other/agencymaterials.html

Medical Management of Vaccine Reactions in Adults in a Community Setting

The table below describes steps to take if an adverse reaction occurs following vaccination.

Administering any medication, including vaccines, has the potential to cause an adverse reaction. To minimize the likelihood of an adverse event, screen patients for vaccine contraindications and precautions prior to vaccination (see "Screening Checklist for Contraindications to Vaccines for Adults" at www.immunize.org/catg.d/p4065.pdf). When adverse reactions do occur, they can vary from minor (e.g., soreness, itching) to the rare and serious (e.g., anaphylaxis). Be prepared.

Vaccine providers should know how to recognize allergic reactions, including anaphylaxis. Have a plan in place and supplies available to provide appropriate medical care should such an event occur.

REACTION	SIGNS AND SYMPTOMS	MANAGEMENT
Localized	Soreness, redness, itching, or swelling at the injection site	Apply a cold compress to the injection site. Consider giving an analgesic (pain reliever) or antipruritic (anti-itch) medication.
	Slight bleeding	Apply pressure and an adhesive compress over the injection site.
	Continuous bleeding	Place thick layer of gauze pads over site and maintain direct and firm pressure; raise the bleeding injection site (e.g., arm) above the level of the patient's heart.
Psychological fright, presyncope, and syncope (fainting)	Fright before injection is given	Have patient sit or lie down for the vaccination.
	Patient feels "faint" (e.g., light-headed, dizzy, weak, nauseated, or has visual disturbance)	Have patient lie flat. Loosen any tight clothing and maintain open airway. Apply cool, damp cloth to patient's face and neck. Keep them under close observation until full recovery.
	Fall, without loss of consciousness	Examine the patient to determine if injury is present before attempting to move the patient. Place patient flat on back with feet elevated.
	Loss of consciousness	Check to determine if injury is present before attempting to move the patient. Place patient flat on back with feet elevated. Call 911 if patient does not recover immediately.
Anaphylaxis	**Skin and mucosal symptoms** such as generalized hives, itching, or flushing; swelling of lips, face, throat, or eyes. **Respiratory symptoms** such as nasal congestion, change in voice, sensation of throat closing, stridor, shortness of breath, wheeze, or cough. **Gastrointestinal symptoms** such as nausea, vomiting, diarrhea, cramping abdominal pain. **Cardiovascular symptoms** such as collapse, dizziness, tachycardia, hypotension.	See the emergency medical protocol on the next page for detailed steps to follow in treating anaphylaxis.

CONTINUED ON NEXT PAGE ▶

IMMUNIZATION ACTION COALITION Saint Paul, Minnesota ▪ 651-647-9009 ▪ www.immunize.org ▪ www.vaccineinformation.org
www.immunize.org/catg.d/p3082.pdf ▪ Item #P3082 (7/19)

Immunization Action Coalition. (2022, March 14). *Immunization action coalition disclaimer*. https://www.immunize.org/iacadmin/disclaimer.asp

Screening Checklist for Contraindications to Vaccines for Adults

PATIENT NAME _____

DATE OF BIRTH ____ / ____ / ____
month day year

For patients: The following questions will help us determine which vaccines you may be given today. If you answer "yes" to any question, it does not necessarily mean you should not be vaccinated. It just means additional questions must be asked. If a question is not clear, please ask your healthcare provider to explain it.

	yes	no	don't know
1. Are you sick today?	☐	☐	☐
2. Do you have allergies to medications, food, a vaccine component, or latex?	☐	☐	☐
3. Have you ever had a serious reaction after receiving a vaccination?	☐	☐	☐
4. Do you have a long-term health problem with heart, lung, kidney, or metabolic disease (e.g., diabetes), asthma, a blood disorder, no spleen, complement component deficiency, a cochlear implant, or a spinal fluid leak? Are you on long-term aspirin therapy?	☐	☐	☐
5. Do you have cancer, leukemia, HIV/AIDS, or any other immune system problem?	☐	☐	☐
6. Do you have a parent, brother, or sister with an immune system problem?	☐	☐	☐
7. In the past 3 months, have you taken medications that affect your immune system, such as prednisone, other steroids, or anticancer drugs; drugs for the treatment of rheumatoid arthritis, Crohn's disease, or psoriasis; or have you had radiation treatments?	☐	☐	☐
8. Have you had a seizure or a brain or other nervous system problem?	☐	☐	☐
9. During the past year, have you received a transfusion of blood or blood products, or been given immune (gamma) globulin or an antiviral drug?	☐	☐	☐
10. For women: Are you pregnant or is there a chance you could become pregnant during the next month?	☐	☐	☐
11. Have you received any vaccinations in the past 4 weeks?	☐	☐	☐

FORM COMPLETED BY _____ DATE _____

FORM REVIEWED BY _____ DATE _____

Did you bring your immunization record card with you? **yes** ☐ **no** ☐

It is important for you to have a personal record of your vaccinations. If you don't have a personal record, ask your healthcare provider to give you one. Keep this record in a safe place and bring it with you every time you seek medical care. Make sure your healthcare provider records all your vaccinations on it.

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Saint Paul, Minnesota · 651-647-9009 · www.immunize.org · www.vaccineinformation.org
www.immunize.org/catg.d/p4065.pdf · Item #P4065 (10/20)

Immunization Action Coalition. (2022, March 14). *Immunization action coalition disclaimer*. https://www.immunize.org/iacadmin/disclaimer.asp

YOU CALL THE SHOTS

Vaccine Administration: Intramuscular (IM) Injection Adults 19 years of age and older

Administer these vaccines by IM injection:

- *Haemophilus influenzae* type b (Hib)
- Hepatitis A (HepA)
- Hepatitis B (HepB)
- Hepatitis A and hepatitis B (HepA-HepB)
- Human papillomavirus (HPV vaccine)
- Influenza vaccine, inactivated (IIV)
- Influenza vaccine, recombinant (RIV4)
- Meningococcal conjugate (MenACWY)
- Meningococcal serogroup B (MenB)
- Pneumococcal conjugate (PCV13)
- Pneumococcal polysaccharide (PPSV23)*
- Tetanus and diphtheria toxoid (Td)
- Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis (Tdap)
- Zoster, recombinant (RZV)

*May also be administered by subcutaneous injection

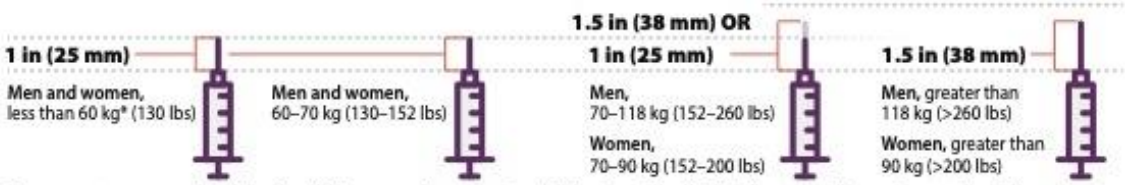
To ensure vaccines are safe and effective, it's important to prepare and administer them correctly:

- Follow aseptic technique.
- Use a new needle and syringe for each injection.
- Perform hand hygiene before vaccine preparation, between patients, when changing gloves (if worn), and any time hands become soiled.‡

‡Gloves are not required unless the person administering the vaccine is likely to come in contact with potentially infectious body fluids or has open lesions on the hands. If worn, perform hand hygiene and change gloves between patients.

1. Use the correct syringe and needle.

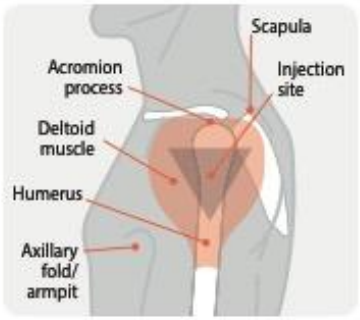
- Administer vaccine using either a 1-mL or 3-mL syringe.
- Use a 22- to 25-gauge needle.
- Use the correct needle length based on the patient's gender and weight. For adults, use a 1- to 1.5-inch needle.



*Some experts recommend a 5/8-inch needle for men and women who weigh less than 60 kg (130 lbs). If used, the skin must be stretched fully and the subcutaneous tissues must not be bunched.

2. Identify the injection site.

- Recommended site: Deltoid muscle in the upper arm
- Use anatomical landmarks to determine the injection site. The deltoid muscle is a large, rounded, triangular shape. Find the acromion process, which is the bony point at the end of the shoulder. The injection site will be approximately 2 inches below the bone and above the axillary fold/armpit.



3. Administer the vaccine correctly.

- Inject the vaccine into the middle and thickest part of the muscle. Insert the needle at a 90-degree angle and inject all of the vaccine in the muscle tissue.
- If administering more than one vaccine in the same arm, separate the injection sites by 1 inch if possible.

For additional information, go to CDC's vaccine administration resource library at www.cdc.gov/vaccines/hcp/admin/resource-library.html.

11/16/20

Centers for Disease Control and Prevention. (2021, May 27). *Use of agency materials.* https://www.cdc.gov/other/agencymaterials.html

1

Vaccine Needs Assessment

A Series on Standards for Adult Immunization Practice

Assessment is the critical first step in ensuring that your adult patients get the vaccines they need for protection against serious vaccine-preventable diseases.

As a standard of care—whether you provide vaccines or not—you should assess your patients' immunization status at *every clinical encounter* and strongly recommend vaccines that they need.

Assessing your patients' vaccination status at every clinical encounter will decrease missed opportunities to vaccinate.[1, 2, 3]

- Many adults do not schedule annual check-ups or come in for preventive services, therefore it is critical to assess vaccine status whenever they do come in for a visit.
- Some vaccines are indicated for adults based on factors other than age, making it important to assess regularly whether your patients have had lifestyle, health, or occupational changes that may prompt the need for additional vaccines.
- Vaccine recommendations for adults change over time, and your patients may not be up to date with the latest recommendations.

There are simple ways to implement routine vaccine assessment into your office patient flow.

- Give patients a vaccine assessment form at check-in.
- Include standing orders or protocols for nursing staff to assess and administer needed vaccines.
- Integrate vaccine prompts into electronic medical records.

See back for more tips and resources.

Routinely assessing patient vaccination status will make a difference.

Adults think immunization is important, but most don't know which vaccines they need throughout their lives. Research indicates that your recommendation is the strongest predictor of whether patients get vaccinated.[4] Implement policies to ensure your patients' vaccination needs are routinely reviewed.

For information on insurance coverage of vaccines for adults, visit: www.cdc.gov/vaccines/hcp/adults

Information Series for Healthcare Professionals
www.cdc.gov/vaccines/adultstandards

U.S. vaccination rates for adults are extremely low.

For example:

- Only 20% of adults 19 years or older have received Tdap vaccination.
- Only 28% of adults 60 years or older have received zoster (shingles) vaccination.
- Only 20% of adults 19 to 64 years old, at high risk, have received pneumococcal vaccination.
- Only 44% of adults 18 years or older had received flu vaccination during the 2014–2015 flu season.

Sources: NHIS 2014 (MMWR 2016; 64(4)), BRFSS 2014-2015 (www.cdc.gov/flu/fluvaxview)

For resources and tips on vaccine recommendation, administration, referral, and documentation, visit:
www.cdc.gov/vaccines/adultstandards

DON'T WAIT. VACCINATE!

CDC

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Centers for Disease Control and Prevention. (2021, May 27). *Use of agency materials.* https://www.cdc.gov/other/agencymaterials.html

VACCINE INFORMATION STATEMENT

Pneumococcal Conjugate Vaccine: *What You Need to Know*

Many vaccine information statements are available in Spanish and other languages. See www.immunize.org/vis

Hojas de información sobre vacunas están disponibles en español y en muchos otros idiomas. Visite www.immunize.org/vis

1. Why get vaccinated?

Pneumococcal conjugate vaccine can prevent **pneumococcal disease**.

Pneumococcal disease refers to any illness caused by pneumococcal bacteria. These bacteria can cause many types of illnesses, including pneumonia, which is an infection of the lungs. Pneumococcal bacteria are one of the most common causes of pneumonia.

Besides pneumonia, pneumococcal bacteria can also cause:

- Ear infections
- Sinus infections
- Meningitis (infection of the tissue covering the brain and spinal cord)
- Bacteremia (infection of the blood)
- Anyone can get pneumococcal disease, but children under 2 years old, people with certain medical conditions or other risk factors, and adults 65 years or older are at the highest risk.

Most pneumococcal infections are mild. However, some can result in long-term problems, such as brain damage or hearing loss. Meningitis, bacteremia, and pneumonia caused by pneumococcal disease can be fatal.

2. Pneumococcal conjugate vaccine

Pneumococcal conjugate vaccine helps protect against bacteria that cause pneumococcal disease. There are three pneumococcal conjugate vaccines (PCV13, PCV15, and PCV20). The different vaccines are recommended for different people based on their age and medical status.

PCV13

- **Infants and young children** usually need 4 doses of PCV13, at ages 2, 4, 6, and 12–15 months.
- **Older children (through age 59 months)** may be vaccinated with PCV13 if they did not receive the recommended doses.
- **Children and adolescents 6–18 years of age** with certain medical conditions should receive a single dose of PCV13 if they did not already receive PCV13.

PCV15 or PCV20

- **Adults 19 through 64 years old** with certain medical conditions or other risk factors who have not already received a pneumococcal conjugate vaccine should receive either:
  - a single dose of PCV15 followed by a dose of pneumococcal polysaccharide vaccine (PPSV23), or
  - a single dose of PCV20.
- **Adults 65 years or older** who have not already received a pneumococcal conjugate vaccine should receive either:
  - a single dose of PCV15 followed by a dose of PPSV23, or
  - a single dose of PCV20.

Your health care provider can give you more information.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Centers for Disease Control and Prevention. (2021, May 27). *Use of agency materials.* https://www.cdc.gov/other/agencymaterials.html

Pneumococcal Disease in Adults and the Vaccines to Prevent It

Pneumococcal disease in adults can range from mild to serious, and can sometimes be deadly. Two vaccines provide protection against this disease. Talk to your doctor to see if they recommend these or any other vaccines for you.

What is pneumococcal disease?

Pneumococcal disease is a term used for a wide range of infections caused by bacteria called *Streptococcus pneumoniae* (pneumococcus), including:

- Ear infections
- Sinus infections
- Pneumonia (lung infection)
- Bacteremia (bloodstream infection)
- Meningitis (infection of the covering of the brain and spinal cord)
- Sepsis (the body's extreme response to an infection)

What are the symptoms of pneumococcal disease?

Symptoms depend on the part of the body the bacteria are affecting.

For **sinus and ear infections**, symptoms are usually relatively mild, such as:

- Cough
- Ear pain
- Fever
- Sore throat

For **pneumonia, bloodstream infections, meningitis, and sepsis**, you can also have more severe symptoms, including:

- Fever or chills
- Cough
- Rapid or difficult breathing
- Chest pain
- Headache
- Stiff neck
- Increased pain when looking at bright lights
- Confusion or low alertness

How do doctors diagnose and treat pneumococcal disease?

Early diagnosis and treatment are very important for serious pneumococcal infections. Diagnosis depends on which type of infection a doctor thinks a patient may have. For meningitis or bloodstream infections, doctors will collect samples of cerebrospinal fluid or blood and send them to a laboratory for testing. Doctors can also use a urine test to diagnose some cases of pneumonia. For illnesses like ear and sinus infections, doctors usually diagnose them based on history, symptoms, and a physical exam. Doctors can treat pneumococcal disease with antibiotics.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

CS300354-A November 05, 2019

Centers for Disease Control and Prevention. (2021, May 27). *Use of agency materials.* https://www.cdc.gov/other/agencymaterials.html