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Increasing Adult Influenza Vaccination Rates in the Primary Care Setting

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Nursing

DOCTOR OF NURSING PRACTICE (DNP) PROGRAM

A DNP PROJECT

**Increasing Adult Influenza Vaccination Rates
in the Primary Care Setting**

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Spring 2020

The George Washington University

ADULT INFLUENZA VACCINATION

Increasing Adult Influenza Vaccination Rates
in the Primary Care Setting

A Project Presented to the Faculty of the School of Nursing
The George Washington University
In partial fulfillment of the requirements
For the Degree of Doctor of Nursing Practice

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Abstract

Background: Provision of vaccinations is one of the most basic interventions aimed at health promotion and disease prevention in the primary care setting. Despite increased public awareness and improved access to vaccinations through minute-clinic settings, health fairs, and employer-offered vaccination clinics, adults in the United States continue to fall short of national goals. Literature demonstrates vaccination rates among adults vary widely and may be affected by a multitude of factors, however vaccination rates may be greatly improved with increased provider engagement.

Objectives: The purpose of this project was to develop, implement, and evaluate a program to improve immunization rates in an ambulatory family practice setting. The primary aim of this study was to implement and assess the efficacy of a multi-pronged provider and staff engagement intervention targeted at increasing influenza vaccination of adults ≥ 18 years of age in the outpatient setting. The primary outcome measured was practice vaccination rates for the influenza vaccine among adult patients seen between October 1, 2019-November 30, 2019.

Methods: This project followed a pre-post-test design, tracking practice influenza vaccination rates among adult patients, following a comprehensive practice intervention to improve provider engagement, tracking of influenza vaccinations, and patient understanding of vaccinations through increased patient education efforts.

Results: During the two-month intervention period, 171 adult patients were evaluated. Data analysis revealed a 12.3% increase in vaccination rates (from 15.2% to 27.5%). A statistically significant improvement in vaccination rates among adult patients was noted following the intervention ($t(170) = 3.470, p = 0.001$). Pre- and post-test surveys were completed by staff members and analyzed before and after staff training. Analysis of staff surveys revealed no statistically significant changes among any of the

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survey items. Additionally, a total of 25 patient surveys were completed to assess reasons for vaccine refusal, revealing the primary reason for vaccine refusal was dislike of needles.

Conclusions Current data demonstrates an overall increase of 12.3% in vaccination rates among patients seen during the intervention period. Additionally, improved vaccination rates were noted in each of the specific demographic categories.

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Increasing Adult Influenza Vaccination Rates in the Primary Care Setting

Influenza affects millions of Americans annually, causing lost days of work and productivity, and more importantly, influenza is associated with complications of chronic illnesses and tens of thousands of deaths per year. The U.S. influenza vaccination rates are still far short of Healthy People 2020 goals and literature demonstrates influenza vaccination rates vary greatly in the adult population. Vaccination rates are affected by a multitude of contributing factors ranging from age, race, ethnicity, culture, geographic location, physician engagement, cost and transportation. Efforts to improve vaccination rates within the primary care setting should account for this and strategies to address this issue should be comprised of a multi-pronged approach. Many barriers to vaccination may be mitigated through community collaborative efforts, increased provider engagement, and use of standing orders. Quality improvement efforts should include consistent documentation and tracking of vaccination rates, and routine review to ensure the practice is meeting established goals.

Background and Significance

Research indicates that many adults in the United States have not received recommended vaccinations, and vaccination rates were lowest among low-income adults, highest among non-Hispanic whites, and indicate persistent racial and ethnic disparities (Norris, Vahratian, & Cohen, 2017; CDC, 2016). Despite the increased use of electronic medical records (EMR) and clinical decision support systems, poor provider engagement and misinformation regarding vaccines in the community at large perpetuate poor vaccination rates among adults ≥ 18 years. According to the Centers for Disease Control and Prevention (2017), influenza caused between 9.2 million – 35.6 million illnesses, 140,000 – 710,000 hospitalizations, and 12,000 – 56,000 deaths annually in the United States since 2010. The CDC currently estimates there have already

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been at least 32 million flu illnesses, 310,000 hospitalizations and 18,000 deaths from flu this year (CDC, 2020). Despite this, U.S. adult vaccination rates continue to fall short of national goals. Data from the 2016-2017 season showed vaccination rates at just 43% versus the Healthy People 2020 goal of 70% (Abbas, Kang, Chen, Were, & Marathe, 2018).

Needs Assessment

Adult vaccination rates were a practice area identified through a review of CDC data and discussions with the practice owner (physician) which could be improved. Decades of research have proven efficacy of vaccinations, especially in those with underlying chronic diseases, and higher rates of vaccination improve the health of communities, however poor rates of vaccination persist among adults. The practice owner specifically noted poor overall vaccination rates related to patient hesitancy or refusal, and difficulty tracking adult immunizations and with immunization documentation in current EMR.

Analysis of this practice revealed important strengths, weaknesses, opportunities and threats that were key in moving forward with successful interventions aimed at increasing adult vaccination rates. Weaknesses included the relative newness of the practice, which serves about 576 patients in total, and small staff size, which may make extended vaccination clinic hours difficult to cover. Additionally, this office is not affiliated with any larger organizations and therefore has limited resources, such as financing, IT support, and public relations. However, one may also view the small size of the practice as a strength as leadership is easily accessible and new interventions may be rapidly rolled out. To overcome issues of limited resources, the practice may discuss collaborative community outreach efforts with other local physicians/small practices. The small staff size promotes a professional and collegial atmosphere oriented towards teamwork, and colleagues are interested in innovation & quality improvement strategies.

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Additionally, monthly staff meetings improve transparency and ensure open communication about practice goals. Another practice strength is that the practice owner is bilingual in an area surrounding Washington D.C., which has a large Hispanic population. The practice is located just off the D.C. Beltway and there is a metro stop adjacent to the office which provides easy access for patients, especially those who may rely on public transportation. However, surrounding commercial development negatively impacts potential foot-traffic.

Poor understanding of how vaccinations work (e.g. fear of getting sick from vaccine) is often a common reason for vaccine hesitancy and any efforts to increase vaccination rates should address this, though time constraints may make it difficult for clinicians to adequately address such issues during a single visit. Incentives from insurers to increase vaccination rates and existing media advertisements encouraging vaccination, however, do provide support for organizational interventions such as those implemented through this project.

Problem Statement & Practice Question

Vaccines are an important tool in disease prevention through individual vaccination and herd immunity and may significantly improve outcomes in those with underlying chronic conditions. However, research indicates that many adults in the United States have not received recommended vaccinations. The overarching practice question for this project was: Can a multipronged proactive provider engagement intervention improve influenza vaccination rates in the primary care setting?

Purpose

The purpose of this project was to develop, implement, and evaluate a program to improve immunization rates in ambulatory settings. This project assessed factors such as inadequate documentation of administered vaccinations and vaccines administered elsewhere,

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poor clinician understanding of vaccine indications and contraindications, identification of missed opportunities for vaccination, as well as patient health beliefs and understanding of vaccines.

Aims

The primary aim of this study was to implement and assess the efficacy of a multi-pronged provider and staff engagement intervention targeted at increasing influenza vaccination of adults ≥ 18 years of age in the outpatient setting. For example, identification of common points in care where missed opportunities for vaccination occur, or poor understanding of contraindications allowed for staff re-education and training. Additionally, assessment of current clinical decision support measures and documentation of vaccinations in the electronic medical record allowed for improved user tracking of vaccinations.

The secondary aim of this study was to identify and address barriers to influenza vaccination of adults ≥ 18 years in the outpatient setting, including patient-specific factors which may contribute to vaccine hesitancy or refusal. Exploration of patient-related factors was imperative in addressing disparities in influenza vaccination, as many organizations offer low cost or free vaccinations in addition to full coverage by most insurers. Understanding of patients' reasons for refusal allows the healthcare provider to correctly address unfounded fears and misinformation.

Objectives

As discussed, this project had several aims and therefore multiple objectives which were established and are outlined below:

1. Completion of evidence-based staff training to increase provider engagement and promote vaccination status assessment at each visit by all staff members.

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2. Identification of the most common reasons for vaccine refusal within the practice.
3. Provision of basic patient education about vaccination during each patient encounter (provided in written form in the triage area and in exam rooms).
4. Evaluation of the electronic medical record software regarding documentation and tracking of patient vaccinations.

Review of Literature

As most vaccinations are given during childhood, much of the existing literature regarding vaccinations focuses on children and childhood vaccinations. A search of peer reviewed articles through the George Washington Himmelfarb Online Catalogue, PubMed, Medline, & CINAHL was employed using the following searcher terms: (adult vaccination) AND (influenza) AND/OR (primary care). The following filters were used: Clinical Study; Clinical Trial; Clinical Trial, Phase I; Clinical Trial, Phase II; Clinical Trial, Phase III; Clinical Trial, Phase IV; Comparative Study; Controlled Clinical Trial; Observational Study; Randomized Controlled Trial; Government Document; Guideline; Journal Article; Meta-analysis; Multicenter Study; Patient Education Handout; Practice Guideline; Review; Abstract, Free full text, Full text; Publication within the past 10 years; Human subjects. Article abstracts were reviewed with the research question and project aims and objectives in mind and further assessed for content and experimental design. Inclusion criteria used to select appropriate studies included: peer reviewed articles, published in English, regarding adult patients (18 years and older). Exclusion criteria included articles regarding, or studies conducted with, pediatric patients or non-humans, and articles published prior to 2009. In total, 15 articles were found to be directly relevant to this project regarding influenza vaccinations in the primary/outpatient setting.

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Much of the existing literature discusses quasi-experimental studies examining various aspects of vaccination, though the study by Lin et. al (2016) was a randomized controlled trial involving multiple primary care practices, and systematic review and meta-analysis by Lau et. al. (2012) included both randomized and nonrandomized studies. Important concepts identified through this literature review are further discussed and were utilized as guiding principles throughout this project:

- This project was implemented in the primary care setting where most influenza vaccinations occur. This is supported by Lu et. al. (2014) who noted doctor's offices are the most common place (38.4%) for receipt of influenza vaccination, stores (20.1%) the next common, and workplaces (17.6%) the third common.
- Addressing poor adult vaccination rates requires a multi-pronged approach (Rockwell, 2015). This project examined barriers to influenza vaccination from both the patient and clinician perspectives and interventions were implemented to reduce both.
- Evidence suggests insufficient motivation in the primary care setting contributes to poor vaccination rates, but increased communication between providers and patients could significantly enhance influenza vaccination rates (Zimmerman, 2014; Maurer & Harris, 2011).
- Practice collaboration with other entities such as public health departments, pharmacies, and worksites could improve influenza vaccination rates (Hurley et.al., 2011).

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- Self-report of influenza vaccination in the current season (but not for previous seasons) can provide a valid measure of vaccine exposure when medical records or registry data are not available (King, Mclean, Belongia, 2018). Part of this project included examination of vaccination documentation and tracking.
- Seasonal influenza vaccine uptake varies significantly across racial and ethnic groups, and older age, perception of high vaccine effectiveness, higher income and no out-of-pocket payments improve vaccination rates (Maurer, Harris, & Uscher-Pines, 2014; Abbas, 2018). However, improved office-based practices such as standing orders increase vaccine uptake and reduce disparities (Zimmerman, Nowalk, Tabbarah, Hart, Fox, & Raymund, 2009).
- Additionally, older patients need intentional messages that recommend vaccination and patient education is needed to counter myths about adverse reactions (Zimmerman et. al., 2003). Specifically, patient tracking/recall/outreach and provider prompts were successful approaches to increasing seasonal influenza immunization rates among inner-city seniors (Humiston, 2011).

Evidence-Based Practice Translation Model

Stetler's Model of Research Utilization is an evidence-based practice (EBP) model that focuses on the individual practitioner rather than organizational change and is one of the original models developed regarding EBP and may be used for formal or informal changes (White, Dudley-Brown, & Terhaar, 2016; Gawlinski & Rutledge, 2008). The Stetler Model was well suited for this project, as the focus was on improving adult vaccination rates in a small family

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practice setting. This model incorporates use of internal data and external evidence and consists of five phases: preparation, validation, comparative evaluation/decision making, translation/application, evaluation (Gawlinski & Rutledge, 2008).

During phase I, the clinician considers external and internal factors, as well as types of research to review and examine (Stetler, 2001). In this phase, the clinician specifically affirms perceived problems, defines desired outcomes, affirms priority of the change, and reviews current evidence (Stetler, 2001). In phase II, the clinician performs a utilization-focused critique. Here the clinician assesses and rates the quality of available evidence and discards non-credible sources (Stetler, 2001). During phase III, the clinician reviews the current practice(s), substantiating evidence, fit & feasibility and decides to move forward or not (Stetler, 2001). If a decision is made to move forward, the clinician will determine type, level, and method of application in phase IV (Stetler, 2001). In formal application of changes, this phase includes identification/design of evidence-based documents, development of an evidence-based plan which includes evaluation, and dissemination of this information (Stetler, 2001). In the final phase, the clinician gathers and evaluates evidence regarding the change process, goal-related progress, outcomes, and change as part of routine practice (Stetler, 2001).

Additionally, this project utilized Lewin's Theory of Change as a guiding principle. Lewin's theory of change incorporates three phases: unfreezing, moving, and freezing. In efforts to increase adult vaccination rates, it is necessary to break down the existing status quo and workflow to identify points of care to that require improvement. In the moving phase, strategies are implemented to increase opportunities for provider engagement and provision of patient education. It is then necessary to ensure these strategies are fully incorporated into the daily workflow and continued after initial implementation in the refreezing phase.

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Methodology**Research Design**

This project examined practice vaccination rates for influenza among all adults within the practice, pre- and post-intervention. Vaccination rates were obtained from the electronic medical record system, and data from 2018 served as a pre-intervention baseline. Pre- and post-intervention vaccination rates were analyzed using independent t-tests (see Table 1).

Providers and staff completed a brief in person training which incorporated guiding principles from an evidence-based program to increase immunizations. A simple survey using a five-point Likert scale was distributed to staff before and after completion of this training to assess attitudes (satisfaction, confidence etc.) regarding workflow and patient engagement (see Table 1).

Additionally, written surveys were provided to patients in the waiting area and exam rooms, to assess attitudes regarding vaccination and specific factors contributing to vaccine hesitancy within this practice.

Table 1

Data Analysis

Dependent variable	Independent variable	Statistical analysis
Practice Immunization Rate	Pre- & Post Intervention(s)	Paired t-test
Staff attitudes	Pre- & Post Intervention(s)	Paired t-test

Setting & Study Population

The interventions were implemented, and data collection was conducted in a private family practice located in the D.C. Metro area. The target population being studied consisted of adult patients ≥ 18 years of age. Eligible participants were those presenting in the office during the study period.

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Subject Recruitment

The clinician in this practice currently sees approximately 10-12 patients per day and serves a 576 total patient panel. Participants were recruited upon presentation for services for any visit type between October 1, 2019 and November 30, 2019.

Consent Procedure

Patients were given the opportunity to decline/consent to participation in the practice survey regarding reasons for vaccine refusal/hesitancy upon presentation to the office.

Risks/Harms

This project did not subject patients to any further intervention than typically present during routine primary care visits which assess for vaccination status and provide patient education and administration of vaccinations onsite.

Subject Costs and Compensation

There was no additional cost to patients for participating in the interventions associated with this project. Conversely, there was no associated compensation to the patient for participating in the interventions associated with this project. Staff members and clinicians were required to attend a brief training session in addition to their daily work activities.

Resources Needed

This project relied heavily on digital data which was extracted from the EMR to measure practice progress in vaccination status. This did not require any IT support or additional resources.

Study Interventions

The primary aim of this study was to implement a comprehensive intervention to increase influenza vaccination of adults ≥ 18 years in the outpatient setting. The primary investigator(s)

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reviewed daily workflow and clinical documentation practices for vaccine administration and tracking of practice vaccination rates. Clinicians were provided training which incorporated basic concepts from an evidence-based program developed by the University of Pittsburgh School of Medicine (2019). This evidence-based training promotes proactive clinical engagement regarding vaccination status assessment and recommendations in the outpatient setting.

Additionally, a survey was provided to participants to assess reasons for vaccine acceptance & refusal. This helped identify specific areas the clinician must address with patients to improve vaccination acceptance within the practice.

Project Timeline

This project was implemented from October 1, 2019 – November 30, 2019. Electronic medical records were audited to assess vaccination rates in 2018 and 2019 for all adults ≥ 18 years of age seen during the intervention period. Each medical record was assessed to determine if the patient had been an established patient in 2018, and if they had or had not received an influenza vaccination in 2018 and in 2019. Patients under the age of 18 were excluded. Patients who were seen multiple times during the intervention period were only counted once. Demographic information was obtained regarding age, gender, and ethnicity. Among those patients seen during the two-month intervention period, vaccination status for 2018 served as the baseline. It was additionally noted if vaccination was received elsewhere, and if it had or had not been documented appropriately in the medical record. During this process, vaccination status was cross-checked with Immunet, the Maryland online registry for vaccinations. Pre- and post-intervention vaccination rates were analyzed using paired t-tests.

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Evaluation Plan

Evaluation of this project required both formative and summative assessments throughout the intervention period. Potential changes to the electronic medical record system and documentation, as well as workflow and staff attitudes, were assessed continuously for accuracy and ease of use during project implementation. Patient survey data was analyzed to evaluate patient-centered barriers to influenza vaccination both during and at the end of the intervention time-period. Primary summative evaluation of this project was performed by examining the overall vaccination rate in comparison to the previous year at the end of the intervention period.

Measured Outcomes

The primary outcome measure was practice vaccination rates, as compared with the previous year. The data was analyzed to assess differences in gender, race, and age within the practice. Additionally, staff attitudes regarding workflow and confidence in patient engagement were measured prior to, and following, the interventions.

Data Analysis, Maintenance & Security

De-identified patient data was analyzed to track practice vaccination rates, as well as differences in vaccination rates by gender, race, and age. Surveys provided to both staff and patients remained anonymous. Survey responses were analyzed using SPSS Statistics software.

Results

During the two-month intervention period from October 1, 2019-November 30, 2019, 171 adult patients were seen in the office. Data analysis revealed 15.2% of this patient population received the influenza vaccination in 2018 and 27.5% received the influenza vaccination in 2019 (see Appendix B). A statistically significant improvement in vaccination rates among adult patients was noted following the intervention ($t(170) = 3.470, p = 0.001$).

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Patients were primarily female (118 females versus 53 males), the largest age group was patients age 26-50 (94 patients). Regarding ethnicity, patients largely identified as African American or Hispanic (93 and 34 total patients respectively).

Staff within the practice completed pre- and post-test surveys regarding vaccination practices, including questions about workflow and confidence in addressing vaccine hesitancy. The survey instrument was composed of ten questions using a five-point Likert scale (see Appendix C). A total of two pre- and two post-test surveys were completed. Each question was independently analyzed for changes before and after the staff training session using a two-tailed t-test with a 95% confidence interval. There were no statistically significant changes regarding any of the items on the staff survey (see Table 2).

Table 2
Staff Survey Analysis

Survey	t value	p value
Most patients in this practice do receive the influenza vaccine.	1.00	0.42
Every staff member is responsible for recommending influenza vaccines.	1.00	0.42
I am responsible for recommending influenza vaccines to patients in this practice.	0.00	1.00
Assessment of vaccination status is a routine part of every patient visit in this practice.	-0.71	0.55
I personally discuss and recommend influenza vaccines at every patient visit.	0.00	1.00
I feel confident answering patient questions about the influenza vaccine.	1.00	0.42
I do not feel comfortable addressing vaccine hesitancy.	0.00	1.00
It is easy to track which patients have received an influenza vaccine and which have not.	-1.34	0.31
Current documentation is cumbersome, and it is difficult to discern which patients have already been vaccinated.	0.00	1.00
I would like further training to help increase my confidence regarding vaccine hesitancy.	0.00	1.00

Additionally, patient surveys were distributed in the waiting area and exam rooms.

Surveys consisted of seven multiple choice questions regarding demographic information and attitudes and beliefs concerning influenza vaccination (see Appendix D). A total of twenty-five

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patient surveys were completed. Demographic information regarding patient survey participants is outlined in Table 3. Differences in vaccine receptivity were evaluated by age, gender and ethnicity (see Table 4). A total of nine survey participants (36%) reported they regularly receive influenza vaccinations and sixteen participants (64%) stated they do not, yet only 24% of participants reported they had received this year's vaccine at the time of the survey. The majority of survey participants stated the primary reasons for vaccine refusal in order of frequency were dislike of needles (26.7%), the belief that influenza vaccines are ineffective (20%), and the belief influenza vaccines cause illness (20%). Nine participants noted "other" for reason of refusal, writing in explanations such as "personal preference," "no reason," or left the write-in area blank.

Table 3
Patient Survey Demographics

Sex	n (%)
Male	12 (48.0%)
Female	13 (52.0%)
Age	n (%)
18-25	4 (16.0%)
26-50	15 (60.0%)
51-75	3 (12.0%)
76-100	3 (12.0%)
Ethnicity	n (%)
Hispanic	6 (24.0%)
White, not Hispanic	5 (20.0%)
Black, not Hispanic	12 (48.0%)
Other, not Hispanic	2 (8.0%)

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Table 4
Vaccination Receptivity

Variable	Vaccination Receptivity	
	Frequency (%)	
	Receives Annual Vaccination	Does Not Receive Annual Vaccination
Age		
• 18-25	0 (n = 0)	100 (n = 4)
• 26-50	73.3 (n = 11)	26.7 (n = 4)
• 51-75	33.3 (n = 1)	66.7 (n = 2)
• 76-100	100 (n = 3)	0 (n = 0)
Gender		
• Male	25 (n = 3)	75 (n = 9)
• Female	46.2 (n = 6)	53.8 (n = 7)
Ethnicity		
• White	25 (n = 3)	75 (n = 2)
• Black or African American	41.7 (n = 5)	58.3 (n = 7)
• Hispanic	0 (n = 0)	100 (n = 6)
• Other; prefer not to answer	50 (n = 1)	50 (n = 1)

Discussion

Overall results indicate a significant improvement in adult vaccination rates among adults who presented to the practice during the intervention period and demonstrates promising implications for nursing practice, policy, quality, and leadership. Additionally, this project demonstrated alignment with the Triple Aims through improvement of individuals' experience of care through increased patient and provider engagement regarding vaccinations, improvement of the work-life of clinicians and staff through increased efficiency of documentation and tracking of vaccinations, and through implementation of positive patient engagement strategies.

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Improvement in vaccination rates was accomplished through basic efforts to increase provider engagement. Staff training helped re-orient team members to a common goal, understand their role regarding vaccinations, and affirmed their confidence in addressing vaccine hesitancy. It is of note, that although there was no statistically significant change in staff survey responses, both staff members had a thorough understanding of vaccine administration and pre-intervention responses demonstrated high confidence in addressing vaccinations with patients, leaving little room for improvement. It was however discovered in training, that staff was not routinely re-assessing vaccination status at follow-up visits. Following the training session, staff verbalized the need for reassessment of vaccination status at all patient visits, even if patients had previously been seen during the current influenza vaccination season.

Through a statistically significant increase in vaccination rates, this project has contributed to increased herd immunity, improving the health of surrounding populations, and reduced per capita costs of care for influenza-related complications and hospitalizations. Such interventions may easily be adapted to improve vaccination rates for other diseases as well as adapted for other clinical settings. Additionally, due to the simplicity of the interventions, continued implementation is easily sustainable.

Limitations

This study was limited by its singular setting and small sample size. Additionally, vaccination status was only tracked for two months out of the calendar year. It is recommended further analysis be conducted over a greater period of time, to include all patients within the practice and to compare multiple years to rule out possible anomalies. The current electronic medical record platform does not allow for changes to be made to the software which would allow for quicker access to immunization status. Customer service was contacted regarding

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improvement, and the team was advised this is not possible at this time. However, training was utilized to ensure staff members opened the appropriate pages of the medical record during all patient encounters.

Maryland state law requires licensed personnel such as a registered nurse or pharmacist to be present if the physician is not, in order to implement standing orders. As current staffing does not include such personnel, standing orders could not be implemented. However, the physician on staff is always present and therefore injections may be offered at any time during office hours without appointments.

Conclusions

Vaccinations are an important part of primary care services and a significant aspect of health promotion and disease prevention. Clinician engagement however often varies, and adult immunization status falls short of expected goals. Additionally, vaccination rates vary by age, race, ethnicity, culture, geographic location, physician engagement, cost and transportation. Addressing practice barriers to adult vaccination requires proactive clinical engagement on the part the healthcare provider and use of a multipronged approach to increase access to and provision of vaccination such as the influenza vaccine. This project demonstrated a statistically significant increase in patient influenza vaccinations during the intervention period and the interventions utilized may easily be incorporated by other clinic sites and to increase provision of additional vaccines.

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Appendix A

Variable Type	Variable Name	Definition	Level of measurement
Dependent variable	Influenza Vaccination administered/received or not	- No (=0) - Yes (=1)	Nominal
	Provision of patient education re: vaccination	- No (=0) - Yes (=1)	Nominal
Independent variable	Provider recommendation of vaccination	- No (=0) - Yes (=1)	Nominal
	Demographics: Gender		Nominal Nominal
	Ethnicity Age		Interval

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Appendix B

Patient Demographics	2018 (Pre-Intervention)		2019 (Post Intervention)	
	Vaccinated	Unvaccinated	Vaccinated	Unvaccinated
Sex, n (%)				
Male	7 (4.1)	46 (26.9)	12 (7.0)	41 (24.0)
Female	19 (11.1)	99 (57.9)	35 (20.5)	83 (48.5)
Race/ethnicity, n (%)				
American Indian or Alaska Native	0 (0)	1 (0.6)	1 (0.6)	0 (0)
Hispanic or Latino	5 (2.9)	29 (17.0)	10 (5.8)	24 (14.0)
Asian	0 (0)	7 (4.1)	1 (0.6)	6 (3.5)
Black or African American	16 (9.4)	77 (45.0)	25 (14.6)	68 (39.8)
Native Hawaiian or other Pacific Islander	0 (0)	0 (0)	0 (0)	0 (0)
White	4 (2.3)	13 (7.6)	6 (3.5)	11 (6.4)
Other; prefer not to answer	1 (0.6)	18 (10.5)	4 (2.3)	15 (8.8)
Age, n (%)				
18-25	3 (1.8)	18 (10.5)	7 (4.1)	14 (8.2)
26-50	10 (5.8)	84 (49.1)	17 (9.9)	77 (45.0)
51-75	9 (5.3)	40 (23.4)	17 (9.9)	32 (18.7)
76-100	4 (2.3)	3 (1.8)	6 (3.5)	1 (0.6)

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Appendix C

You are invited to participate in this research project because you are a healthcare provider or staff member at this practice site. The purpose of this research project is to assess the effects of a multipronged intervention to increase influenza vaccination rates of this practice. Your participation in this research study is voluntary, and there is no penalty if you choose not to participate. Your completion of this survey indicates your consent to participate in this research study.

The procedure involves completing the attached survey. The results of this study will be used for scholarly purposes and may be shared with George Washington University representatives. To help protect your confidentiality, the survey does not contain information that will personally identify you.

This research has been reviewed according to George Washington University IRB procedures for research involving human subjects. If you have any questions about the research study, please contact Leah K. Prescott MSN, FNP-BC at lprescott@gwmail.gwu.edu.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Most patients in this practice do receive the influenza vaccine.	<input type="radio"/>				
2. Every staff member is responsible for recommending influenza vaccines.	<input type="radio"/>				
3. I am responsible for recommending influenza vaccines to patients in this practice.	<input type="radio"/>				
4. Assessment of vaccination status is a routine part of every patient visit in this practice.	<input type="radio"/>				
5. I personally discuss and recommend influenza vaccines at every patient visit.	<input type="radio"/>				
6. I feel confident answering patient questions about the influenza vaccine.	<input type="radio"/>				
7. I do not feel comfortable addressing vaccine hesitancy.	<input type="radio"/>				
8. It is easy to track which patients have received an influenza vaccine and which have not.	<input type="radio"/>				
9. Current documentation is cumbersome, and it is difficult to discern which patients have already been vaccinated.	<input type="radio"/>				
10. I would like further training to help increase my confidence regarding vaccine hesitancy.	<input type="radio"/>				

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Appendix D

You are invited to participate in this quality improvement project because you are an adult, over the age of 18. The purpose of this project is to assess attitudes and beliefs regarding influenza vaccination. Your participation is voluntary, and there is no penalty if you choose not to participate. Your completion of this survey indicates your consent to participate in this quality improvement project.

1. What is your age?
 - 18-25
 - 26-50
 - 51-75
 - 76-100

2. Please specify your ethnicity.
 - Hispanic
 - White, not Hispanic
 - Black, not Hispanic
 - Other, not Hispanic
 - Other/Prefer not to answer

3. Please specify your gender.
 - Male
 - Female
 - Other/Prefer not to answer

4. Do you receive annual influenza vaccines?
 - Yes
 - No

5. Have you received an influenza vaccine this year?
 - Yes
 - No

6. If you do not receive an annual influenza vaccine, why not? (Please select all that apply)
 - Allergy
 - I don't like needles
 - Flu shots are not effective
 - Flu shots make me sick
 - Cost (I cannot afford a flu shot)
 - My doctor does not recommend them
 - Religious reasons
 - Other (Please specify _____)

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7. What would make you more likely to receive an influenza vaccine? (Please select all that apply)
- If it was available without needles (e.g. intranasal vaccine)
 - If my friends or family members recommended it
 - If my doctor recommended it
 - If walk-in flu shots were available at my doctor's office without an appointment with the doctor
 - Other (Please specify _____)

The results of this study will be used for scholarly purposes and may be shared with George Washington University faculty and students. To help protect your confidentiality, the survey does not contain information that will personally identify you. If you have any questions about the quality improvement project, please contact Leah K. Prescott MSN, FNP-BC at lprescott@gwmail.gwu.edu.