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Perceptions of the Flu Vaccine in the Setting of COVID-19

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Perceptions of the Flu Vaccine in the Setting of Covid-19

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Abstract

Background: Vaccination is a key component to public and personal preventative health. The COVID-19 pandemic has illuminated the need for further research into how best to encourage vaccination, especially in harder to reach or vulnerable populations.

Purpose: This project sought to evaluate beliefs and perceptions of the flu vaccine in the context of the COVID-19 pandemic and to explore the views of the project site's population in order to develop more targeted educational programs for increasing flu vaccination. The project focused on the ambulatory population of the emergency department.

Methods: The survey tool administered was based on the National Flu Survey to evaluate potential numbers of vaccination and rationale if participants choose to decline vaccination. It was administered to adult English-speaking patients in an urban academic medical center emergency department and then the survey was analyzed for differences in attitude between specific demographic groups. Data was collected via RedCap electronic data capture tools.

Results: A total of 69 patients participated in the survey. No correlation was found between demographic data and the likelihood of being vaccinated for flu or COVID-19. The most significant correlation was between previous flu vaccination and current vaccination for both flu and COVID-19.

Conclusion: Previous vaccination indicates a willingness to seek future vaccinations in those seeking emergency care. Future interventions should be focused on those who historically have not been vaccinated.

Keywords: Flu vaccine, COVID-19 vaccine, beliefs and perceptions

Table of Contents

Perceptions of the Flu Vaccine in the Setting of Covid-19	5
Introduction.....	5
Background.....	5
Problem Statement	6
Analysis of the Project Site.....	6
Review of the Literature	7
Methods.....	7
Major Themes	7
Evidence-Based Practice.....	11
Theoretical Framework/Evidence-Based Practice Model	11
Goals and Objectives	12
Methods.....	13
Project Site and Population.....	13
Measurement Instruments.....	13
Data Collection Procedure	13
Data Analysis	14
Ethical Considerations and Protection of Human Subjects	14
Timeline	15
Results.....	15

Discussion	22
Setting Facilitators and Barriers.....	23
Conclusion	24
Limitations	24
Further Research	26
Cost-Benefit Analysis	26
References	29
Appendix A.....	36
Appendix B	40
Appendix C	45
Appendix D.....	46
Appendix E	47
Appendix F.....	48

Perceptions of the Flu Vaccine in the Setting of Covid-19

Introduction

Influenza and other viral respiratory infections cause thousands of infections and deaths each year. Patients with comorbidities are at significantly higher risk of complications and death from the flu than healthy individuals. While the influenza vaccine has been widely available at minimal cost for decades, people are still very hesitant to receive it (Barberis et al., 2016; NORC at the University of Chicago [NORC], 2020). As of 2020, even in the setting of a global pandemic, over one third of Americans did not intend to receive a flu vaccination for the season (NORC, 2020).

While that number alone is daunting, each person has their own individual reasons for not wanting to get a flu vaccine. Individual reasons, as explored by numerous researchers, can be sorted into three categories: misinformation about the vaccine, misinformation or mistrust of the medical and pharmaceutical communities, and lack of resources or availability to receive the vaccine (Athota, 2016; Beers et al., 2019; Buechler et al., 2020; Freimuth et al., 2017; Kong et al., 2020; Lutz et al., 2020; Olanipekun et al., 2020; Wooten et al., 2012).

These reasons vary by community. Understanding the community and their specific needs and rationale for declining vaccination can lead to the development of more targeted interventions for specific populations. This project focuses on the development of an emergency department based vaccination program for improved access to vaccines and other preventative health measures for patients who may interact with the medical system most frequently in the ED.

Background

Influenza and pneumonia are the seventh leading cause of death in the state of Massachusetts (Centers for Disease Control and Prevention [CDC], 2021). Even though a leading cause of death, adults have a vaccination rate of only 44% (Massachusetts Department of Public Health [MA DPH], 2021). High risk adults, defined as those with asthma, heart disease, or diabetes, have vaccination rates between 42% and 46% while those aged 65 or older are vaccinated at approximately 58% of the total population (MA DPH, 2021). Adults suffering from social hardship factors, such as homelessness, are additionally more likely to be unvaccinated but have a higher likelihood of contracting influenza or a flu-like illness (Rogers et al., 2019).

Problem Statement

By evaluating beliefs, perceptions, and demographic factors that impact access and desire to receive flu vaccination, public health and medical organizations can devise better programs to provide for the most vulnerable patients where they most commonly encounter and engage with the medical system. In addition to the primary goal as stated, this project additionally seeks to better understand changes in patient beliefs and perceptions in the setting of the SARS-COV-2 (COVID-19) pandemic.

Analysis of the Project Site

At present, the large urban academic medical center emergency department where this project was conducted sees over 100,000 individual patients annually (Aaronson et al., 2019). As is typical in emergency settings across the US, many patients present to the ED when they do not have a primary care provider and need what may be considered non-emergent medical care (Beers et al., 2019). The project site is associated with a free flu clinic that is open one day per week during flu season and operates out of a conference room below the ED, however it is not typically mentioned to patients during their ED visit. The goal of this project was to understand

the perception of flu vaccination in the changing climate of the COVID-19 pandemic and provide additional data for more targeted public health measures, like vaccination, for the project site's specific population.

Review of the Literature

Methods

Inclusion criteria for this review of literature were fairly broad including: articles published 2012-2022, written in English, and included search terms “flu vaccine,” “influenza vaccine,” “homeless,” “emergency department,” and “emergency department vaccination.” The beliefs and perceptions of the flu vaccine, or the factors, both personal and demographic, that influence vaccination uptake were of particular interest.

Several databases were used to identify articles that fit the above criteria. CINAHL, PubMed, Cochrane, and Google Scholar all returned articles fitting the above specifications. A total of 25 articles were selected due to their relevance to the mentioned criteria.

Major Themes

The selected studies were found to fit into one of four thematic categories: vaccine uptake in underserved populations, vaccine beliefs and perceptions, interventions to increase vaccination uptake, and efficacy of emergency department based vaccination programs.

Flu Vaccinations in Homeless and Underserved Populations The first theme noted was that of uptake of vaccines in homeless or other underserved populations in the US. This included five of the 25 selected studies. In their study, Beers, Filter, and McFarland explored offering vaccines to homeless individuals at nontraditional vaccine administration sites (2019). The researchers found that interventions at locations other than the health center saw increased vaccination rates while the medical center rates did not improve (Beers et al., 2019). In an

epidemic situation, Buechler et al. examined the beliefs and perceptions of the homeless in regard to hepatitis A vaccination. They found that 41% of subjects felt that they had difficulty accessing vaccination resources and 30% of subjects felt that the population in general was fully vaccinated, indicating a need for further efforts for vaccination outreach and accessibility (Buechler et al., 2020).

In Germany, similarly to Buechler et al.'s Detroit study, Bohmer et al. evaluated barriers to vaccination post-pandemic (2012). This study determined that while subjects in high risk groups or from higher socioeconomic status were more likely to receive a flu vaccine, post pandemic vaccination rates were far below target coverage numbers (Böhmer et al., 2012). This same study identified two main reasons for subjects not being vaccinated: fear of side effects, and a belief that vaccination is not necessary (Böhmer et al., 2012).

Kong et al. conducted a similar study in Australia, evaluating the factors that impact flu vaccine uptake in hard-to-reach populations including the homeless (2020). They determined that outreach and increasing accessibility to vaccines for these populations results in significant improvements in vaccine uptake (Kong et al., 2020).

Perceptions and Beliefs about Flu Vaccinations The second theme consisted of perceptions and beliefs regarding a person's decision to receive a flu vaccine. In a 2016 doctoral dissertation, Athota evaluated the effect that personal beliefs and perceptions had on an elderly patient's likeliness to get a flu vaccine (2016). Findings from this dissertation determined that vaccination rates in elderly patients can vary significantly based on the patient's ethnic background, with Hispanic and African American patients reporting significantly lower rates of vaccination than European Americans (Athota, 2016). These patients also exhibited differences in their likelihood to get vaccinated even if they believed that the vaccine was effective and safe

(Athota, 2016). Athota's study also determined that recommendation from a healthcare provider had a significant positive impact on a patient's probability of getting vaccinated (2016).

Buechler et al., in comparison to Athota's broad survey of elderly adults, focused on the homeless population in Detroit (2020). This study actually fits into multiple categories due to the emphasis on beliefs in the homeless population (Buechler et al., 2020). The Detroit study concluded that the homeless population who exhibited vaccine hesitancy fell into one of two categories: those concerned for side effects or illness from the vaccine itself, and those who did not trust in the intentions of the medical or pharmaceutical communities (Buechler et al., 2020). In the case of those concerned about the physical effects of the vaccine, researchers found that educational materials and discussions with providers were often enough to convince the patient to accept a vaccine while those who did not trust the medical establishment or vaccine manufacturers would often continue to decline vaccination (Buechler et al., 2020).

Wooten et al. conducted a similar study to Athota's, with similar results: flu vaccination behavior in elderly patients is affected by the outreach and influence of the patient's medical providers (Athota, 2016; Wooten et al., 2012). Both studies also identified disparities in vaccination beliefs and uptake rates between different ethnic and racial groups, indicating that more work must be done to ensure equitable care for all patients (Athota, 2016; Wooten et al., 2012).

Distilling beliefs and perceptions down to the simplest components, Freimuth et al. evaluated the role of risk perception in vaccine acceptance of African American and white adults in the United States (2017). The findings here echoed those of others, determining that those who felt themselves at lower risk of illness or death from the flu were less likely to get vaccinated (Freimuth et al., 2017).

Interventions to Increase Vaccination Uptake A third theme of articles included those evaluating interventions to increase flu vaccination rates in various patient populations. Many of these studies overlap with those in the other categories, such as those by Thomas and Lorenzetti in 2018 and Wooten et al. in 2012. Both of these studies examined factors that influence flu vaccination rates in elderly patients in the United States (Thomas & Lorenzetti, 2018; Wooten et al., 2012). Wooten et al. determined that interventions need to be tailored to specific populations with emphasis on addressing disparities. Similarly, Kong et al. found that hard-to-reach patients responded to outreach programs that made care more readily available and focused on their needs (2020).

Efficacy of Emergency Department Based Vaccination Programs The final theme was composed of studies evaluating the efficacy of emergency department based vaccination programs. This category was included in the literature review due to the proposed project site being an emergency department. In a paper published by the American Academy of Emergency Medicine and reviewed by the clinical guidelines committee, Abraham et al. explored the prevention, diagnosis, and treatment of vaccination in the emergency department (2016). In the published guidelines, vaccination is included as a recommendation to prevent infection in patients who present to the ED and have not yet been vaccinated for the year (Abraham et al., 2016). Putting this guideline into action, Baumer-Mouradian et al. implemented a mandatory screening for all patients presenting to the pediatric ED (2020). By implementing mandatory screening instead of optional, the researchers found that parents were interested in having their children vaccinated while in the ED for other reasons, if offered the opportunity (Baumer-Mouradian et al., 2020).

One significant barrier to ED-based vaccination programs like the ones above is concern for time-based metrics. This concern has been disproved by Casalino et al. in 2018. They determined that initiating an ED based flu vaccination program allowed for increased coverage without significant impact to important time metrics including length of stay (Casalino et al., 2018). Hart et al. also evaluated the efficacy of ED vaccination programs, but in terms of cost instead of time (2018). They found that offering flu vaccinations in the emergency department resulted in \$114 of averted flu care costs (Hart et al., 2018).

Evidence-Based Practice

As evidenced by the above studies, as well as some older works like those of Slobodkin et al. in 1998, Cox et al. in 2000, Rimple et al. in 2006, Molinari et al. in 2007, Martin, Brauner, & Plouffe in 2008, and Morrison in 2009, influenza is a public health hazard, especially to those at increased risk from medical or social comorbidities. The state of homelessness alone puts individuals at increased risk of death, independent of other factors (Morrison, 2009). Homeless individuals also tend to have higher rates of chronic illness, smoking, and illicit substance use, putting them at high risk for complications from influenza (Story et al., 2014). Additionally, many of the homeless patients and patients in underserved populations tend to use emergency departments as a source of primary care (Lin et al., 2015). Since many of these patients tend to interact mostly with the health care system in the ED setting, evaluating the patient population for specific needs and providing information about local resources helped to improve access to vaccination for underserved patient populations.

Theoretical Framework/Evidence-Based Practice Model

This project used the evidence-based practice model of the plan-do-study-act (PDSA) method (Taylor et al., 2014). This method, a “four-stage cyclic learning approach” allows for

multiple cycles in order to achieve a viable and continuously improving and adapting solution to a problem (Taylor et al., 2014). The PDSA method also incorporates significant weight to each stage of a cycle in order to improve with each repetition. In applying the PDSA method to this vaccination project, the first phase focused on obtaining the necessary data to develop increasingly more involved interventions for the site in the future.

In the **planning** phase of this project, a survey modeled on NORC's annual survey of intention to get a flu vaccine was adapted to better capture both flu and COVID-19 vaccine beliefs and intentions, as well as to provide more detailed information on the needs and specific demographics of the site's patient population (NORC, 2020). This survey was then administered to the patient population at the approved project site, in order to better understand their vaccination beliefs and practices.

The **do** phase of the project, as well as the **study** and **act** phases, would be additional projects, to be completed after data collection and a thorough development of an ED based vaccination program.

Goals and Objectives

This project was the first step towards the ultimate goal of creating an ED based influenza vaccination program. To that end, the goal of this first project was to gain better understanding of the ED patient community's beliefs and perceptions surrounding flu vaccination in the setting of the global COVID-19 pandemic. The information gathered during this project provided demographic information for the ED to use in planning further interventions and programs for vaccination and other important health measures based on the project site's specific patient population that utilizes the ED. In several rounds of the PDSA

model, continued exploration of the population's beliefs and perceptions as well as resource deficits could lead to development of additional ED based public health initiatives.

Methods

Project Site and Population

The project site was the emergency department at a large urban academic medical center. The ED sees over 100,000 patients annually (Aaronson et al., 2019). The patient population of the large academic medical center includes patients from over 140 countries and speaking over 128 languages (Massachusetts General Hospital Public Relations Staff [MGH PR Staff], 2021). These patients, especially from surrounding communities, include immigrants (30%), those who speak languages other than English at home (40%), and those whose household income is below the poverty line (20%) (MGH PR Staff, 2021).

Measurement Instruments

The survey administered was based on the National Flu Survey (NFS) used by NORC at the University of Chicago in collaboration with the CDC to evaluate potential numbers of vaccination and rationale if participants choose to decline vaccination (2020). The tool is available online for participant access. The NFS questions were altered only in the substitution of the COVID-19 vaccine for the flu vaccine in those specific questions. The survey questions and demographic questions can be found in appendices A and B.

Data Collection Procedure

The subject group was composed of a convenience sample of patients in the emergency department in September and October 2021. The patients were approached by the DNP student during their ED visit and invited to participate in the survey. Additionally, flyers located around

the department invited patients who have mobile devices to access the survey via their device (appendix F).

If the patient decided to participate in the survey, the subject was then offered a paper survey or a QR code for the electronic version. The subject then filled out the survey and either returned it to the primary investigator or submitted it to the online survey capture tool. If the subject indicated at the end of the survey that they would like information and resources related to the vaccine and where to receive one, a separate sheet was provided in paper and electronic formats (appendix E).

The data were collected and managed using REDCap electronic data capture tools hosted at the approved project site, a large academic medical center. REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for data integration and interoperability with external sources (Harris et al., 2019).

Data Analysis

All data collected during the two-month survey period was exported from RedCap to SPSS for analysis. The data were cleaned of any nonsensical data and then assessed using descriptive statistics and Pearson's R correlations to identify any trends between vaccine perceptions and demographic data. All data was evaluated for significance at $p=0.05$.

Ethical Considerations and Protection of Human Subjects

The University of Massachusetts, Amherst (UMass) Internal Review Board (IRB) approval was obtained prior to initiating the DNP project. This project was undertaken as a

Quality Improvement Initiative at the approved academic medical center, and as such was not formally supervised by the Institutional Review Board per their policies. Participation of all subjects was completely voluntary, with an option to refuse any or all questions at the participant's discretion. Paper surveys that did not include any identifying information were administered by the primary investigator only and kept in a secured location accessible only by the primary investigator. Online survey responses were also be accessible only by the primary investigator. There was no physical component or risk of harm to the subjects. All participants were provided the opportunity to speak with the primary investigator for support at their request in the event that the survey contents cause any unforeseen emotional distress. Participants were also be offered vaccination information and locations to receive vaccination at their request (appendix E).

Timeline

The timeline for this project was two months of data collection in October and November 2021 (appendix C). After the data collection period, all survey data was compiled and sorted over the next two months, December 2021 and January 2022. Data review, analysis, and interpretation took place in January and February 2022.

Results

This project evaluated the beliefs, perceptions and demographics of a sample of adult emergency department patients in a large urban academic medical center. In total, 70 patients participated in the survey over a period of 2 months. The participants were encouraged to participate via QR code or paper survey after seeing the code on flyers around the ED or being approached by the DNP candidate.

Figure 1

Participant Demographics

		Count	
What is your age?	18-29	30	
	30-44	15	
	45-59	12	
	60-75	8	
	75+	3	
What gender do you identify as?	Male	27	
	Female	39	
	Non-binary	1	
	Transgender male	1	
	Transgender female	0	
	Other	0	
	Prefer not to respond	0	
What is your highest level of education?	Some high school	3	
	High school diploma or equivalent	4	
	Some college	9	
	Associates degree or equivalent	10	
	Bachelors degree or equivalent	23	
	Some graduate studies	5	
	Graduate degree or equivalent	12	
	Post-graduate degree or equivalent	2	
	What is your race/ethnicity?	White	52
		Black and/or African American	5
Asian		3	
Native Hawaiian, Native American, or Alaskan Native		0	
Pacific Islander		0	
Middle Eastern		3	
Other		4	
Prefer not to respond		1	
Do you identify as Hispanic or Latino?		Yes	7
		No	58
	I dont know	0	
	I prefer not to respond	2	
What is your primary language?	English	59	
	Spanish	3	
	Haitian Creole	1	
	Chinese (Mandarin or Cantonese)	0	
	Portuguese	0	
	Other	5	
	Prefer not to respond	0	

The population of non-critical, English-speaking patients in the emergency department, were primarily ages 18-29 (43.5%, n=30) years, but covered all ages including 75 years and older. A majority of patients who participated in the survey identified as female (56.5, n=39) and 40.6% (n=28) identified as male. Subjects spanned all levels of education, with the majority having a bachelor's degree or equivalent (34.8%, n=24). The next most common level of education was a graduate degree or equivalent (17.4%, n=12). Subject demographics also indicate a primarily white (76.8%, n=53), non-Hispanic or Latinx (86.8%, n=59), and privately insured patient population (62.3%, n=43). In the overall population, a majority also reported having a primary care provider (78.3%, n=54). Figure 1 presents the breakdown of participants by basic demographic characteristics.

Figure 2

Flu and COVID-19 Vaccination Rates 2021-2022

		Count
Have you had a flu vaccine (nasal mist or shot) in the past three months?	Yes	27
	No	41
	I dont know	1
Are you planning on getting a flu vaccine (nasal mist or shot) in the next four months?	Yes	36
	No	21
	I dont know	4
Have you gotten a Covid-19 vaccine?	Yes (skip to question 11)	64
	No	4
	I dont know	0
Are you planning on getting the Covid-19 vaccine if you have not?	Yes	6
	No	4
	I dont know	1

Figure 2 displays the breakdown of subjects who have either been vaccinated or intended to be during the season. Of the 69 survey participants, 38.6% (n=27) had already received a flu vaccine for the 2021-2022 season. An additional 58.1 (n=36) responded that they were planning

on receiving a flu vaccine in the next four months of the season. In total, 90% of the surveyed subjects (n=63) indicated that they have or will receive a flu vaccine during the 2021-2022 flu season.

A similar number of respondents endorsed already having received a COVID-19 vaccine at 94.2% (n=65). Of the remaining subjects, 84.3% indicated that they plan to receive a COVID-19 vaccine (n=6). This later number also includes one participant who indicated both having received a vaccine and was also planning on getting one.

For those who did not receive a vaccine and were not planning on receiving either vaccine, the data show some slightly different rationale based on the type of vaccine.

In the flu vaccine rationale question, respondents indicated that they typically do not get the flu (20%, n=4) or do not get sick (10%, n=2). Others indicated a concern over the risk of contracting influenza from the vaccine (20%, n=4) or the risk of other side effects from the vaccine (20%, n=4). Additionally, 45% of subjects indicated other reasons for not receiving the flu vaccine, in addition to the ones listed (n=9). Two subjects indicated a health condition that precludes them from being vaccinated against the flu (10%) and a further one marked having or knowing someone who had a negative reaction to the flu vaccine in the past (5%).

Regarding the COVID-19 vaccine, patients indicated other reasons for their decision to decline immunization. In their rationale for declining a COVID-19 vaccine, no subjects indicated feeling as though they do not get sick or are unlikely to contract COVID-19. Instead, of the five patients who indicated that they do not plan to receive the vaccine, 80% (n=4) indicated concerns over either contracting the disease or side effects from the vaccine. Another subject indicated that they did not believe that the vaccine worked (20%, n=1). An additional subject indicated that they already had COVID-19 and therefore did not need to be vaccinated (20%, n=1). Two

subjects also indicated other reasons than those included as a reason for not receiving a COVID-19 vaccine (40%).

Figure 3

Past and Present Flu Vaccination Status

Correlations

		Have you had a flu vaccine (nasal mist or shot) in the past three months?	Did you get a flu vaccine (nasal mist or shot) last year (Sept 2020-Feb 2021)?
Have you had a flu vaccine (nasal mist or shot) in the past three months?	Pearson Correlation	1	.372 ^{***}
	Sig. (2-tailed)		.002
	N	69	69
Did you get a flu vaccine (nasal mist or shot) last year (Sept 2020- Feb 2021)?	Pearson Correlation	.372 ^{***}	1
	Sig. (2-tailed)	.002	
	N	69	69

^{***} Correlation is significant at the 0.01 level (2-tailed).

Patients who had received the flu vaccine during the previous flu season (2020-2021) were more likely to have already received a flu shot for the 2021-2022 season (Pearson correlation .372, $p < 0.01$). This correlation is demonstrated in figure 3, above.

Figure 4

Past Flu and COVID-19 Vaccination Status

Correlations

		Did you get a flu vaccine (nasal mist or shot) last year (Sept 2020- Feb 2021)?	Have you gotten a Covid-19 vaccine?
Did you get a flu vaccine (nasal mist or shot) last year (Sept 2020- Feb 2021)?	Pearson Correlation	1	.289 [*]
	Sig. (2-tailed)		.017
	N	69	68
Have you gotten a Covid-19 vaccine?	Pearson Correlation	.289 [*]	1
	Sig. (2-tailed)	.017	
	N	68	68

*. Correlation is significant at the 0.05 level (2-tailed).

These subjects were also more likely to get a flu vaccine if they had not already been vaccinated (Pearson correlation .317, $p < 0.05$). Subjects who had been vaccinated for flu in the previous year were also more likely to have received a COVID-19 vaccine (Pearson correlation .289, $p < 0.05$), as illustrated in figure 4.

Interestingly, having received a flu vaccine during the 2021-2022 season was not significantly correlated with having had a COVID-19 vaccine. When the data were analyzed, there were no significant relationships found between age, race/ethnicity, levels of education, insurance, transportation, or having a primary care provider and the likelihood of the respondent having had a flu or COVID-19 vaccine or intending to receive one.

Additionally, fewer than half those surveyed indicated that the current COVID-19 pandemic had any influence on their flu vaccination status.

Of the survey respondents, less than half indicated that COVID-19 has made them more likely to receive a flu vaccine (43.9%, $n=29$). An additional 39.4% indicated no change in their

decision to be vaccinated against influenza because of COVID-19 (n=26). Four subjects indicated that COVID-19 decreased their interest in getting the flu vaccine (6.1%). A further four respondents stated that they did not know if COVID-19 had any impact on their flu vaccination decision and two subjects declined to respond.

The one key finding in this project was that past flu vaccination was a positive predictor of current and future flu and COVID-19 vaccination.

Discussion

The initial purpose of this study was to create an ED-based vaccination program for influenza and then for COVID-19. Vaccination programs have been successful in other EDs for decades (Abraham et al., 2016; Baumer-Mouradian et al., 2020; Casalino et al., 2018; Hart et al., 2018; Kong et al., 2020). Due to several factors including logistics between nursing pharmacy, and ordering providers, this project needed to be simplified. To that end, the first step in the process of developing a program for the ED was to determine what factors influenced whether someone was interested in receiving a vaccine.

As mentioned, the demographic distribution of survey participants was more than half white, female, and with advanced education. This data should be compared to demographics collected by the hospital to ensure a representative sample was achieved prior to making inferences based on the survey population.

The one significant factor found through analysis was that previous vaccination had a positive correlation with future vaccination behaviors. Patients who reported previously being vaccinated were more likely to receive vaccination in the future, not just for influenza but for COVID-19 as well.

These results appear consistent with those found by Lutz et al. in 2017 and 2018 when they examined factors associated with perceptions of vaccine safety and efficacy. They, and others, also determined that recommendation by a health care provider significantly increased the willingness of a patient to receive a vaccine (Lutz et al., 2020; Olanipekun et al., 2020).

Risk perception, studied by Freimuth et al., also played a role in a patient's decision to be vaccinated against the flu (2017). Freimuth et al. found that patients who perceived themselves to be at higher risk of becoming ill from the flu were more likely to be vaccinated (2017).

The current project, still in the planning phase of the PDSA model for creating an ED based vaccination program, found that only slightly more patients (43.9%, n=29) thought that the current COVID-19 pandemic made them more likely to get a flu vaccine than in previous years. Further study could be undertaken using a model similar to that of Freimuth et al. to evaluate whether patients who declined vaccination also did not perceive themselves to be at high risk of illness from COVID-19.

In the context of a Plan-Do-Study-Act framework, this project is the first part of the planning phase. Using the data gathered from this study will inform the next step, the creation and implementation of an ED-based vaccination program. The significant correlation between previous vaccination and current and future intention to be vaccinated indicates a need to focus efforts on those who have historically declined vaccination according to their records.

Setting Facilitators and Barriers

The project site itself included a significant number of facilitators to this study. The large academic presence, research-friendly culture, supportive environment, and a patient population that is familiar with the ongoing research and improvement projects made approaching staff and patients for inclusion straightforward. Additionally, the project site allowed for the placement of

flyers with QR codes to invite patient participation, even when the primary investigator was not on site.

Barriers to the project initially included the participation of patients who were in the emergency department for care and might not be interested in filling out a survey. Interestingly, the political climate surrounding the COVID-19 pandemic also became a barrier to patient participation. When approached to participate in the survey, some patients and their visitors instead wanted to engage in political discussions regarding the safety and efficacy of the COVID-19 vaccines, as well as the origins and theories about the disease itself. The DNP student had to explain many times that the vaccines themselves were not being studied at the current time by this investigator or the subject of the current project. After redirection from the aforementioned political topics, the patients generally did not want to be included in the survey.

Conclusion

Influenza is a highly communicable disease with a significant financial and socioeconomic impact. Vaccination is approximately 60-78% effective at preventing influenza and serious health consequences of influenza infection (Abraham et al., 2016). This project evaluated the factors that comprise an individual's decision receive or decline flu and COVID-19 vaccination, as well as any relationship the pandemic may have had on flu vaccination. While this project found a common thread in those who have been previously vaccinated continuing to see out vaccination, there were some significant limitations to this project, as well as many avenues open for future exploration and study.

Limitations

One significant limitation was time and the ability to reach a larger sample of patients. The ED site used sees well over 100 patients per day so the 69 who completed the study survey

are not necessarily a representative sample for the true ED population. Another was the willingness of ED patients to participate. This could be due to their illness or injury that prompted them to present to the ED. Patients could also have elected to not participate because they had already received a flu vaccine or COVID-19 vaccine and did not understand the purpose of the project.

Another, unforeseen limitation, was the skew in demographics by those willing to participate and those who were not. As mentioned above, the most prevalent demographics in the survey sample were higher education, white, and female. This trend would be a worthwhile avenue for further study in order to better understand the whole target population, not just this group. One theory is that of the politicization of vaccination and disease prevention during the COVID-19 pandemic. The DNP student had many conversations with patients about potential participation in the survey, only to be told by the patient or their family that they did not believe in the COVID-19 pandemic or vaccine. When the DNP student attempted to elaborate on the purpose of the survey and its implications on the ED, the patient or family continued to discuss the COVID-19 pandemic, citing a lack of belief in the safety of COVID-19 vaccines specifically, or occasionally, other concerns regarding COVID-19 or vaccinations in general. Even after several explanations about the purpose of the project and reassurances that no vaccinations would be given, the patients and families continued to decline to participate, so this portion of the population was generally lacking from the final data set.

The data set was not analyzed via multivariate methods to isolate each specific demographic factor against vaccination status, rather each demographic descriptor was handled individually. More research and analysis would be necessary to fully explore the implications of each demographic grouping within the sample population, provided the population is accurately

representative of the ED's patients in general. Additional multivariate analyses of the data could provide a much more thorough evaluation of the ED population and their vaccination status while controlling for each individual demographic. However, this would have been more reliable and accurate with a larger sample.

Additionally, the survey was only conducted in English. While some patients did indicate that their primary language was something other than English, they did need to be able to read and understand English in order to participate in this project.

Further Research

The significant results of this project, the positive correlation between previous flu vaccination and future vaccination behaviors, provide several avenues for future research, both in the ED setting and in a broader context. In the ED setting, there exists an opportunity to explore methods of encouraging patients to participate in preventative health care like vaccination while they are engaged with the healthcare system. In a broader sense, closer examination of demographics and vaccination patterns can help with public health and safety, as well as disease prevention in the future.

With the impact of the COVID-19 pandemic not yet fully explored and understood, much work remains to be done to fully realize and comprehend all the factors that comprise an individual and a population's decision to receive or decline a vaccination.

Cost-Benefit Analysis

In addition to the future research and potential to reach additional patients for vaccination, the aim of the project could eventually have financial implications for the project site and patient care as well. According to the Centers for Disease Control and Prevention (CDC), a single dose of a quadrivalent influenza vaccine costs between \$13.04 and \$26.39 for

the intramuscular injectable formulation. The intranasal live attenuated quadrivalent vaccine costs between \$16.45 and \$23.70. The variability in cost is related to brand and CDC or private sector pricing.

The cost of influenza however, can be measured in dollars, lives, and socioeconomic impact. Twenty years ago, Cox et al. (2000) estimated the cost of treating influenza in the ED to be around \$141.89 for a patient who was discharged home from the ED and \$3,251.04 for patients requiring admission to the hospital. Adjusted for inflation, influenza costs an ED approximately \$221.08 for a discharged patient and \$5,065.57 for an admitted patient (BLS, 2021). Annually, influenza costs the United States (US) \$13.4 billion in direct medical costs, when adjusted for inflation from Molinari et al.'s 2007 study. Indirect medical costs, including lost earnings related to illness or death amount to \$21 billion (Molinari et al., 2007; US Bureau of Labor Statistics [BLS], 2021). In addition to the financial aspect, influenza accounts for more than 31.4 million outpatient visits and over 3.1 million hospitalized days per year (Molinari et al., 2007).

In comparison to the cost of influenza or even providing vaccination, the financial implications of surveying patients for interest in vaccination and providing information and lists of resources for patients were negligible. The survey was offered both on paper and online. In the case of a paper survey, the only cost was the ink and paper on which the survey is printed. The primary investigator was on site to administer surveys at no cost to the project site. The online survey was created on REDCAP, the tool used by the project site for data capture, by the primary investigator in order to collect, store, and export data. Analysis of the exported data was also conducted by the primary investigator at no cost to the project site. Based on the cost of

vaccination against the cost of influenza infection or other disease infection, further exploration of this topic could reduce the cost of influenza or even COVID-19 infection in money or lives.

Ultimately, the best predictor of future vaccination was previous vaccination.

Demographic data appeared to have an impact on this decision for the sample from a large urban academic medical center emergency department insofar as patients self-selected for participation based on previously discussed, generally political, factors. This project was just the first step towards creating a departmental program for offering vaccination to patients during their admission. The data gleaned from this first survey revealed that future interventions should focus on those who typically do not get vaccinated for flu annually. Additionally, research can be done on those who elected not to be vaccinated and not to participate in the survey, citing concerns about the pandemic or vaccines in general. More research is needed to fully explore this complex topic and develop further public health initiatives within the ED setting.

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Appendix A

Flu and COVID Survey

- 1.) Have you had a flu vaccine (nasal mist or shot) in the past three months?
 - a.) Yes (skip to question 4)
 - b.) No
 - c.) I don't know
- 2.) Are you planning on getting a flu vaccine (nasal mist or shot) in the next four months?
 - a.) Yes
 - b.) No
 - c.) I don't know
- 3.) If you are not planning on getting a flu vaccine this year, please indicate how you made your decision?
 - a.) I never get the flu
 - b.) I am not likely to get very sick from the flu
 - c.) I am allergic to the flu vaccine
 - d.) I do not like needles
 - e.) I, or someone I know, had a bad reaction to the flu vaccine in the past
 - f.) I do not have time to get the vaccine
 - g.) I am concerned about getting the flu from the vaccine
 - h.) I am concerned about other side effects from the vaccine
 - i.) I have a health condition that prevents me from getting the vaccine
 - j.) I do not think the vaccine works
 - k.) I think the vaccine costs too much

l.) I do not have a way to get to a vaccination site

m.) Other _____

4.) Did you get a flu vaccine (nasal mist or shot) last year (Sept 2020- Feb 2021)?

a.) Yes

b.) No

c.) I do not know

5.) Did you get your child(ren) vaccinated for flu this past season, in the last 3 months?

a.) I do not have children under age 18

b.) Yes

c.) No

d.) I do not know

e.) Prefer not to respond

6.) Do you plan on getting your child(ren) vaccinated for flu this upcoming season, the next 4 months?

a.) I do not have children under age 18

b.) Yes

c.) No

d.) I do not know

e.) Prefer not to respond

7.) Where have you gotten the flu vaccine in the past, if you have received the vaccine before?

a.) Primary Care Office

b.) Workplace

- c.) Urgent Care
- d.) Retail Pharmacy (CVS, Walgreens, Rite Aide, etc)
- e.) Public health clinic
- f.) Hospital

8.) Have you gotten a Covid-19 vaccine?

- a.) Yes (proceed to question 11)
- b.) No
- c.) I do not know

9.) Are you planning on getting the Covid-19 vaccine if you have not?

- a.) Yes
- b.) No
- c.) I do not know

10.) If you have not already received the Covid-19 vaccine and are not planning on getting it, what are the factors that influenced your decision (circle/check all that apply)?

- a.) I never get sick
- b.) I am not likely to get very sick from Covid-19
- c.) I do not like needles
- d.) I am allergic to the Covid-19 vaccine
- e.) I had a bad reaction to other vaccines in the past
- f.) I do not have time to get the vaccine
- g.) I am concerned about getting COVID-19 from the vaccine
- h.) I am concerned about side effects other than getting COVID-19 from the vaccine
- i.) I have a health condition that prevents me from getting the vaccine

j.) I do not think the vaccine works

k.) I think the vaccine is too expensive

l.) I do not think I need the vaccine because I have already had COVID-19

m.) I do not have access to a vaccination site

n.) Other _____

11.) Has the COVID-19 pandemic made you more or less likely to get a flu vaccination in the future?

a.) Yes, I am more likely to get a flu vaccine

b.) Yes, I am less likely to get a flu vaccine

c.) No, the COVID-19 pandemic has not influenced my opinion of the flu vaccine

d.) I do not know

e.) Prefer not to respond

Appendix B

Flu and COVID-19 Vaccination Survey Demographics Section

This portion of the survey is intended to capture the demographics and needs of the MGH patient community so that we may better address these in the future. Please respond to as many of the questions as you are able. If you do not wish to answer a particular demographics question, please indicate with the “prefer not to respond” option.

- 1.) What is your age?
 - a.) 18-29
 - b.) 30-44
 - c.) 45-59
 - d.) 60-75
 - e.) 75+
 - f.) Prefer not to respond
- 2.) What gender do you identify as?
 - a.) Male
 - b.) Female
 - c.) Non-binary
 - d.) Transgender male
 - e.) Transgender female
 - f.) Other _____
 - g.) Prefer not to respond
- 3.) What is your highest level of education?
 - a.) Some high school

- b.) High school diploma or equivalent
 - c.) Some college
 - d.) Associate's degree or equivalent
 - e.) Bachelor's degree or equivalent
 - f.) Some graduate studies
 - g.) Graduate degree or equivalent
 - h.) Post-graduate degree or equivalent
- 4.) What is your race/ethnicity?
- a.) White
 - b.) Black and/or African American
 - c.) Asian
 - d.) Native Hawaiian, Native American, or Alaskan Native
 - e.) Pacific Islander
 - f.) Middle Eastern
 - g.) Other _____
 - h.) Prefer not to respond
- 5.) Do you identify as Hispanic or Latinx?
- a.) Yes
 - b.) No
 - c.) Prefer not to respond
- 6.) What is your primary Language?
- a.) English
 - b.) Spanish

- c.) Haitian Creole
- d.) Chinese (Mandarin or Cantonese)
- e.) Portuguese
- f.) Other _____
- g.) Prefer not to respond

7.) Where do you live?

- a.) Boston
- b.) Dorchester
- c.) Chelsea
- d.) Charlestown
- e.) Roxbury
- f.) Revere
- g.) Watertown
- h.) Suburb of Boston _____
- i.) Other in MA
- j.) Other state _____
- k.) Other country _____
- l.) Prefer not to respond

8.) What type of setting do you live in?

- a.) Own house/condo/apartment
- b.) Rent house/condo/apartment
- c.) Shelter
- d.) Homeless

e.) Group home

f.) In transition

g.) Other _____

h.) Prefer not to respond

9.) What is your usual method of transportation

a.) Private vehicle (car/motorcycle/scooter/etc)

b.) Bicycle

c.) Public transit (MBTA, bus, train, amtrak, etc)

d.) The Ride

e.) Ride-share service (uber, lyft, taxi, zipcar, etc)

f.) Walk

g.) Other _____

h.) Prefer not to respond

10.) Do you have a primary care provider (MD, DO, NP)?

a.) Yes

b.) No

c.) I do not know

d.) Prefer not to respond

11.) Do you have a cell phone?

a.) Yes

b.) No

c.) I don't know

d.) Prefer not to respond

12.) Which type of insurance do you have?

- a.) Private
- b.) MassHealth
- c.) Medicare
- d.) Medicaid
- e.) Combination of above
- f.) None
- g.) I don't know
- h.) Prefer not to respond

13.) Would you like resources and information about the flu and COVID-19 vaccines and where to get vaccinated?

- a.) Yes
- b.) No
- c.) Only information
- d.) Only vaccine distribution locations
- e.) Prefer not to respond

Appendix D
Cost Benefit Analysis

Table 2

Vaccine vs. Illness Costs Table

Cost	Vaccine	Admitted Patient	Discharged Patient
Fluarix Quadrivalent	\$18.13	\$221.08	\$5,065.57

Appendix E

Flu and COVID-19 Vaccine Resources

MA Residents

Covid-19 Vaccine Locations: <https://www.mass.gov/info-details/covid-19-vaccination-locations>

Flu Vaccine Locations: <https://www.mass.gov/info-details/influenza-vaccination>

NH Residents

Covid-19 Vaccine Locations: <https://www.vaccines.nh.gov/vaccination-locations>

Flu Vaccine Locations: <https://www.dhhs.nh.gov/dphs/cdcs/influenza/index.htm>

General Vaccine Information

Covid-19 Vaccine Information Sheet: <https://www.cdc.gov/vaccines/covid-19/eua/index.html>

Flu Vaccine Information Sheet: <https://www.cdc.gov/vaccines/hcp/vis/vis-statements/flu.pdf>

Appendix F

Flyer Inviting Patients to Participate in Survey Project

How do you feel about the flu shot? Has COVID-19 influenced your thinking about it?

Help our team better understand your vaccination and preventative health needs by participating in our survey!

QR Code for Redcap Survey Here

This survey is a DNP project evaluating beliefs and perceptions of the flu vaccine during the COVID-19 pandemic. Participation is voluntary and very appreciated.

Primary Investigator: Lauren Vogel-Hanley, RN, DNP Candidate UMass Amherst