COVID-19 Vaccination Status has Relationships with Age, Trust and Workplace Pressure among Faculty

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Abstract

Background: The COVID-19 pandemic has profoundly affected society on a local, national, and global level. New York City (NYC) experienced a coronavirus surge during COVID-19 pandemic. Vaccine hesitancy exists. Determining barriers and facilitators of COVID-19 vaccination among faculty was imperative to improve vaccination rate. This quality improvement project was to determine a relationship between vaccination status and age among faculty that received at least one COVID-19 vaccine.

Methods: A cross sectional survey design of faculty from a large public urban health science university in NYC. Thirty-five completed the 10-questions survey *via* Survey Monkey. The Social Package for the Social Sciences (SPSS) program analyzed the data.

Results: Thirty-five participated in the study. Vaccination rate was 77.1% (n=27). Significant negative correlations were found between COVID-19 vaccination status and ager (35) = -0.409, p=0.015; factors impacting decision to vaccinate/not vaccinate against COVID-19 r(35) = -.393, p=0.020; and feeling pressure to take the COVID-19 vaccine r(35) = -0.578, p= <0.001. No significant correlations found between COVID-19 vaccination and gender, ethnicity, days of work in person, and vaccine brand.

Conclusion: This study contributes to the knowledge about vaccination rate and factors that may be associated with vaccination among faculty. Findings can provide valuable information for developing effective vaccination programs. While results are useful to understanding factors that contributed to vaccination rates in a smaller subset of the faculty; generalizations of findings to other faculty groups from other universities in the urban settings may be less likely due to differences across subgroups.

Keywords: Vaccination rate; COVID-19; Nursing; Health

Introduction

The coronavirus pandemic caused millions of infections and deaths worldwide and had a devastating impact both in the United States and in New York City [1-4]. While the infection was mild and asymptomatic, it caused severe disease in over 13% of people [5]. The development of the COVID-19 vaccine was an essential tool in eliminating the pandemic. Vaccines are the safest and effective tools in preventing disease and improving public health [6]. Vaccinations are the most cost-effective way to prevent specific diseases. Although vaccines were available, not everyone is in favor of taking it for individual reasons [7]. Vaccine hesitancy remains a hurdle throughout various populations. Access to vaccines allows humans to live healthier lives while also protecting the most vulnerable [8]. Not knowing enough about vaccine preventable diseases, lack of consistent information from credible sources, utilizing the internet as a source for information, perception, beliefs and mislead information have been major contributions identified in the United States regarding hesitancy [9-11].

Background

The literature reports that many were hesitant due to negative attitudes, adverse effects, and the limited time it took create the vaccine. According to Sherman et al. [11], in the United Kingdom, there was an increased likelihood of vaccination with older age, and those that had a positive perception of the vaccine. They had weaker beliefs that the vaccine was unsafe or had unwanted side effects. For those with uncertainty of vaccination, the highest amount of people that did not want to vaccinate were those that had negative beliefs or attitudes followed by adverse effects and newness of the vaccine [12]. For patients who received the COVID-19 vaccine, efficacy was

important to determine the reduction of the disease from the clinical trial. According to Olliaro [13] the Pfizer and Moderna Vaccines had a 94% to 95% efficacy in preventing symptomatic coronavirus. There was an expectation that 0.05% of people who were vaccinated will get the disease. If learned facts about efficacy and comparing different vaccines were available, the public can make an educated decision and choose the most effective one.

Various cultures and backgrounds caused the unwillingness to be vaccinated. Common back grounds with other healthcare personnel may have increased a person's trust in getting vaccinated. Therefore, it would be beneficial for vaccine program administrators to involve coworkers, with similar backgrounds, to engage healthcare workers that were hesitant [14]. Barriers to getting immunized were lack of trust and communication. According to Kahn et al. [14], to gain trust of care providers, there needed to be improved communication regarding the COVID-19 vaccine. Informed decision making may have decreased the likelihood of vaccine hesitancy. Advancing age and medical comorbidities such as chronic cardiac or lung disease, diabetes and obesity increase the risk of severe disease, hospitalization, intubation, and death [15]. Since there was a higher risk of those aged 65 and higher to develop severe complications of coronavirus, it was important to see if there was a relationship between older faculty receiving the vaccine in case further education would need to be provided regarding prevention. Therefore, the purpose of this project was to determine the vaccination rate and explore the barriers or facilitators to COVID-19 vaccination among faculty. In New York City, faculty at the large urban health science university continued working and caring for students online versus in person learning. Through an informal query, very few staff members were noted to be vaccinated. Understanding barriers and facilitators of COVID-19 vaccination among faculty was to improve the vaccination rate. The specific aim of this project was to determine if there was a relationship between age and vaccination status of faculty that have received at least one COVID-19 vaccine.

Theoretical framework

The PDSA cycle guided this project. It involves four major stages: Plan, Do, Study and Act. These phases are used in quality improvement strategies [16]. It guides project leaders on how to improve the quality of developments. The step involves developing a plan to test the project changes, identifying what, who, where, and when of the project, and the type of data to be collected. This project was in the planning stage for several months and there was no quality improvement intervention. The PDSA cycle seeks to refine proposed changes before they can be implemented on a large scale (Figure 1).

Methods

Design: A cross-sectional survey design was conducted for this project.

Sample and setting: A convenience sample of 112 faculty, 18 years and older were recruited from two departments, the College of Nursing and School of Health Professions of a large public urban health sciences university in New York City, to participate in the study. Thirty-five (35) faculty completed the online survey.

Instrument: A 10-question survey including demographic information was developed using Survey Monkey which was the method for data collection. The 10-question survey was pretested. The informed consent was included in the survey. Participants clicking the survey denoted consent to participate. Survey was anonymous and

allowed the surveyor only one opportunity to take the questionnaire. It evaluated the COVID-19 vaccination status for faculty. Faculty had approximately 5 min to complete the 10 questions via email using survey monkey. Target sample was 20; survey was open for 10 days and yielded more participants. The summary of the study variables and measurement units shown in Table 1a, 1b.

Ethical considerations

The University Institutional Review Board (IRB) letter of approval was obtained prior to the study, indicating that IRB review was deemed unnecessary for this project. The survey was anonymous, and participation was voluntary. Informed consents were embedded in the survey. Participants' confidentiality was assured by coding the participants using random identification numbers and data was encrypted.

Data analysis

For all data analysis procedures, IBM SPSS Version 2.8 was used. Descriptive statistics was used to describe the demographics and if faculty received at least one COVID-19 vaccination. Pearson correlations coefficient were conducted to determine linear correlations of the variables.

Results

The purpose of this project was to identify barriers and facilitators of COVID-19 vaccination among the faculty in two colleges at a large urban health sciences university in New York City, The College of Nursing and School of Health Professions. The specific aim was to identify if there was a relationship between vaccination status of those faculty who received at least one COVID-19 vaccine and age. Baseline data included demographics and factors which impacted the decision to vaccinate or not. The Frequency Table of Age, Gender, Ethnicity, Class, Department of faculty working shown in Table 2.

Descriptive analysis of variables

Age, gender, ethnicity, number of workdays onsite and class: There were 35 faculty members completed the online survey from the 112 who were recruited. The age group was categorized into seven groups. Most of the participants were in the 41 to 50 years old (25.7%) and 61 to 70 years old (25.7%) categories with the least participants were in the 18 to 30 years old (11.4%). The participants were over-represented by females, 82.9% (n=29) with only 8.6% (n=3) males. There were more African Americans who participated in the study. The cohort consisted of 42.9% (n=15) African Americans, followed by Caucasians 34.3% (n=12). Majority of the faculty in both departments reported belonging to the upper-class category 67.7% (n=23) and
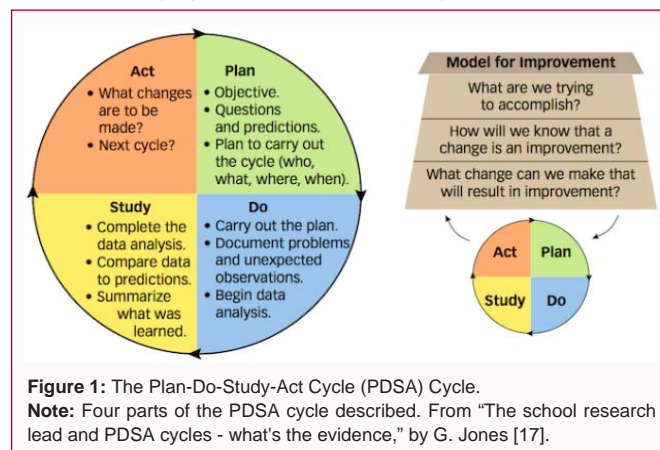

Figure 1: The Plan-Do-Study-Act Cycle (PDSA) Cycle.
Note: Four parts of the PDSA cycle described. From "The school research lead and PDSA cycles - what's the evidence," by G. Jones [17].

Table 1a: Study of study variables and measurement units.

Variables	Measurement Units (Categories)
Age	(18-30/31-40/41-50/51-60/61-70/71 + Years old)
Gender	(Male/Female/ Transgender Male/Female/Other)
Ethnicity	(Asian/African American OR Black/Caucasian/Hispanic/Native Hawaiian OR Pacific Islander/ American Indian OR Alaskan Native/ Mixed Multiple/ Prefer Not to Answer/Other)
Class	(Lower Middle Class/Middle Class/Upper Middle Class/Upper Class)
Days Working in Person	(0/1-2/ 3-4/5-7)
One Covid Vaccine	(Yes/No)
Factors Affecting Vaccination	(Trust/Religious Reasons/Social Media/Culture/Side Effects/ Efficacy/Access/Medical Condition/Other/I have no Concerns)
Pressure	(Yes/No/Would rather not disclose)
Brand	(Yes/No)
Department	(College of Nursing/School of Health Professions/Prefer not to say)

Table1b: Frequency distribution questions related to COVID-19 vaccination.

Variables	Frequency	%
Did you receive at least 1 COVID vaccine?		
Yes	27	77.14
No	8	22.86
Total	35	100
Which of the following factors impacted your decision to vaccinate/not vaccinate against the COVID-19 virus?		
None of the above	3	8.57
Trust	9	25.71
Religious reasons	0	0
Social media	0	0
Culture	0	0
Side effects	0	0
Efficacy	7	20
Access	4	11.43
Medical condition	3	8.57
Other (please specify)	9	25.71
Total	35	100
Do/did you feel pressure from your workplace to take the COVID-19 vaccine?		
I have no concerns	0	0
Yes	7	20
No	28	80
Total	35	100
Was the brand a factor in your decision regarding vaccination?		
I have no concerns	0	0
Yes	15	42.86
No	20	57.14
Department at Health Sciences University working as faculty		
College of Nursing	18	51.43
School of Health Professions	14	40
Prefer not to say	3	8.57
Total	35	100

25.7% (n=9) belonging to the upper- class category (Table 2).

COVID vaccine status, factors impacting vaccination: Twenty-seven participants (77.1%) reported receiving at least one dose of the vaccine as compared to 22.9% (n=8) that did not. For factors impacting vaccination, nine participants (25.71%) indicated other factors impacted their decision to or not to get vaccinated. Similarly, participants reported Trust 25.7% (n=9) impacted their decision to or not to get vaccinated. Additional variables the participants chose were Efficacy, 20.0% (n=7), Access11.4% (n=4) and Medical Conditions 8.6% (n=3) respectively. Other factors and Trust were the most common variables participants reported that impacted their vaccination status followed by efficacy, access, and medical conditions. None in the sample chose religious reasons, social medial or culture as factors impacting their decision to get vaccination or not (Table 2).

Pressure from the workplace, brand of vaccine: Eighty percent (n=28) of participants reported that they did not feel pressure from their workplace to get vaccinated as compared to 20% (n=7) who did feel pressure. Brand of vaccine 57.1% (n=20) was not a factor in getting vaccinated, whereas 42.9% (n=15) felt that brand was a factor in getting vaccinated (Table 2).

Department where the faculty are working: More than half of the participants were faculty from the College of Nursing, 51.43% (n=18) whereas, 40% (n=14) were represented by the School of Health Professions, 8.57% (n=3) preferred not to say.

Correlational analysis

The results of Pearson correlations coefficient are presented in Table 3. The significance level was set at 0.05 level. The results indicated that there were significant negative correlations between COVID-19 vaccination status and ager (35) = -0.409, p=0.015; between COVID-19 vaccination status and factors impacted decision to vaccinate/not vaccinate against the COVID-19 r(35) = -0.393, p=0.020; and between COVID-19 vaccination status and feeling pressure from work place to take the COVID-19 vaccine r(35) = -0.578, p= <0.001. No significant correlations were found between COVID-19 vaccination status and gender r(35) =0.104, p=0.553; between COVID-19 vaccination status and ethnicity r(35)=074, p=0.671; between COVID-19 vaccination status and class r(34) = -0.286, p=0.101; between COVID-19 vaccination status and days of work in person r(35)=0.083, p=0.634; and between COVID-19 vaccination status and vaccine brand r(35)=0.196, p=0.258 (Table 3).

Discussion

The findings of this quality improvement study indicated that the vaccination rate was 77.1% (n=27), those who received at least one dose of the COVID vaccine and 22.9% (n=8) did not receive at least

Table 2: Frequency distribution of sociodemographic characteristics.

Variables	Frequency	%
Age (in years)	Participants	
18-30	2	5.71
31-40	5	14.29
41-50	9	25.71
51-60	6	17.14
61-70	9	25.71
71+	2	5.71
Would rather not disclose	2	5.71
Total	35	100
Gender		
Male	3	8.57
Female	29	82.86
Prefer not to answer	2	5.71
Transgender female	0	0
Transgender male	0	0
Other (please specify)	1	2.86
Total	35	100
Ethnicity		
Asian	2	5.71
African American or Black	15	42.86
Caucasian	12	34.29
Hispanic	1	2.86
Native Hawaiian or Pacific Islander	1	2.86
American Indian or Alaskan Native	0	0
Mixed/Multiple	1	2.86
Prefer not to answer	4	11.43
Other (please specify)	0	0
Total	35	100
Socioeconomic Status		
Lower middle class	1	2.94
Middle class	23	67.65
Upper middle class	9	26.47
Upper class	1	2.94
How many days of the week are you working in person?		
0	13	37.14
1-2	9	25.71
3-4	6	17.14
5-7	7	20
Total	35	100

one dose of the vaccine. This 77.1% vaccination rate is much higher than 72% rate in Brooklyn and 65% rate in New York City (NYC) report. As of October 2021, 72% of New York State received at least one dose [18] and 77% nationally [19,20]. One might speculate that perhaps the 77.1% rate would even be higher if more colleges were included in the study. In NYC, the partially vaccination rates tend to be higher among Native Americans/Alaska Native 95%, Females 73%, and those aged 55 to 64 years old 90% [20].

Significant negative correlations were found between vaccination status and age. The average age of the participants was at 41 to 50 and 61 to 70 years old range. The findings revealed that the higher the age of the faculty, the more likely they are to receive at least one COVID-19 vaccine. The majority of faculty from both colleges received at least one COVID-19 vaccination. The findings in this study corroborate with the reports by Liu and Li [21] where vaccine hesitancy increases as age decreases. The anticipated and actual findings were similar because it was expected that the older the faculty, the more likely to receive at least one COVID-19 vaccine. Perhaps, the older faculty may think they are more vulnerable and have a higher risk of contracting COVID-19 due to having multiple comorbidities.

Furthermore, it is typically believed that older participants tend to receive the vaccines because of their higher risk of contracting COVID. Younger participants may tend to delay vaccination because they may believe that they have lesser risk of contracting the disease. Some researchers have found that the older people are more likely to be vaccinated to decrease hospitalization rates and resources due to having multiple co-morbidities [22]. The findings strengthen the need to use more convincing efforts to encourage vaccination and disease prevention programs not only for the older population but also for the younger population.

Gender was not significantly correlated with vaccination status. The sample was over represented by females, about 83% (n=29) as opposed to only 17% (n=6) non-females and therefore, would be difficult to evaluate the differences. Reports in previous studies indicated that females had a higher vaccination rate in NYC [20] for example, which is consistent with the findings among the faculty in this current study. However, these findings are inconsistent with the findings by Liu and Li [21] which reported that women were more likely to show vaccine hesitancy than men in the initial data collection period, but across time the percentage of women with vaccine hesitancy declined. In this current study, only three males participated, and of those three, two received the vaccine. The greater number of female faculty (n=29) participating in this study as compared with male faculty (n=3), is reflective of the sample population at the College of Nursing and School of Health Professions.

Ethnicity was not significantly correlated with vaccination status. This study found that Caucasian faculty had a higher vaccination rate as compared to other faculty in NYC at 34%. A study by the New York City Health [20] found that among different ethnic groups who were partially vaccinated, Blacks had the lowest rate of vaccination rate at 48%. This study, black faculty had a lower vaccination rate of 28% even though a higher representation in the university. Lower vaccination rate among African Americans/Blacks may be due to mistrust to vaccines, religious reasons, or misinformation. It is also mentioned that vaccine hesitancy is weighted more heavily for minority groups due to racial injustices in vaccine development/testing, religious/ ethical concerns, accessibility, and legitimacy of vaccine messaging/ communication [23]. Although there is strong evidence in receiving vaccination, there may be other reasons contributing to this increased rate of vaccine hesitancy. Faculty may be reluctant to endorse these items related to hesitancy; therefore, scores may be inflated. Nevertheless, the reasons for the ethnic differences are not fully clear, suggesting research is needed to determine the actual factors associated with vaccine hesitancy.

A significant and surprising finding of this study was that participants didn't feel any pressure to receiving the COVID-19

Table 3: Pearson Correlation Coefficient: Variables and 1 COVID Vaccine.

Variables			Did you receive at least 1 COVID vaccine?
What is your age?	Pearson Correlation		1
	Sig. (2-tailed)	-0.409*	
	N	35	
	Sig. (2-tailed)	0.015	
	N	35	35
What gender do you identify as?	Pearson Correlation	0.104	1
	Sig. (2-tailed)	0.553	
	N	35	35
Which of the following ethnicities would you use to describe yourself? Select all that apply.	Pearson Correlation	0.074	1
	Sig. (2-tailed)	0.671	
	N	35	35
What would you consider yourself as?	Pearson Correlation	-0.286	1
	Sig. (2-tailed)	0.101	
	N	34	34
How many days of the week are you working in person?	Pearson Correlation	0.083	1
	Sig. (2-tailed)	0.634	
	N	35	35
Which of the following factors impacted your decision to vaccinate/not vaccinate against the COVID-19 virus?	Pearson Correlation	-0.393*	1
	Sig. (2-tailed)	0.02	
	N	35	35
Do/did you feel pressure from your workplace to take the COVID-19 vaccine?	Pearson Correlation	-0.578**	1
	Sig. (2-tailed)	<0.001	
	N	35	35
Was the brand a factor in your decision regarding vaccination?	Pearson Correlation	0.196	1
	Sig. (2-tailed)	0.258	
	N	35	35

*Correlation is significant at the 0.05 level (2-tailed)
**Correlation is significant at the 0.01 level (2-tailed)

vaccination. Results revealed a significant negative correlation between vaccination status and feeling pressure from the work place to get vaccinated. The data analysis showed a statistical significance between faculty not feeling pressure from their work place and a higher vaccination rate. The findings that participants did not feel pressure to be vaccinated was inconsistent with the literature by Woodhead et al. [23], which identified that suspicions and fear surrounding institutional pressure regarding vaccination has led to hesitancy. According to Woodhead et al. [23], being mandated and forced to vaccinate would restrict one's autonomy in decision making. Others felt that it is also unfair to be forced to vaccinate with a limited evidence-base knowledge. Those who did not receive at least one COVID-19 vaccine did feel pressure from their work place which has led to vaccination hesitancy.

The self-report survey questions could have impacted the participants' responses stating that they did not feel pressure from their work place. Even though faculty were informed that the survey was anonymous, perhaps they did not want to report they felt pressure from their work place for fear of ramifications. The data collection of this study was completed on July 30th, 2021, before the vaccine mandate in the fall 2021 was implemented that would lead the faculty feeling pressure from the workplace to get vaccinated.

Most of the participating faculty 77.14% (n=27), received the COVID-19 vaccine, 67.65% (n=23) of which considered themselves as middle class. There is currently no literature to support perception of class and receiving at least one COVID-19 vaccine. Those who self-identified as middle class, have a higher rate of being partially vaccinated as compared to those who self-identified as belonging to lower middle-class, upper-middle class or upper-class.

Limitations

This study has some limitations. First, the study used a convenience sample of faculty from only two colleges in a large public urban health science university in New York City, with a small sample size. Second, the participants were over represented by females, understandably because most of the participants came from the College of Nursing, where the faculty are predominantly females. Additionally, more African Americans 42.9% (n=15) participated in the study. The number is reflective of the prevalence of African Americans in both colleges. Third, the survey was based on self-reports, and caution

should be exercised when interpreting the data, since participants may not have been forthcoming about their responses, even though participants were assured of their anonymity at the time of the study. Lastly, the survey questionnaire may not have captured the total picture of factors contributing to vaccination or reasons why faculty did not get vaccinated. For future studies, revision of the survey questionnaire may need to include detailed variables related to vaccine hesitancy, most importantly, variables related to the factors impacting whether to vaccinate or not vaccinate.

While the study results are useful to understanding the factors that contributed to vaccination rates in a smaller subset of the faculty; generalizations of findings to other faculty groups from other universities in the urban settings may be less likely due to differences across subgroups. Data may only represent the experiences of those who volunteered to participate in the study. Findings from this sample may only be representative of those who lived in similar urban areas in the city.

Conclusion

The present study revealed only a small picture of the dynamics of vaccination among faculty. Results showed that the factors affecting vaccination of faculty were trust, other factors, efficacy, and access to the vaccine. The results of the study also showed significant negative correlations between COVID-19 vaccination status and age that is consistent with the literature. This study yielded an unexpected finding of less work place pressure leading to an increase in vaccination rates. It is important to note that even though those variables were related, we do not know which way the causality goes. After being in the planning stage for several months identifying the plan of the project, a quality improvement intervention did not take place.

The findings in this study, nonetheless, contribute to the literature and knowledge on vaccination among faculty. The study has provided insight into what factors may be associated with vaccination among faculty, thus providing policy makers with valuable information for developing effective vaccination programs to improve public health outcomes. A larger sample size is highly recommended that would include all the schools and colleges within the university and the healthcare workers in the university hospital. Further investigation is needed in exploring social class and the specific other factors and receiving one vaccination. Lastly, research is needed to validate effective programs to encourage vaccination.

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