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Assessing Perceptions of Influenza Vaccination While Pregnant Among Women Who Have Not Yet Conceived: Predictors and Modifiers of Uptake

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Running head: ASSESSING PERCEPTIONS OF INFLUENZA VACCINATION WHILE PREGNANT AMONG WOMEN WHO HAVE NOT YET CONCEIVED: PREDICTORS AND MODIFIERS OF UPTAKE

Assessing Perceptions of Influenza Vaccination While
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Merrimack College
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Abstract

Pregnant women are particularly vulnerable to complications and death caused by the Influenza virus. Pregnant women account for only 1% of the population at a time, but 6-10% of the deaths caused by the flu. This study surveyed women over the age of 18 years old, that are students and staff/faculty of Merrimack College, to assess their perceptions of the influenza vaccine during pregnancy. The survey was administered using a Likert-scale to assess knowledge about the flu vaccine. Option four of the scale represented uneducated answers, while option one represented educated answers about the flu vaccine. The t-test used had a p value of 0.008 and it showed a significant difference between the knowledge of the students and staff about the flu vaccine. Among the staff, 57.14% believes that the flu vaccine can give you flu; while, only 10.98% of the students believe the same. There is a need to increase the knowledge about the flu vaccine, so that when pregnant, the woman will have the awareness to make the right decision.

Introduction

The influenza vaccine protects against the influenza virus by triggering the immune system to hemagglutinin and neuraminidase, the proteins found on the capsule of the influenza virus. (Oyelola, 2014). The flu vaccine is reformulated every year utilizing a strain that captures the protein of the most prevalent flu viruses. However, there are variations in the strains of virus which can cause the flu, limiting the effectiveness of the vaccine. (Lewnard, Cobey., 2019) The degree of vaccine effectiveness changes from season to season and the strains are closely observed by the World Health Organization since 1999. (Journal of Preventive Medicine and

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Hygiene., 2016). Vaccination recommendations created are based on location, with one set being created for the northern and one for the southern atmosphere.

There are two main types of flu vaccines: attenuated and the inactivated vaccine. The inactivated vaccines are created in embryonated hens' eggs, which is a limiting factor, and it may not resemble a normal immune response. The attenuated vaccine was created in the 1970's, and it was the first trivalent live vaccine created. The attenuated vaccine can create an immune response more identical to the immune response caused by an actual infection, which might cause flu-like symptoms such as low-grade fever, headaches, and nose congestion. (Journal of Preventive Medicine and Hygiene., 2016).

Influenza vaccination is an efficient way to prevent Influenza in children, adults, elderly and pregnant women, with efficacy rates of 40% to 60% (CDC., 2018). Pregnant women and children are at risk populations that experience hospitalization and mortality at an increased level due to influenza infections. (Meharry, Colson, Grizas, Stiller, Vazquez., 2013). According to The American College of Obstetricians and Gynecologists, influenza vaccinations are recommended in pregnant women in any gestational trimester. (Ahluwalia, Singleton, Jamieson, Rasmussen, Harrison., 2011).

However, vaccination rates of the Influenza vaccine have remained low among the most at risk groups (Ahluwalia et al., 2011). Pregnant women only account for 1% of the population, but they account for 6-10% of the deaths caused by Influenza. (Fisher, Scott, Hart, Winn, Gibbs, Lynch., 2011). Previous research has shown that there are barriers preventing women from obtaining proper immunization and there is a need to address and understand those barriers so

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that fewer women and babies can be affected by the morbidity and mortality caused by Influenza.

Literature Search Strategies

The strategies used in this literature review included searching by keywords including pregnancy, flu vaccination, interventions, benefits and risks, and epidemiology; searching with and/or options. The main database system utilized was the Merrimack College McQuade Library, which also provided access to titles covering those topics. The main databases used were The Journal of the American Medical Association and Elton B. Stephens Co. (EBSCO). Inclusion criteria were: 1) Published articles, 2) Age of the articles was limited to articles between 2007 and 2018, 3) Demographic information provided by the Center for Disease Control and Prevention (CDC), 4) Adults were used as the sample population, 5) Articles and Journals published in English only.

Literature Review

Benefits and risks of vaccination during pregnancy:

Pregnant women are more vulnerable to complications and death from the flu virus. The flu vaccination can provide not only protection for the mom but also for the baby. (Christian, 2016). A substantial benefit of receiving the vaccine is that it can be passed down to the fetus through the placenta and breast milk, and infants up to 6 months of age are not candidates for the flu vaccine. (Wong, 2016). Since 2004, the U.S Center for Disease Control and Prevention and the College of Obstetrician and Gynecology have recommended to pregnant women to receive

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the trivalent inactivated vaccine. (Jamieson, Dmitry, Kissin, Bridges, Rasmussen., 2012). In addition, since the 2013-2014 flu season, the quadrivalent vaccine which targets the A/H1N1, A/H3N2, B1, and B2 strains, is recommended. (Christian, 2016).

The efficiency of the flu vaccine in adults is usually between 50%- 70%. (Christian, 2016). In addition, another meta-analysis performed in 2012 reported a 59% efficiency, with a 95% confidence interval that the trivalent vaccine works among adults. The efficiency of the trivalent vaccine used in the pregnant women was still high, but it showed a greater range of results from 54% to 89%. (Jamieson et al., 2012). Furthermore, the vaccination can prevent not only the flu but can reduce preterm delivery risks, small-for-gestational at birth, and fetal death. (NCBI, 2012).

A study using a retrospective cohort from women that delivered between November 2009 and April 2010 and received the influenza vaccination during their second or third trimester from hospitals of Ontario, Canada was used to further analyze the benefits of receiving the immunization. (NCBI, 2012). The relationship between vaccination and live birth at a gestational age below 37 weeks live birth gestational age below 32 weeks, singleton, live birth below the 10th percentile of birth weight, 5-minute Apgar score below 7, and fetal death was taken into consideration. Other confounding individual characteristics such as asthma, diabetes, preeclampsia, postpartum, family income and educational level were added. The results showed that H1N1 vaccination levels were higher among older mothers aged 25 or above, higher in women that gave birth in January, and among the higher education groups. There was a significant risk reduction for the live birth gestational age below 32 weeks. In addition, there were 139 fetal deaths in the non-vaccinated group and 60 deaths among the vaccinated group.

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After considering the individual confounding characteristics, the influenza vaccine showed to be significant benefits among this group. (NCBI, 2012).

The risks of the Influenza vaccine in pregnant women are not widely known, and some pre-existing conditions such as obesity in pregnancy, can reduce the efficacy of the immune system by reducing the number of mononuclear cells due to adipose cells; its effects on the fetus are unknown. (Christian, 2016). The vaccination can also promote stress, and maternal stress has been linked to pre-termed birth, however, this is not widely studied. (Christian, 2016). In this study, there might be a weak association between miscarriages and the flu vaccine. The study conducted at Marshfield during the 2010-2011 and 2011-2012 flu season compared 485 women between 18-44 years of age who had a miscarriage, to 485 women of the same age who had a safe delivery. (Sun, 2017). Among the women who miscarried 17 had received the flu vaccine at least 28 days before the miscarriage, and also had the flu vaccine received in the previous season. Therefore, the study only saw a link in the women who had been vaccinated two years in a row. Another similar study is being done for the seasons of 2012-2013 and should be published in 2019. (Sun, 2017). The study did not look at the history of miscarriages, which could make these women more likely to miscarry again, creating a confounding variable.

Epidemiology of vaccination coverage during pregnancy:

Vaccination rates among pregnant women can vary due to race, ethnicity, insurance status, and medical providers available in their area. Black women have the lowest influenza vaccination levels compared to Hispanic and White. Hispanic pregnant women have the highest vaccination coverage among the three groups. (CDC, 2017). In the 2016-2017 flu season,

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coverage among women aged 18-24 years was of 41.7%, compared to women aged 25-34 which was 58.4%, and 58.8% in women aged 35-49 years of age. (CDC, 2017).

In the 2015-2016 flu seasons, 46.5% of the women that received the flu vaccine had a below college degree educational level, 52.6% had a college degree level education, and 58.2% had above a college degree education (CDC, 2016). In that same year, 53.5% of the vaccinated women had a private or military insurance, 46.8% had a public insurance, and 14.9% had no insurance, yet flu vaccines are free at flu clinics. (CDC, 2016). Considering the poverty level, 43.1% of the women were below the poverty level when received the flu vaccine, and 52% were above the poverty level (CDC, 2016). Among the main places that those women received the vaccination, 36.6% received in the OBGYN office, 28.4% at the family's physician office, 13.2% at grocery stores and 8.4% at the hospital. (CDC, 2016).

Considering those statistics, higher education is correlated to greater levels of receiving the flu vaccine, aligned with age in which women 25 years or above had higher levels of influenza vaccination than women younger than 25 years of age. The uninsured women had a low level of vaccination due to the barriers caused by not having insurance and not being able to afford fee for service. Among the places with the highest levels of flu vaccination given, the OBGYN offices and the primary care physicians play a pivotal role in education and promoting vaccination. To achieve a greater number of women vaccinated, interventions should focus on education in OBGYN and primary care offices, free or low-cost vaccines, and standing orders for the flu vaccine so that it can be easily administrated by nurses and other health care providers.

Vaccination decision making during pregnancy:

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The Pregnancy Risk Assessment Monitoring System (PRAMS) is a survey used to collect data on maternal and infant health. In the years of 2009 through 2010, 30 states participated in collecting data about the Influenza vaccine. (Ahluwalia et al., 2011). In that period, only 50.7% of pregnant women reported receiving the vaccination. Among the reasons for not receiving the vaccine, 71% reported that they do not usually receive the flu vaccine; 47.7% were concerned about their baby's safety, and 45% were worried about their own safety. (Ahluwalia et al., 2011). Another study at the University of Colorado Hospital surveyed post-partum women about the flu vaccine. Among the women that delivered at the University of Colorado Hospital, 64% were vaccinated against seasonal influenza (Fisher et al., 2012). Out of the women that did not receive the flu vaccine, 25% reported that they were not aware of the importance of the flu vaccine to prevent the flu. (Fisher et al., 2012). Vaccine levels among pregnant women have been low for several years, with approximately half of the women not receiving the flu vaccine every year. (Christian, 2016). Among the greatest reasons that affect vaccine uptake is lack of knowledge, fear of needles, mistrust, and lack of access to medical clinics. (Christian, 2016).

During the flu season of 2009-2010, the vaccination rates of the influenza vaccine in pregnant women increased by 33%, followed by 41% in the 2013-2014 season. Among the women that received the vaccine, 80% reported receiving it in their traditional health care setting. (Kerr, Bennekom, Mitchell, 2016). Health care providers have an important mission to educate patients and promote the use of the influenza vaccination. There is a strong relationship between advice given by health care providers and the women's decision to get vaccinated. (Ahluwalia et al., 2011). In 2015-2016 flu season, 63% of women who were recommended and offered to receive the flu vaccine on the same day, received the vaccine. This contrasts with 38%

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of women that received the recommendation but no offer, and 13% who received neither recommendation nor offer. (Kerr et al., 2016).

The decision to receive the flu vaccination can be based on education about the vaccine, as well as recommendations of providers, family, and friends. This cross-sectional study in the United Kingdom shows how social networking can play a part in the women's decision to receive immunization during pregnancy. (Ford, Alwan., 2018). The use of the internet to search for the risks and benefits of immunization during pregnancy is widely used to address women's questions and concerns (Ford, Alwan., 2018). However, due to incorrect information, or inaccurate data, the use of social networking sites can reduce vaccination rates due to poor quality sources. (Ford, Alwan., 2018).

Existing interventions to improve vaccination uptake during pregnancy:

There are several interventions implemented that focus on addressing provider-focus interventions, pregnant women focused intervention and interventions with both.

In the provider focused intervention, a randomized controlled study was done in the 2007- 2008 and 2008-2009 influenza season. The Medical College of Wisconsin Obstetrics and Gynecology clinic sent an alert to the electronic prenatal record of patients which had not received the influenza vaccine or had informed refusal. The Medical College noticed that in the season of 2008-2009 there was a higher number of discussions about the influenza vaccine with the patients, due to the electronic email was mentioned. The vaccination rate in 2008-2009 increased by 21% compared to the 2007-2008 season. (Klatt, Hopp., 2012).

As an example of pregnant woman-focused intervention, the Emory University School of Medicine, the socioecological model was used to understand the individual, environmental and

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community levels of influence, reinforcing the importance of a multilevel approach to change a behavior. A total of 276 pregnant women from minority backgrounds such as Black/African American, Hispanic/Latina, and Multiracial groups were selected. In a randomized process, one-third of the women were assigned a standard vaccine information sheet, one third an on-frame message and one third a loss frame message. The on-frame message promoted the benefit of taking an action against a risk, per example you will have less chances of contracting the flu if you receive the flu vaccine. The loss frame message focuses on the cost of not receiving the vaccine, such as you could die from the flu, if you don't receive the flu vaccine. After 30 days, the women were contacted to respond to a phone interview to attest on how willing they would be to receive the vaccination. The loss-framed intervention, which emphasizes the risk of not receiving the vaccine had the best outcomes for vaccination. In addition, family support and messages delivered by their health care providers played a part on their overall decision to get vaccinated. (Frew, Saint-Victor, Owens, Omer., 2014). This data shows that the way in which the patients are presented with the information to receive the flu vaccine, could have an impact on their decision to be vaccinated.

In an approach using a combination of components, the University of Medicine in New Mexico performed a retrospective study aimed to increase education and knowledge about flu vaccination to the providers and staff of the hospital. In addition, it was implemented the use of standing orders which could be used by the nurses on the obstetrician floor, without the provider's supervision. The combination of staff education and standing orders increased immunization rates significantly, by facilitating the process of getting vaccinated, and by being

able to provide the patients with more accurate information about the risks and benefits of the flu. (Ogburn, Espey, Contreras, Arroyo., 2007).

The interventions that aim at enhancing access to influenza vaccine can be effective due to reducing existing barriers that prevent pregnant women from obtaining the vaccination. Such interventions include reducing the cost and increasing the locations and hours of the vaccination center. In addition, it is essential to ensure that vaccination centers are properly stores and can provide basic orientation about the vaccine. (Wong, 2016).

In conclusion, the provider-based interventions guarantee that there are no missed opportunities to receive the vaccine. The pregnant woman focused interventions are based on increased education and motivation so that the women can seek vaccination. (Wong, 2016). Education has been shown to be an effective method to change health behaviors and can be a powerful tool to transmit information to family, friends, and community. Most of the interventions in this topic showed positive results with the proper amount of guidance, education, and advertisement, in a multilevel approach.

Discussion

There are several benefits known that justify the need to invest in more interventions for the flu vaccination in pregnant women. Among the main barriers encountered by these women, most are lack of knowledge, lack of insurance and not enough locations to obtain the immunization. This study is important because it aims to assess the reasons why women are not getting vaccinated before and during pregnancy. The pre-existing barrier that exists before becoming pregnant can sustain during pregnancy, and that is why most pregnant women who did not get the vaccine before becoming pregnant, will not get the vaccine while pregnant.

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According to the interventions mentioned above, education has been successful in increasing the rates of vaccination; the providers play a pivotal role in promoting that education, and by offering the flu vaccination on site, it makes the vaccination more accessible. Considering the few unknown risks of the vaccine, and the many positive outcomes of it, a greater quantity of intervention should be created and applied to the groups that need it the most, and to increase in overall the number of pregnant women receiving the immunization.

Capstone Study: Methods

Participants

The participants were composed of women who were students, faculty and staff of Merrimack College. The inclusion criteria are students age 18 and the exclusion criteria are male, women that have been pregnant, or women unaffiliated with Merrimack College. We asked the participants to complete the survey by contacting professors via email and asking permission to administer the survey in the classroom. Once granted permission, we will personally go to the classrooms and ask the students to complete the survey. We will make clear that this is a voluntary participation and there are no penalties for declining to participate. The survey is going to be administered online, through a google form; and therefore, we will email the link out to the Health Science faculty and staff for completion as well.

Measures

We administered the survey through a google form, using a Likert-scale containing the options of one through four, one being strongly disagree and 4 strongly

agree. The survey was composed of 23 questions, and it takes approximately 15 minutes to complete the survey. The first section of the questionnaire used the scale to identify their knowledge about the flu vaccine, through the health belief model. Some of the questions asked in this section are “A person could die from the flu, the flu can be prevented through vaccination, if a person is pregnant and contracts the flu, nothing happens to the baby, the flu vaccine cannot give you the flu.” The second part of the survey used the Health Belief model to rank perceived barriers, perceived benefits, perceived susceptibility, and perceived severity of getting the flu. Some of the questions used are “I am aware that the flu vaccine is available, I am aware that getting the flu vaccine reduces my chances of getting the flu”. Most of the questions used to assess the knowledge of the participants about the flu vaccine were obtained from the CDC flu sheet information. The questions used in the stages of change and health belief model were adapted from the article “Decision on Influenza vaccination among the elderly: A questionnaire study based on the Health Belief Model and the Multidimensional Locus of Control Theory”.

Procedures

After we received authorization from professors, we scheduled a time during the period of January 22nd of 2019 and February 15th of 2019 in which we visited the classrooms and administered the survey. First, we explained that the survey was anonymous and there are no penalties in completing the survey. However, the students might benefit from increased knowledge about the flu vaccine. Next, the students

received a paper survey which contained the consent form (Appendix 1), and filled out the questions (Appendix 2) to the best of their knowledge. Upon completion, we informed the inform the students that if there were any questions or concerns, they could contact me for clarification. In addition, the staff and professors of Merrimack College received a google form survey instead, which was filled at their most convenient time.

Data Analysis

Using the obtained quantitative data, we transferred the participants' answers from the paper survey to an excel spreadsheet for coding. The data obtained from the google form was also transferred to the excel sheet. After, the data was imported to STATA 15.0 and used to analyze the distribution of answers. Among the 23 questions asked, 21 were Likert-scale based, and two were Yes or No questions. The Likert-scale had option one as strongly agree, option 2 as agree, option 3 as disagree, and option 4 as strongly disagree.

During the STATA data analysis, the orientation of the question was relevant and needed to be adjusted depending on the way it was worded: positively or negatively. For questions 1, 2, 3, 4, 5, 10, 20, and 22 the order of the Likert scale was modified in a way that strongly agree was option four, and strongly disagree was option one. This change was to ensure that option 4 represented an "uneducated" or negative view of the vaccine, while option 1 represents educated or affirmative views of the vaccine. Therefore, the higher the score obtained the worst knowledge about the flu vaccine.

Results

The respondents of the survey were composed of 83 undergraduate students, and 14 faculty/staff members of the Health Science Department of Merrimack College. All the students, staff and faculty members are identified as females. The demographic information for the students at Merrimack College is composed of 72.9% white, 6.13% Hispanic, 2.9% African American, and 1.4% Asian (Data USA., 2018)

A total of 23 knowledge questions were asked in the survey, which is presented in Table 1. Among the 83 students, 90.36% agreed that it was not difficult to find a place nearby to get vaccinated, and 45.78% agreed that without the flu shot, there is an increased risk of contracting the flu. However, 12.20% agreed that getting the flu vaccine while pregnant could harm the baby. Among the 14 faculty members surveyed, the results to the same questions were 78.57%, 42.86% and 14.29%, respectively.

Table 1. Percentage of women who responded strongly agree and strongly disagree in the knowledge-based questions on the survey assessing perceptions of the flu vaccine.

Response	Items	Students Response		Faculty	
		Strongly Agree	Strongly Disagree	Strongly Agree	Strongly Disagree
Disagree	Influenza Vaccine has Unpleasant Side Effects (35.71%)	(n=83, 9.24%)	(n=83, 19.28)	(n=14, 0%)	(n=14, 0%)
	I am generally opposed to vaccinations (92.86%)	(n=83, 2.41%)	(n=83, 63.86%)	(n=14, 0%)	(n=14, 0%)
	Influenza vaccine is too expensive (92.86%)	(n=83, 1.20%)	(n=83, 53.01%)	(n= 14, 0%)	(n=14, 0%)
	It is difficult to find a place to get the flu vaccine near me (78.57%)	(n=83, 1.20%)	(n=83, 90.36%)	(n=14, 0%)	(n=14, 0%)

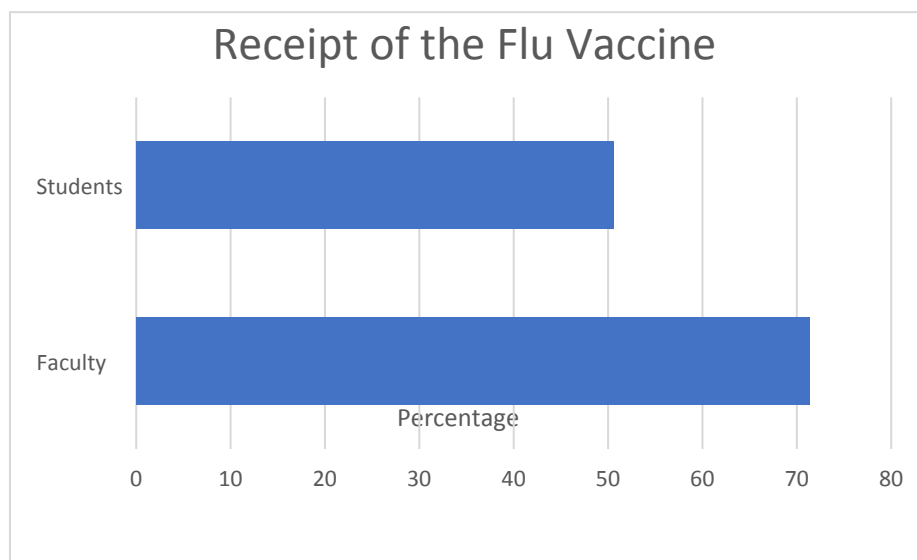
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I believe that getting the flu vaccine while pregnant can cause miscarriage (n=82, 1.22%)	(n=82, 15.85%)	(n=14, 0%)	(n=14, 0%)
I believe that the flu vaccine effectively protects against the flu (n=82, 26.83%)	(n=82, 6.10%)	(n=14, 21.43%)	(n=14, 0%)
I believe that taking the flu vaccine while pregnant can protect my baby from the flu (n=82, 10.98%)	(n=82, 15.85%)	(n=14, 35.71%)	(n=14, 0%)
Without the flu shot I have an increased risk of getting the flu (n= 83, 45.78%)	(n=83, 7.23%)	(n=14, 42.86%)	(n=4, 0%)
If I had the flu, I would not be able to manage daily activities (n=83, 60.24%)	(n=83, 3.61%)	(n=14, 28.57%)	(n=14, 0%)
If I had the flu while pregnant, I could harm my baby (n=82, 12.20%)	(n=82, 12.20%)	(n=14, 14.29%)	(n=14, 0%)
I am aware that the flu vaccine is available (n=14, 0%)	(n=83, 74%)	(n=83, 2.41%)	(n=14, 92.86%)
I am aware that getting the flu vaccine reduces my chances of getting the flu (n=14, 0%)	(n=83, 63.86%)	(n=83, 6.02%)	(n=14, 78.57%)
I plan to get vaccinated sometime in the future (n=14, 0%)	(n=81, 56.79%)	(n=81, 14.81%)	(n=14, 64.29%)
I would schedule my flu vaccination for the next 30 days (n=14, 21.24%)	(n=81, 20.99%)	(n=81, 23.46%)	(n=14, 35.71%)
I usually get the flu vaccine every year (n=14, 7.14%)	(n=83, 55.42%)	(n=83, 24.1%)	(n=14, 78.57%)
A person could die from the flu (n=14, 0%)	(n=83, 62.65%)	(n=83, 1.20%)	(n=14, 71.43%)
The flu can be prevented through vaccination (n=14, 0%)	(n=83, 39.76%)	(n=83, 2.41%)	(n=14, 28.57%)
If a person is pregnant and contracts the flu, nothing happens to the baby (n=14, 57.14%)	(n=83, 4.82%)	(n=83, 34.94%)	(n=14, 0%)
The flu vaccine can give you the flu (n=14, 0%)	(n=82, 10.98%)	(n=82, 19.51%)	(n=14, 57.14%)
The flu is not a serious illness (n=14, 64.29%)	(n=83, 2.41%)	(n=83, 51.81%)	(n=14, 0%)
You can spread the flu to others before you have any symptoms (n=14, 0%)	(n=83, 51.8%)	(n=83, 3.61%)	(n=14, 64.29%)

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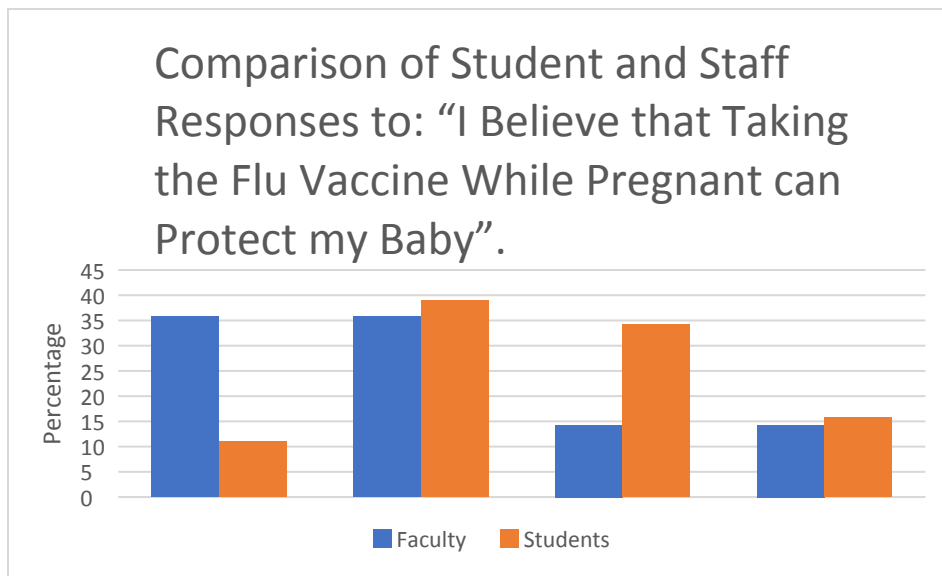
Questions 15 “I have an appointment scheduled to get the flu shot” and 16 “I have received my flu vaccine for this season” were used to assess how many students and staff/faculty received the flu vaccine for the season; and if not, whether they plan on receiving it afterwards.

Figure 1. Percentage of Students and Staff that received the Flu Vaccine in the 2018-2019 season.



Results obtained from STATA were used to create a two-sample t test with equal variance for the staff and student response. The staff $n=14$ had a mean of 32.7, with a standard error of 1.493, and a standard deviation of 5.59. In comparison, the student pool $n=83$ had a mean value of 39.17, with a standard error and standard deviation of 0.9439 and 8.6, respectively. The t-test used a 95% confidence interval for both groups and showed a significant difference between the two groups' responses ($p > 0.008$).

Figure 2. Student's and Staff's answer on question “I believe that taking the flu vaccine while pregnant can protect my baby”.



Discussion

Correlation to Literature and Major Findings

Considering that the highest barrier preventing women from getting vaccinated are based on lack of education, habit to receive the vaccine, and provider recommendation, we decided to investigate how the barriers that prevent pregnant women from getting vaccinated can be addressed before the women becomes pregnant, by assessing major barriers that prevent women from becoming vaccinated on regular basis, as those barriers can play an even larger role during pregnancy. Based on previous research used in this study, there were no other studies focused in analyzing the knowledge differences between staff and students about the flu vaccine; and how that can correlate to the rate of vaccination during pregnancy.

There are several confounding variables that can account for the different vaccination rates among pregnant women including knowledge, ethnicity, insurance, and medical availability in the area. Education level also plays a role in the number of women that get vaccinated and in

the amount of knowledge about the vaccine. According to the responses obtained, the cost and location of the flu vaccine does not seem to be a significant barrier. Among the students, 90% reported having no difficulty obtaining the flu vaccine compared to 78% of the staff. Regarding the cost of the flu vaccine, 53% of the students believe that the flu vaccine is expensive, compared to nearly 93% of the staff. However, the questions focused on pregnancy and the flu vaccine such as question seven: "I believe that taking the flu vaccine while pregnant can protect my baby" resulted in a higher density of answers options 2 and 3, standing for agree and disagree respectively. This showed that the students and staff were unsure of the answer and chose the mild response, showing a lack of knowledge about the side effects of the flu vaccine.

In the 2015-2016 season, 46.5% of the women that received the flu vaccine had a below college degree educational level, 52.6% had a college degree level education, and 58.2% had above a college degree education (CDC, 2016). Only about one quarter (26.83%) of the students surveyed believe that the flu vaccine effectively protects against the flu. Meanwhile, 21.63% of the Health Science faculty believe in the efficacy of the vaccine. Despite this belief, 55% of the students receive the flu vaccine yearly compared to 78% of the staff. Furthermore, 60.24% of the students believe that they had the flu, they would not be able to manage daily activities, in comparison to 28.57% of the staff population. Surprisingly, 57.14% of the staff believes that the flu vaccine can give you the flu, while in the students' group, only 10.98% believe in the same. The flu vaccine cannot cause Influenza (CDC., 2019).

Limitations and Future Recommendations

The sample population used for this study was obtained exclusively from the pool of students and faculty of Merrimack College. Considering that the faculty/staff is composed of educated individuals that have at minimum a bachelor's level of education, the amount of knowledge about the flu vaccine is expected to be higher than average. In addition, the students surveyed were either majoring or minoring in Health Science, and possibly have a higher level of education about the importance of the flu vaccine than non-health science students. In addition, Merrimack College offers flu vaccine clinics during flu season that provide free vaccination to students and faculty. Therefore, barriers in obtaining the vaccine among both groups were low, especially among the student group. Both groups are an underrepresentation of the level of education and accessibility of the general population, accounting for sampling bias.

Some of the strengths of this study are a large sample size of n=83 students, and n=14 faculty of the Health Science Department. In addition, the questions asked in the survey were quantitative, using a Likert scale, addressing knowledge and the adoption of the flu vaccine in this and previous seasons.

In a future study, it would be beneficial to collect a broader sample of the population, accounting for the differences in education levels, and types of knowledge about health science, and the flu vaccine. It would also be important to collect additional information such as number

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of previous pregnancies, ethnicity, age, highest level of education and marital status; as those variables might play a role in the decision-making factor to receive the flu vaccine.

Furthermore, a pre- and post- knowledge survey could be used to assess the likelihood that students and faculty still think that they can get the flu from the flu vaccine. Therefore, the results could be used to find the knowledge gap between the different groups, and to create an educational program focused in increasing knowledge about vaccines and their side effects.

Conclusion

According to the results obtained from the survey, there is a substantial lack of knowledge about the flu vaccine among the Merrimack College sample surveyed. However, the students surveyed represented an educated population that is working towards a bachelor's degree. Among the staff and faculty, all have a bachelor's degree or higher. In the U.S., only 33% of the population have a bachelor's degree, which would probably represent a population that has a greater lack of knowledge about the benefits of flu vaccine during pregnancy. There is a need to assess the knowledge of the community and promote campaigns within primary care offices to incentivize the use of the flu vaccine. Habit plays a big role in the decision-making process to get a flu vaccine, and therefore if more women get in the habit of receiving the flu vaccine before pregnancy, chances are that less barriers will be in the way of receiving the flu vaccine when pregnant.

Appendix 1



MERRIMACK COLLEGE

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Consent to Participate in Research Study

TITLE: Assessing perceptions of Influenza vaccination while pregnant among women who have not yet conceived: predictors and modifiers of uptake.

Investigators Franciela Golden, April Bowling.

IRB Number: IRB-FY18-19-89

Introduction

- You are being asked to be in a research study that is assessing barriers on women who have to yet conceived, about getting the flu vaccine.
- You were selected as a possible participant because you are a woman attending Merrimack as a student, or employed as faculty or staff is eligible to participate
- We ask that you read this form and ask any questions that you may have before agreeing to be in the study.

Purpose of Study

- The purpose of the study is to identify barriers that could prevent women from getting the flu vaccine when pregnant. The research questions will be used to analyze fears and concerns

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about getting the flu vaccine in women that are not pregnant, in order to address it before pregnancy. In that way, when pregnant, there could be less barriers preventing them from getting the flu vaccine.

- Ultimately, this research may be presented as a capstone project and published.

Description of the Study Procedures

- If you agree to be in this study, you will be asked to do the following things: fill the survey questions in class, which should take less than 15 minutes.

Risks/Discomforts of Being in this Study

- There are no reasonably foreseeable risks in filling out this survey.

Benefits of Being in the Study

- The benefits of participation could be an increased knowledge about flu vaccination.

Confidentiality

- This study is anonymous. We will not be collecting or retaining any information about your identity.

Payments or Compensation

- You will not receive any type of compensation for filling out the survey.

Right to Refuse or Withdraw

- The decision to participate in this study is entirely up to you. You may refuse to take part in the study *at any time* without affecting your relationship with the investigators of this study, Merrimack College or any study partners. Your decision will not result in any loss or benefits to which you are otherwise entitled. You have the right not to answer any single question, as well as to withdraw completely from the interview or survey at any point during the process; additionally, you have the right to request that the interviewer not use any of your interview material.

Right to Ask Questions and Report Concerns

- You have the right to ask questions about this research study and to have those questions answered by me before, during or after the research. If you have any further questions about the study, at any time feel free to contact me, Franciela Golden at goldenfb@merrimack.edu or by telephone at 813-484-0773. If you like, a summary of the results of the study will be sent to you. If you have any other concerns about your rights as a research participant that have not been answered by the investigators, you may contact the Chair of the Merrimack Institutional Review Board at (978) 837-5280 or by email at irb@merrimack.edu.

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- If you have any problems or concerns that occur as a result of your participation, you can report them to the Chair of the IRB at the contact information above.

Informed Consent

- Continuing with this survey indicates that you have decided to volunteer as a research participant for this study, and that you have read and understood the information provided above.

Appendix 2

Health Belief Questionnaire

Knowledge questions

A person could die from the flu

The flu can be prevented through vaccination

If a person is pregnant and contracts the flu, nothing happens to the baby

The flu vaccine cannot give you the flu.

The flu is not a serious illness

You can spread the flu to others before you have symptoms

Perceived Barriers

Influenza vaccine has unpleasant side effects

I am generally opposed to vaccinations

Influenza vaccine is too expensive

It is difficult to find a place to get the influenza vaccine near me

I believe that getting the influenza vaccine while pregnant can cause miscarriage

Perceived benefits

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I believe that the influenza vaccine effectively protects against the flu

I believe that taking the influenza vaccine when pregnant can protect my baby from flu

Perceived susceptibility

Without the flu shot, I have an increased risk of getting the flu.

If I had the flu, I would not be able to manage daily activities

If I had the flu vaccine while pregnant, I could harm my baby

Stages of Change

Pre-contemplation

I am aware that the flu vaccine is available

I am aware that getting the flu vaccine reduces my chances of getting the flu

Contemplation

I plan to get vaccinated sometime in the future

I would schedule my flu vaccination for the next 30 days

Preparation

I have an appointment scheduled to get the flu shot

Action

I have received my flu vaccine for this season

I usually get the flu vaccine every year

Appendix 3.

Assessing Perceptions of Influenza Vaccination while Pregnant Among Women who have not yet Conceived: Predictors and Modifiers of Uptake.

Assessing Perceptions of Influenza Vaccination While Pregnant Among Women Who Have Not Yet conceived: Predictors and Modifiers of Uptake

1- Influenza vaccine has unpleasant side effects

Strongly Agree Strongly Disagree

2- I am generally opposed to vaccinations

Strongly Agree Strongly Disagree

3- Influenza vaccine is too expensive

Strongly Agree Strongly Disagree

4- It is difficult to find a place to get the flu vaccine near me

Strongly Agree Strongly Disagree

5- I believe that getting the flu vaccine while pregnant can cause miscarriage

Strongly Agree Strongly Disagree

6- I believe that the flu vaccine effectively protects against the flu

Strongly Agree Strongly Disagree

7- I believe that taking the flu vaccine when pregnant can protect my baby from the flu

Strongly Agree Strongly Disagree

8- Without the flu shot, I have an increased risk of getting the flu.

Strongly Agree Strongly Disagree

9- If I had the flu, I would not be able to manage daily activities

Strongly Agree Strongly Disagree

10- If I had the flu vaccine while pregnant, I could harm my baby

Strongly Agree Strongly Disagree

11- I am aware that the flu vaccine is available

Strongly Agree Strongly Disagree

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12- I am aware that getting the flu vaccine reduces my chances of getting the flu

Strongly Agree Strongly Disagree

13- I plan to get vaccinated sometime in the future

Strongly Agree Strongly Disagree

14- I would schedule my flu vaccination for the next 30

Strongly Agree Strongly Disagree

15- I have an appointment scheduled to get the flu shot

Strongly Agree Strongly Disagree

16- I have received my flu vaccine for this season

Strongly Agree Strongly Disagree

17- I usually get the flu vaccine every year

Strongly Agree Strongly Disagree

18- A person could die from the flu

Strongly Agree Strongly Disagree

19- The flu can be prevented through vaccination

Strongly Agree Strongly Disagree

20- If a person is pregnant and contracts the flu, nothing happens to the baby

Strongly Agree Strongly Disagree

21- The flu vaccine cannot give you the flu

Strongly Agree Strongly Disagree

22- The flu is not a serious illness

Strongly Agree Strongly Disagree

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23- You can spread the flu to others before you have symptoms

Strongly Agree Strongly Disagree

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