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DOCTOR OF NURSING PRACTICE (DNP) PROGRAM

A DNP PROJECT

TITLE: VACCINES: GIVE THEM A SHOT

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Abstract

Human immunodeficiency virus (HIV) is a retrovirus that impairs immune response by infecting CD4 T cells and destroys them. Vaccines were created as a method to prevent transmission of diseases and are especially important for people living with HIV (PLWH) due to their immunocompromised state. However, PLWH are not being vaccinated according to current guidelines. Lack of knowledge from patients and providers were considered barriers to becoming vaccinated. The purpose of this project was to create video-audio format education modules about each of the recommended vaccines for PLWH to increase knowledge among adult-gerontology and family primary care nurse practitioner students at Rutgers University, New Jersey. This project was a pre and post test design which the pre-test assessed baseline knowledge and analysis was conducted to assess if post test scores statistically increased after viewing the modules. Nonparametric statistics were used for data analysis on SPSS. Overall, post test scores significantly improved compared to pre-test scores. Students that were in the HIV specialization track and those who completed more clinical semesters did statistically better on the pre-test than participants who were not. However, these attributes did not contribute to statistically better post test scores compared to other participants. No difference was found between students in the family and adult-gerontology track on either pre or post test scores. Students can use this increased knowledge in their future practice as providers to educate PLWH about the importance of vaccines, improve vaccination rates, and ensure quality of life in this immunocompromised population.

Keywords: people living with HIV, vaccines, education module

Vaccines: Give Them a Shot

Introduction

Vaccines were created as a method to prevent the transmission of certain diseases. Vaccines contain the antigen of a disease; when these antigens are introduced to the immune system, antibodies are created so they can initiate an immune response in the presence of the disease (CDC, 2017b). This process is an especially important disease prevention method for people living with the human immunodeficiency virus (HIV) because of their immunocompromised state (AIDSinfo, 2017).

HIV is a retrovirus that impairs immune response by infecting CD4 T cells and destroying them (AIDSinfo, 2017; Choi, Chrisler, & Reno, 2015). The virus is spread through contact with bodily fluids such as blood, semen, pre-seminal fluids, vaginal fluids, and breast milk (AIDSinfo, 2017). When the CD4 count falls below 200 or there is an opportunistic infection involved, it is considered acquired immunodeficiency syndrome (AIDS). The advent of antiretroviral therapy (ART) prevents HIV from destroying CD4 T cells which allows people living with HIV (PLWH) to live longer and healthier lives (AIDSinfo, 2017). PLWH are more at risk for vaccine preventable diseases due to their immunocompromised state.

However, PLWH are vaccinated at a lower rate than their HIV negative counterparts despite having an impaired immune system (Crum-Cianflone & Wallace, 2014). This is detrimental because low CD4 counts increase the susceptibility of PLWH to vaccine preventable diseases (VPDs) and they may be unable to receive certain vaccines (AIDSinfo, 2017; Crum-Cianflone & Wallace, 2014). PLWH rely on herd immunity to stay healthy during times when they cannot receive the recommended vaccines because of their immunocompromised state.

Herd immunity is when a majority of the population is vaccinated against a disease, those who are not immune will still have protection against that disease (CDC, 2017a). Many people are choosing not to vaccinate themselves or their children which has led to an increase in VPDs (Brady, 2015; Phadke, Bednarczyk, Salmon, & Omer, 2016). In the morbidity and mortality weekly report (MMWR) in 2014, there was a report that compared non-influenza vaccination rates in 2012 to 2011 in adults that were 19 years or older. This report demonstrated that vaccination rates for multiple vaccines such as pneumococcal saw a decrease in 2012 when compared to 2011in the general population regardless of HIV status (Williams et al., 2014). The pneumococcal vaccine decreased by 0.1% in high risk individuals between the ages of 19 and 64; there was also a 2.4% decrease in older adults greater than 64 years old. There was a limited increase in tetanus-toxoid containing vaccines (Tdap or Td), herpes zoster, and the human papillomavirus (HPV) vaccine with an increase of 5.8%, 4.4%, and 0.5% respectively (Williams et al., 2014). decreasing vaccination rates is (or can lower) lowering herd immunity protection for PLWH increasing their risk for contracting VPDs. Screening is necessary to identify missing vaccinations in PLWH in order to increase vaccination rates so they are protected against VPDs.

Background and Significance

The *Adult and Adolescent Opportunistic Infection Guidelines* recommend that all PLWH with a CD4 count 200 or greater should get an annual influenza vaccine; pertussis vaccine (Tdap); pneumococcal vaccine; meningococcal conjugate vaccine; hepatitis B series; hepatitis A series; HPV vaccine series; measles, mumps, and rubella vaccine; and the varicella vaccine (Panel on Opportunistic Infections in HIV-Infected Adults and Adolescents, 2018). Caution needs to be taken when the CD4 count is less than 200 because PLWH will not have enough T-cells to initiate the proper immune response to the vaccines or vaccines that contain live antigens

can cause an exacerbation of the disease (Panel on Opportunistic Infections in HIV-Infected Adults and Adolescents, 2018).

Immunization rates among PLWH are lower when compared to their HIV negative counterparts and places them at risk for VPDs (Doherty et al., 2016). Multiple studies have shown PLWH are less likely to be screened and vaccinated for the CDC recommended vaccines (Gerend, Madkins, Gregory Phillips, & Mustanski, 2016; Hechter et al., 2014; Hoover et al., 2012; Kourkounti, Paparizos, Leuow, Paparizou, & Antoniou, 2015). These included vaccinations such as hepatitis A and hepatitis B. One study at eight HIV clinics found that only 40-50% of PLWH were screened for either of these diseases; more than 80% were considered susceptible for them yet less than 30% were vaccinated (Hoover et al., 2012).

In contrast, another study that assessed for hepatitis B screening among primary care providers in the general population found that 90% of primary care providers screen pregnant women, 61% screen people who have more than one sex partner in 6 months, 80% screen men who have sex with men (MSM), 86% screen people who have sex with prostitutes, and 87% screen sex workers. Sixty percent of these providers vaccinated more than 10 patients with the hepatitis B vaccine in the past year (Said & Jou, 2014).

These studies suggest there is wide variation in screening and vaccination rates among providers and that PLWH may be screened and vaccinated at lower rates compared to other groups at risk for VPDs. Vaccinating PLWH against VPDs is an important component of health promotion and disease prevention. Increased screening is necessary to ensure PLWH are vaccinated at rates comparable to other populations at risk for VPD.

Problem/Purpose Statement

PLWH are more susceptible to VPDs but are not being vaccinated according to current guidelines and at a lower rate than their HIV negative counterparts (Crum-Cianflone & Wallace, 2014; Said & Jou, 2014). It is vital that missing vaccinations are identified in PLWH so that they are properly protected against VPD especially as herd immunity is decreasing in the general population (CDC, 2017b; Phadke et al., 2016; Williams et al., 2014).

The purpose of this project is to create education modules aimed at family and adult-gerontology nurse practitioner students at Rutgers University to increase their knowledge about the recommended vaccines for PLWH. They can then apply this knowledge to later practice thus increasing vaccination rates in PLWH.

Needs Assessment

The need to assess for vaccinations among PLWH came from a comment voiced by a preceptor at a clinic in New Jersey. The nurse practitioner at the site wondered if the patients at that facility were vaccinated according to current recommended guidelines. The literature search supports this anecdotal report that PLWH are not being vaccinated according to recommended guidelines despite being susceptible for the vaccine preventable disease (Gerend et al., 2016; Hechter et al., 2014; Hoover et al., 2012; Kourkounti et al., 2015).

This project will be conducted at Rutgers University in New Jersey.

PICOT Clinical Question

Will education modules about the different recommended vaccines for a patient with HIV (I) increase their knowledge about vaccine administration for PLWH (O) among family and adult-gerontology primary care nurse practitioner students at Rutgers University (P)?

Aims and Objectives

The aim of this project is to increase nurse practitioner students' knowledge about the recommended vaccines for PWLH. The first objective is to create education modules about the different vaccines and time of administration for each. The second objective is to assess knowledge prior to the education modules and afterwards. This will be assessed through questionnaires and comparing pre and post test scores.

Review of Literature

The review of literature to support this was conducted using the PubMed database. The keywords used to conduct this search included: *HIV, HIV patients, HIV positive patients, HIV infected, people living with HIV, PLWH, PLWHA, vaccination*, immunization*, hepatitis A vaccin*, hepatitis B vaccin*, hepatitis vaccin*, influenza vaccin*, flu vaccin*, pneumonia vaccin*, pneumococcal vaccin*, anti-vaccination movement, vaccination refusal, provider, practitioner, healthcare provider, health care provider, healthcare practitioner, health care practitioner, physician, nurse practitioner, and barrier*. Articles were included if they were published between January 1, 2012 to April 8, 2018. Only studies conducted in the United States (U.S.) were included; studies which were done at an international location were excluded.

The review for vaccination trends in the United States and New Jersey focused on the adult population aged 18 years or older. Vaccination trends focused on either populations that were HIV positive or regardless of HIV status. Articles which focused on vaccination rates in high risk populations for contracting HIV were excluded from this review.

Articles included in the review focused on adults' or providers' perspectives about the barriers and facilitators of getting vaccinated. Articles were excluded if the focus was on children, adolescents, or parents' perspectives about childhood vaccinations. Articles that

discussed creating a vaccine against HIV, serological response to the vaccines, or testing different schedules or strength of vaccines were also excluded.

A total of 1,094 articles were found using the above keywords and 19 were identified as pertinent to this review of literature using the inclusion and exclusion criteria mentioned above.

U.S. Vaccination Rates and Trends

A 2015 national survey conducted to assess vaccination rates in the U.S. in non-institutionalized civilians found an increase in influenza vaccination rates in adults ≥19 years old by 1.6% and pneumococcal vaccines for high risk individuals between the ages of 19-64 years old by 2.8% from the prior year (Williams et al., 2017). The tetanus, hepatitis A, hepatitis B, and human papilloma virus (HPV) vaccines saw no changes compared to the prior year. However, besides the herpes zoster vaccines, all the other mentioned vaccines are not at the optimal level dictated by *Healthy People 2020* (Williams et al., 2017).

Healthy People 2020 recommends 70% of the population should be vaccinated with the annual influenza vaccine but 44.8% of the U.S. population ≥19 years old were immunized in 2015 (Williams et al., 2017). Less than half the population was protected against the influenza virus and this places immunocompromised people, such as PLWH, for contracting the virus from another individual.

One other vaccine that is recommended for PLWH due to their immunocompromised state is the pneumococcal vaccines (Panel on Opportunistic Infections in HIV-Infected Adults and Adolescents, 2018). The national survey specifically looked at pneumococcal vaccines for high risk populations such as PLWH between 19-64 years old and found only 23.0% of the high risk population were vaccinated against pneumococcal pneumonia when *Healthy People 2020* aims to have a minimum of 60% immunized (Williams et al., 2017).

New Jersey State Health Assessment Data (NJSHAD) tracks both U.S. and state influenza rates in adults ≥65 years old. The U.S. influenza rates have declined since 2011 when 61.3% of the population reported receiving the flu vaccine. In 2016, only 58.8% of the U.S. population was vaccinated for influenza (NJSHAD, 2018).

Lower vaccination rates in the U.S. are decreasing herd immunity protection and need to be increased so PWLH can be protected against VPDs.

New Jersey Vaccination Rates

The New Jersey (NJ) health department and other government agencies have not conducted a statewide survey to assess for vaccination rates in the adult population 18 years and older regardless of HIV status. One survey assessed national and state shingles vaccination rates for 2014 showed the national shingles vaccination rate was 31.8% and NJ had a rate of 22.5% (Lu, O'Halloran, Williams, & Harpaz, 2017). NJ's influenza vaccination rate was at 60.9% for 2016 and has remained between 57.2-61.3 % since 2011 (NJSHAD, 2018). Pneumococcal vaccine for adults ≥65 years old in 2015 was 66.5% in NJ compared to the U.S. average of 71.9% (NJSHAD, 2018).

NJ Department of Health collects data on only two vaccines for adults ≥65 years old (NJSHAD, 2018). There have not been significant changes to influenza vaccination rates in NJ and pneumococcal vaccine rates were lower than the national average. All other vaccine data involved school aged children, their vaccination status, and those who were exempted from getting vaccinated. It would be beneficial for NJ to assess vaccination rates in adults younger than 65 years old to examine how the state vaccine rates compares to the national average and *Healthy People 2020 goals*.

Vaccination Rates in PLWH

There were no national or state level surveys found which assessed for vaccination rates among PLWH. All studies which were found focused on specific vaccines such as influenza, hepatitis A, and hepatitis B vaccines (Marcus D Durham et al., 2014; Hoover et al., 2012; Weiser, Perez, Bradley, King, & Shouse, 2018). However, many of these studies did indicate that PLWH were candidates for these vaccines but only a small percentage received them.

Hoover et al. (2012) found at eight different urban HIV clinics, only 42% of PLWH were screened for hepatitis A; 84% were considered susceptible to this it, but only 29% received the hepatitis A vaccines. This vaccination rate is better than the 2015 national average for both adults 19-49 years old and those ≥50 years old which 12.3% and 5.5% respectively reported receiving the hepatitis A vaccine (Williams et al., 2017).

Hoover et al. (2012) also assessed for hepatitis B and found 52% were screened for hepatitis B; 82% were considered susceptible, but only 25% were vaccinated (Hoover et al., 2012). The same was seen in Weiser et al.'s (2018) study where data was collected through telephone interviews, face-to-face interviews, and chart reviews between June 2009 to May 2013. Out of 18,089 PLWH, 82.9% of them were not vaccinated nor had documented immunity against hepatitis B. Only 9.6% were initiated on the hepatitis B vaccine series (Weiser et al., 2018). Both of the hepatitis B vaccination rates in PLWH are lower than the 2015 national average for adults between 19-49 years old who 32% reported receiving the hepatitis B vaccine (Williams et al., 2017). However, Hoover et al.'s (2012) study had a higher vaccination rate when compared to the 2015 national average of adults ≥50 years old at 16.5% (Williams et al., 2017).

One observational study spanned from July 1999 to June 2013 found the annual influenza rate for PLWH in eight different HIV clinics ranged from 25.8-50.9% with an average of 38.7% (Marcus D. Durham et al., 2011; Marcus D Durham et al., 2014). The influenza vaccination rate in PLWH is lower when compared to the 2015 national survey at 44.8% and far from the *Healthy People 2020* goal of 70% (Williams et al., 2017).

It would be more beneficial if there were more studies conducted which assessed for all the different vaccination rates in PLWH. From the studies that have been conducted, hepatitis A vaccination rates in PLWH from those clinics did better than the 2015 national average however the rate is poor compared to how many were found susceptible to the disease. Hepatitis B and influenza vaccination rates also need improvement as they are below the national average. Thus, it is important to promote vaccines in PLWH to increase vaccination rates for protection against VPDs.

Patient Barriers to Vaccination

The two most frequently mentioned barriers for patients receiving their recommended vaccines were lack of knowledge about the vaccines and cost (Lu, O'Halloran, Kennedy, et al., 2017; Lu, O'Halloran, & Williams, 2015; Nowak, Sheedy, Bursey, Smith, & Basket, 2015). Patients who believed they were not susceptible for a VPD, such as the flu, and were not aware of that the annual influenza vaccine is recommended in all adults were less likely to receive this vaccine (Nowak et al., 2015).

Patients mentioned costs as a deterrent to receiving all their recommended vaccine either because the cost was too high or insurance would not cover it (Lu, O'Halloran, Kennedy, et al., 2017). This was evidenced by a cross sectional study done by Lu et al. (2015) when it looked at vaccination rates between adults who reported having insurance and not having insurance. All

rates of vaccination were higher for those who reported they had insurance when compared to those who did not. One major difference can be seen in the pneumococcal vaccination rates for high risk individuals between 19-64 years old with 23% with insurance were vaccinated versus 9.8% for those who did not have insurance (Lu et al., 2015).

There were no studies found which focused on barriers to vaccination in PLWH. It would be beneficial to assess if PLWH had barriers to receiving all the CDC recommended vaccines.

Provider Barriers to Vaccination

One major barrier which was mentioned in all studies to assess for providers' barriers to vaccinating their patients was financial cost (Hurley et al., 2018; Hurley, Bridges, Harpaz, & et al., 2014; Hurley et al., 2017; Montag Schafer & Reidt, 2016). Hurley et al. (2017) found more than one third of general internal medicine and family medicine providers sometimes or frequently do not recommend vaccines if they believe insurance will not cover it. Close to one fourth stated they would not recommend a vaccine if they thought a patient could not afford it (Hurley et al., 2017). Financial cost has also caused many providers to refer their patients to another facility, such as pharmacies, to receive their vaccines if insurance would not cover it or if there would be inadequate reimbursement (Hurley et al., 2014). This was further explored in a cost analysis done for the HPV, Prevnar pneumococcal vaccine, and herpes zoster vaccine at a Ryan White clinic in Alabama (Eaton, Kulczycki, Saag, Mugavero, & Raper, 2015). The cost analysis indicated that all three vaccines resulted in money lost over time regardless of insurance reimbursement or Ryan White funding reimbursement.

Only one study was found which specifically assessed for HIV health care providers' knowledge, attitude, and practice about the herpes zoster vaccine in PLWH. Three hundred

thirty six providers responded and only 67.5% believed the vaccine decreased herpes zoster rates in PLWH and 75% did not vaccinate their patients despite antiretroviral therapy (Aziz, Kessler, & Huhn, 2013). Most providers could not identify that there is an increased incidence rate of herpes zoster in PLWH and that the vaccine afford immune protection. Other barriers to vaccinating PWLH with the herpes zoster vaccine included safety concern from possible dissemination and belief that the vaccine is ineffective (Aziz et al., 2013).

The literature is missing more studies about HIV providers' knowledge and barriers to administering all the recommended vaccines for PLWH.

Facilitators to Increasing Vaccination Rates

Two facilitators that increased vaccination rates in adults were provider recommendation for a vaccine and increased knowledge about the vaccine and its associated disease process (Suryadevara et al., 2014; Wheldon et al., 2017). Patients identified their health care provider as the primary source of information about vaccines for their disease. One study focused on the Tdap vaccine which identified the health care provider as the first source of information (Suryadevara et al., 2014). There was increased uptake of this vaccine if the providers discussed and recommended Tdap to the patients which increased patients' knowledge about the vaccine and its disease. The other study assessed for the HPV vaccine in men who have sex with men 22-26 years old and found that providers who were knowledgeable about the human papilloma virus were more likely to discuss sexual orientation and the vaccine with their patients (Wheldon et al., 2017).

One study looked at immunization completion rates comparing HIV care given by an infectious disease (ID) specialist alone, a generalist alone, or a combination of an ID specialist and generalist (Rhodes, Chang, Regan, Singer, & Triant, 2017). The immunizations monitored

in this study were the pneumococcal, influenza, and initial hepatitis B vaccines. The ID specialist and generalist group had the highest rate of immunization completion however, this could be contributed to increased visits office visits allowing for more engagement in care (Rhodes et al., 2017).

There were no studies found that assessed facilitators increasing vaccination rates in adults in all the recommended vaccines. There is missing literature detailing what specific communication method such as directly speaking with the patients or providing education pamphlets will influence the uptake of vaccines more. It is also beneficial to assess how to increase vaccination uptake in HIV providers and PLWH.

Theoretical Framework

The Plan-Do-Study-Act cycle is used to guide the implementation, assessment, and conclusion of this project (Appendix C).

Plan-Do-Study-Act (PDSA) Cycle

The PDSA cycle is a tool used to accelerate implementing quality improvement projects. The first step is the planning phase which takes into consideration all the factors that are necessary to implement the plan that include the site and how data will be collected Fime The planning phase for this project includes a needs assessment, which was accomplished by anecdotal discussion and literature review. The results from the needs assessment will be used to create education modules aimed at increasing nurse practitioner students' knowledge about the recommended vaccines for PLWH. The education modules will include each vaccine that is recommended for PWLH and the appropriate schedule for each.

The do step will be implementing the education modules in Rutgers University's primary and adult-gerontology primary care nurse practitioner students. This phase includes collecting

data from the pre and post test scores. Any issues that arise during the data collection need to be documented during this phase (Minnesota Department of Health, n.d.).

The study is the third step which analyzes the data that will be collected (Minnesota Department of Health, n.d.). This will reveal whether the education modules increased knowledge about the recommended vaccines for PLWH. If there is an increase in knowledge, then post test score should be statistically higher than pre-test scores.

Act is the last step and this phase will be the dissemination of study results. If the education modules do increase knowledge about the recommended vaccines for PLWH, it can be incorporated in the Rutgers University nurse practitioner curriculum. Nurse practitioner students can then incorporate this knowledge into their later practice and increase vaccination rates in PLWH.

Methodology

This project used a pre and post test design that involved education modules available on the Canvas platform. The educational modules addressed the recommended vaccines for PLWH which include the annual influenza, Td/Tdap, MMR, varicella, herpes zoster, HPV, pneumococcal, hepatitis A, hepatitis B, and meningococcal vaccines (Panel on Opportunistic Infections in HIV-Infected Adults and Adolescents, 2018). A pre-test questionnaire was given prior to the start of the education modules to assess baseline knowledge about the recommended vaccines for PLWH. Then the educational modules discussed each vaccine, administration schedule, and precautions that need to be taken. A post test was administered to assess if scores increased after completion of the educational modules.

The pre and post test design was appropriate for this project because it assessed whether the education modules increased knowledge about the recommended vaccines for PLWH by comparing the scores before and after the education modules.

Setting

The project took place at Rutgers University in Newark, New Jersey for students enrolled in family and adult-gerontology primary care nurse practitioner students. The educational modules were available on the Canvas platform and could be done from any computer that had internet access.

Study Population

The population included currently enrolled nurse practitioner students at Rutgers University in the family and adult-gerontology primary care track. Participants were eligible to enroll in this project if they were in the primary care track, all other tracks were excluded. Primary care track students that had graduated from the doctorate program at Rutgers University were not eligible to participate.

Subject Recruitment

Participants were recruited through the Rutgers e-mail server about enrolling in this project. Flyers were created to bring attention to the project and were included in the body of the email after IRB approval (Appendix D). The primary investigator went to two classes to promote information and participation in the project targeting family and adult-gerontology primary care track nurse practitioner students. Recruitment was also performed through the Canvas platform to increase participation from eligible subjects.

Consent Procedures

This project is required to have an IRB review as it is a student project. Therefore, consent was obtained before the beginning of the demographics survey. Participants read the IRB approved consent document that explained the aim of the project, what participants were expected to do, and how they can withdraw if they choose not to continue with the project (Appendix E). Participants were informed that no personal identifiers, such as name or date of birth, will be asked of them. Course professors and grades were not affected by their participation or non-participation. The information that was collected were whether the students were enrolled in family or adult-gerontology primary care track, were in the HIV specialization track at Rutgers University, number of semesters in clinical, and pre-test post test evaluation scores (Appendix F).

Risks/Harms

Participants did not suffer physical, psychological, social, or economic risk as this project was voluntary. There was minimal risk to potential loss of privacy as no personal identifiers were collected from the participants.

Costs and Subject Compensation

This project had no costs because communication, recruitment, and intervention were delivered electronically. The only cost that incurred was $36.00 for the final poster.

To support improving patient care, Rutgers Biomedical and Health Sciences is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team. Participants were compensated with 0.5 continuing education credits (CEUs) through these accreditations.

Study Interventions

The intervention was educational modules created on PowerPoint that was converted to an mp4 video and audio format that followed a fictional patient who had recently been diagnosed with HIV and his healthcare provider. The provider educated the patient about the different vaccines that were recommended for him, the diseases that each vaccine prevented, the appropriate schedule for each vaccine, and precautions that needed to be addressed. Nine educational modules were created and educated the participants about the recommended vaccines as if they were the fictional HIV positive patient. This intervention was assessed by how it affected participants' post test scores compared to the pre-test scores (Appendix G). The pre and post tests consisted of 15 questions: 10 were multiple choice, 3 were select all that apply, and 2 were true and false. The maximum score that could be achieved on either test was 20 out of 20 (100%).

Outcomes Measured

The outcomes measured were if post test scores significantly improved compared to pre test scores after participants reviewed the education modules to assess an increase in knowledge about the recommended vaccines for PLWH. Analysis was conducted comparing pre and post test scores of participants in the family primary care track and those in the adult-gerontology primary care track. Analysis compared pre and post test scores of participants enrolled in the HIV specialization track and those who are not. Correlation analysis conducted to assess if more semesters of clinicals completed affected pre and post rest scores.

Project Timeline

Once IRB approval was received, the modules were implemented for a total of eight days (Appendix H). The project was available on Canvas on April 6, 2019 and data was collected on

April 15, 2019. The results from the pre-test and post test scores were inputted into SPSS to conduct data analysis. Presentation of project results and poster presentation were done on May 25, 2019.

Resources Needed

The required resources included access to the email addresses of enrolled nurse practitioner students at Rutgers University who are in the family and adult-gerontology primary care track. The email list was obtained by faculty and team members. Primary investigator sent out emails about enrollment into the project. Primary investigator attended two classes to increase recruitment effort. Alexander Library in Rutgers, New Brunswick was utilized for its printing services of the project poster.

Evaluation Plan

The evaluation plan involved asking the participants if the education modules met the objective of improving their knowledge about the recommended vaccines for PLWH (Appendix I). It assessed how much the modules improved their knowledge and how willing they are to apply what they learned into their future clinical practice. There was space available to the participants to write in questions, concerns, or recommendations about the education modules and project.

Maintenance and Security

Data collected from this project will be maintained by the Center for Professional Development. They adhere to the Rutgers University's policies and regulation on data security for personal and professional information. Data results were deidentified of personal information and sent to the primary investigator. Documents will be kept in the Center of

Professional Development for a minimum of 6 year after the project. All personal information was kept private per Rutgers University's policies.

Data Analysis

The final number of participants that were included in the data analysis was 54. Seventy-nine participants finished the demographic survey; 73 finished the pre test; 56 participants finished the demographic survey, pre test, and post test. However, only 54 participants were included in the data analysis because one participant did not clarify if he was in the family or adult-gerontology primary care track. Another participant did not answer the questions for whether he was enrolled in the HIV specialization track or how many semesters of clinicals did he complete.

Majority of the participants were in the family primary care track (75.9%), most were not enrolled in the HIV specialization track (79.6%), and half of the participants had not completed any semesters of clinical (Appendix J). All data analysis was conducted on SPSS Statistics program and nonparametric statistics were used because results were not normally distributed.

Results

The mean pre post test score was 11.31 out of 20 (56.55%); the lowest score was 4 out of 20 (20%) and the highest score was 20 out of 20 (100%) with a standard deviation of 3.612. The mean post test score was 15.37 out of 20 (76.85%); the lowest score was 5 out of 20 (25%) and highest score was 20 out of 20 (100%) with a standard deviation 3.466 (Appendix K).

A Wilcoxon signed ranked test was conducted to compare pre and post test scores because of skewed post test scores. Data analysis showed that post test scores statistically improved from pre test scores after viewing the education modules (p=0.000).

Mann-Whitney analysis test was conducted to assess a difference in score between participants in the family primary care track and participants in the adult-gerontology track. No statistical difference was found between these two groups on either the pre or post test scores (p=0.135 and p=0.439 respectively).

Mann-Whitney analysis test was conducted to assess a difference in pre and post test scores for participants in the HIV specialization track and participants who are not. Participants in the HIV specialization track had statistically higher scores on the pre test than participants not in the track (p=0.044). However, this statistical difference was not found in the post test scores (p=0.430).

A Spearman's Rho correlation test was conducted to assess if more clinical semesters completed correlated to higher pre and post test scores. A moderately strong correlation was found in the pre test that participants who completed more semesters of clinicals had higher pre test scores (r_s=0.490, p=0.000). However, no correlation was found in the post test scores (p=0.673).

Discussion

Participants' post test score did statistically improve compared to pre test scores after viewing the education modules. The education modules did improve baseline knowledge about the recommended vaccines for PLWH. Participants enrolled in the HIV specialization track had statistically higher pre test scores than participants who were not. A correlation was found that participants who completed more semesters of clinical had statically higher pre test scores. However, both of these attributes did not contribute to statistically higher post test scores.

Participants in the HIV specialization track were most likely exposed to vaccine knowledge for PLWH earlier in their education and had more knowledge than the other

participants thus leading to higher pre test scores. This can also be seen in participants who had more clinical experience; more clinical semesters completed meant more exposure to vaccines. However, this was not seen in the post test scores; neither being in the HIV track nor completing more clinical semesters had a statistical impact. Most likely because all participants viewed the same education modules, acquired the same set of knowledge about the recommended vaccines for PLWH which equalized knowledge across all participants.

This project did have its limitations; it was a convenience sample of only family and adult-gerontology primary care nurse practitioner students at one specific university. Results can not be generalized across all advanced practice nurse practitioner students or other types of participants. Time was another limitation as the project was available for only 9 days which decreased the amount of time for more participant recruitment.

Implications for Clinical Practice

Participants of this study can use the knowledge they gained from the education modules towards their future practice and patients. Participants are now aware that PLWH need certain vaccines because of their immunocompromised state. They can immunize their future patients according to the recommended guidelines. They will also be able to educate their patients about the importance of each vaccine, the disease each one prevents, and its contraindications.

Implications for Healthcare Policy

The literature review has stated that both providers and patients mentioned finance as a barrier to either giving or getting vaccines. This project increased the knowledge and awareness about the importance of each vaccine in PLWH which can lead to changes in healthcare policy. Vaccinations are important in protecting this immunocompromised population and policies need

be changed to cover all the recommended vaccines especially in an era of anti-vaccine sentiments and decreased herd immunity.

Implications for Quality and Safety

Quality and safety can be improved by increasing vaccination rates in PLWH which will increase immune response against VPDs. PLWH need to be vaccinated so quality of life can be preserved. Vaccines will ensure they have the necessary antibodies to combat future diseases. It is also a safeguard of their health in an era of vaccine resistance.

Implications for Education

Education modules in a video and audio format are an appropriate method to delivering information that departs from the didactic lecture style. The education modules will be available through Rutgers for CEUs for the next 2 years. The original PowerPoint files will be available for the Center for Professional Development and changes can be made to the original files if guidelines should change. The educational modules can also be incorporated into the Rutgers' HIV curriculum.

Plans for Future Scholarship

Results from this project will be submitted in an abstract to various peer reviewed journals for publications. The poster can also be submitted to future conferences for presentation opportunities. This project will be available to other students, faculty members, and providers to increase knowledge about the recommended vaccines for PLWH.

Conclusion

PLWH are immunocompromised and need to be vaccinated against VPDs according to current guidelines. Two facilitators identified that can increase vaccination rates is increasing provider knowledge about the different vaccines recommended for PLWH and increase

discussion about these vaccines. The education modules did increase knowledge in participants about the different recommended vaccines for PLWH. Increased knowledge can lead to educating patients about the importance of vaccines and thus immunizing this immunocompromised population.

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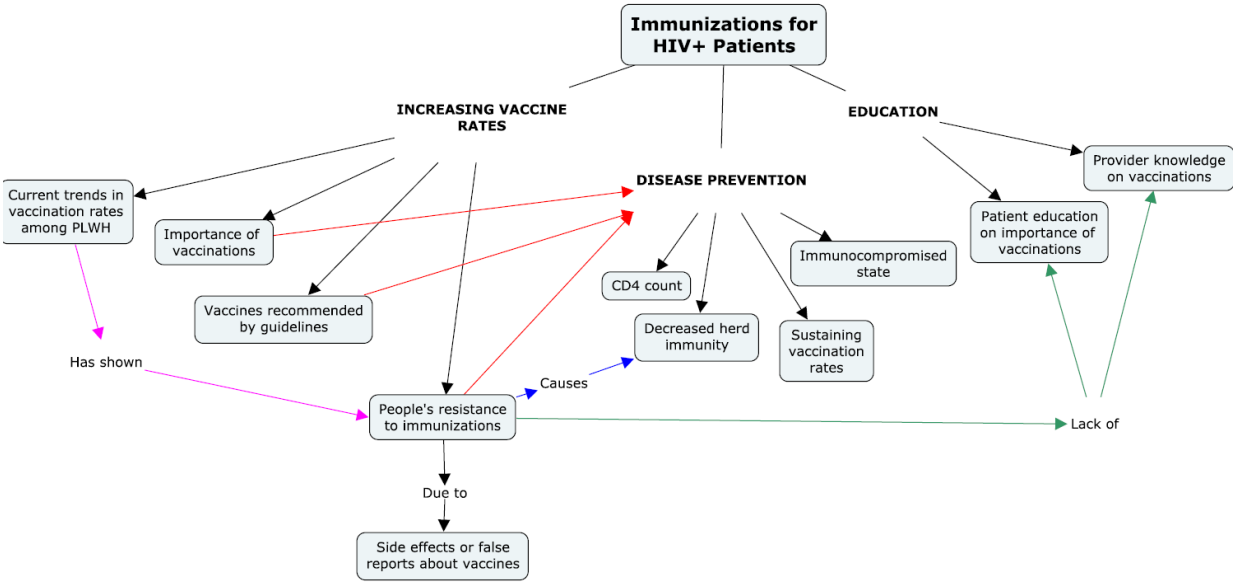
Appendix A

Concept Map



Appendix B

Evidence Table

Author & Date	Evidence Type	Sample, Sample Size, Setting	Study findings that help answer the EBP Question	Limitations	Evidence Level & Quality
Panel on Opportunistic Infections in HIV-Infected Adults and Adolescents (2018)	Clinical Practice Guidelines	n/a	These are the recommended vaccinations for adults and adolescents who are HIV positive.	n/a	-Level IV -High Quality
United States Vaccination Trends					
Author & Date	**Evidence Type**	**Sample, Sample Size, Setting**	**Study findings that help answer the EBP Question**	**Limitations**	**Evidence Level & Quality**
Lu, O'Halloran, Williams, et al. (2017)	Cross Sectional Study (Telephone Survey)	Assessed shingles vaccination rates for adults ≥60 years	-n= 208,505; 3,486 declined -National: 31.8% -NJ: n=4,960; 22.5%	-Self reported data	-Level III -High quality
Williams et al. (2017)	Cross Sectional Study (National Survey)	National Health Interview Survey (NHIS) of U.S. non-institutionalized civilian households in 2015	-Influenza: adults at or older than 19 was at 44.8% which is a 1.6% increase from 2013-2014 (Healthy People 2020 target 70%)	-Self reported vaccinations -Did not include military or incarcerated individuals	-Level III -Good quality

			-Pneumococcal between 19-64: 23.0%, 2.8% increase -≥65 years old: 63.6%, similar to 2014 (HP 2020: 19-64: 60%; ≥65: 90%) -Tetanus: ≥19 years old 61.6%, 19-49 62.1%, 50-64 64.1%, ≥65 56.9%; no changes in any age group compared to prior year -HAV: ≥19 9.0%, 19-49 12.3%, ≥50 5.5%; no changes; higher in people who travel -HBV: ≥19 24.6%, 19-49 32.0%, ≥50 16.5%; no change -HZ: ≥60 30.6%, 2.7% point increase (HP 2020: 30%) -HPV: women: 19-26 41.6% at least 1 of the vaccines, no change; men: 19-26 10.1%, at least 1 vaccine, no change	-55.2% response rate	
HIV Vaccination Rates					
Author & Date	**Evidence Type**	**Sample, Sample Size, Setting**	**Study findings that help answer the EBP Question**	**Limitations**	**Evidence Level & Quality**
Hoover et al. (2012)	Retrospective Chart Review	Medical records reviewed for hepatitis testing of HIV+ patients between	-Only 42% were screened for hepatitis A; 84% were susceptible but only 29%	-This research was done at an HIV clinic so cannot be	-Level III -Good quality

		2004-2007; n=1329 patients' charts; 8 large HIV clinics in different cities (Atlanta, Chicago, Los Angeles, Miami, New York, and San Francisco)	received hepatitis A vaccine. -52% screened for hepatitis B; 82% found susceptible but only 25% vaccinated -54% screened for hepatitis C	generalized to at risk population -New electronic record might not indicate immunity or previous vaccinations if patients never provided that information	
Marcus D. Durham et al. (2011)	Observational Cohort Study (chart review)	Cohort of HIV+ patient from eight different clinics in six U.S. cities and limited to patients seen between 7/1/1999-6/30/2008.	-n=5,365 -66% received at least 1 flu vaccine in 4.1years -Annual influenza rate ranged between 25.8-43.3% -Average: 35% received influenza (high risk goal: 60%)	-Could have been vaccinated elsewhere -Chart only reviewed for 8 HIV specific clinics -Majority of demographic were white MSM so not generalizable	-Level III -Good quality
Marcus D Durham et al. (2014)	Observational Cohort Study (chart review)	Further investigation of previous study from 7/1/1999-6/30/2013	-n=6,548 -Annual influenza rate ranged between 26.4-50.9% -Average: 38.7% -Highest rate of vaccination seen during 2009-2010 season	-See above	-Level III -Good quality
Weiser et al. (2018)	Cross Sectional Study	The Medical Monitoring Project (MMP) is a national surveillance system for PLWH. Data collection conducted by telephone, face-to-face, and chart	-n=18,089 -44.2% had no documentation of vaccination, immunity, or infection in medical record at the beginning of study (candidates for vaccination) for HBV vaccine	-No information from outside facilities where patients might receive care	-Level III -Good quality

		review between June 2009-May 2013.	-9.6% (n=783) initiated vaccination -7.5% not vaccinated but had new documentation of HBV immunity/infection -82.9% (n=6,542) not vaccinated nor showed immunity		
Barriers to Vaccination					
Author & Date	**Evidence Type**	**Sample, Sample Size, Setting**	**Study findings that help answer the EBP Question**	**Limitations**	**Evidence Level & Quality**
Aziz et al. (2013)	Survey	HIV health care providers (HCP); n= 1700 (only 336 returned survey); continuing medical education (CME) listserve 2008	-Survey assessed for provider knowledge, attitude, and practice about herpes zoster (HZ) -HCPs had poor knowledge about increased incidence of HZ in HIV+ patients and immune protection -Most HCPs agreed that HZ was diagnosed more in HIV+ patients and that it is a serious disease; however, only 67.5% felt that the vaccine helped reduce incidence and 75% did not currently vaccinate regardless of ART -Barriers to HZ vaccination include safety concerns, vaccine ineffectiveness, and possible dissemination	-Low response rate -Responses are self-reported instead of observed -Not generalizable to all HIV HCPs	-Level III -Low quality

Eaton et al. (2015)	Cost Analysis	Cost analysis was done for Gardasil, Prevnar, and Zostavax at an HIV Ryan White clinic in US in 2013. This Alabama clinic deferred Gardasil and Prevnar due to cost. Any patient that was considered eligible for these vaccines were included in cost analysis.	-(Vaccine price + administering fee) – (insurance reimbursement) -Highly variable reimbursement rates -Prevnar most costly will a loss of $60, 691 -Scenario included the recommended uptake of all 3 vaccines: loss of $44,119 for initial time and then $20,440 for subsequent years -Ryan Funding for reimbursement of uninsured: loss of $62,326 -Cost is an issue across all providers	-Study only done at one site in Alabama -Insurances differ state to state	-Level III -High quality
Hurley et al. (2014)	Cross Sectional Study (surveyed primary care physicians)	Survey sent to primary care physicians between 3/2012-6/2012 about their perspectives about adult vaccines.	-n=352 for general internists -n=255 for family medicine -97% assessed for vaccination status at annual visits -Family physicians more likely to assess for HAV, HBV, MMR, HPV, meningococcal, and varicella vaccines than general internists -Financial barriers were the biggest barriers to vaccination	-Self reported practice -Not generalizable to all primary care physicians	-Level III -Good quality

			-Most common reason for referring patients some place to receive vaccines was either insurance did not cover it or there would be inadequate reimbursement -Majority of providers agreed that primary care physicians should be responsible for patients receiving recommended vaccines		
Hurley et al. (2017)	Cross Sectional Study (Survey)	Surveys sent to primary care physicians to assess how many vaccinations were deferred because of cost, how satisfied they were of payment, knowledge of Medicare coverage, and awareness of vaccine specific provisions between 6/2013-10/2013	-n=317 (72%) general internists -n=236 (59%) family physicians -More than 1/3 said they sometimes or frequently do not recommend vaccines if they though insurance would not cover -Nearly 1/4 would not recommend a vaccine if they thought the patient could not afford it	-Low response rate in family physicians -Self reported practice	-Level V -Good quality
Hurley et al. (2018)	Cross Sectional Study (surveyed primary	Survey sent to general internists and family physicians from 12/2015-1/2016 to assess knowledge and barriers to adult	-n=617 (66% response rate) -95% or more of all respondents stated they assessed for and recommended the pneumococcal vaccines	-Generated from primary care physicians from American College of Physicians and	-Level III -Good quality

	care physicians)	pneumococcal vaccines	-28% reported that the current recommendations were somewhat unclear or even difficult -Less knowledgeable about vaccine recommendations for at risk adults <65 years old -54% correctly identified interval for adults ≥65 -Top barriers to giving pneumococcal vaccines were financial concerns and determining patient's vaccination history	American Academy of Family Physicians -Self reported practice	
Lu, O'Hallora n, Kennedy, et al. (2017)	Cross Sectional Study (internet panel survey)	Assessed the awareness of VPDs, their correlating vaccines, and self reported vaccination status conducted between February 27-March 23, 2015.	-n=2,683; response rate: 67% -5.5% cost as a barrier -5.2% insurance did not cover -37.5% of adults 19-64 with high risk immunized with pneumococcal -Participants more familiar with vaccines for influenza, HPV, and Td/Tdap -Lower for pneumococcal, HBV, and HZ	-Self reported data -Not accessible by those without an internet access	-Level III -Good quality
Lu et al. (2015)	Cross Sectional Study (NHIS	One adult was randomly selected in each household for questioning.	-Influenza ≥18 (non insured vs insured) 14.4% vs 44.3% -PPSV: 18-64 with high risk: 9.8% vs 23.0% -Td ≥18: 53.2% vs 64.5%	-61.2% response rate -Self reported -Most participants in this study were insured	-Level III -Good quality

	2012 data used)		-Tdap: ≥18: 8.4% vs 15.7% -HAV: 18-49 that travel: 16.6% vs 19.8% -HBV 18-49: 27.5% vs 38.0% -Shingles ≥60: 6.1% vs 20.8% -HPV women 18-26: 20.9%vs 39.8% -Those with regular physician more likely to have received recommended vaccines		
Montag Schafer & Reidt (2016)	Cross Sectional Study (Survey)	Surveyed geriatric providers about knowledge and barriers to HZ vaccine. Survey distributed to HCP and geriatricians at Extended Care Department of Hennepin County Medical Center.	-6/10 stated vaccine not stocked at their practice -5/10 referred patients to an outside pharmacy for administration -4/10 identified reimbursement and storage as a barrier -8/10 did NOT perceive safety and effectiveness as a barrier -7/10 did NOT see obtaining the vaccine as a barrier -5/9 unsure how reimbursement worked -6/9 were likely to recommend the vaccine	-Response rate 58% (10/17) -Only surveyed one specific county	-Level III -Low quality

Nowak et al. (2015)	Qualitative Meta-Analysis	29 unpublished studies were analyzed over a 14 year span about knowledge, attitude, and beliefs (KAB) relating to the flu vaccine. Research was conducted by the Health Communication Science Office in the CDC.	-Many knew about the flu vaccine, knew its disease course, aware of the vaccine but did not believe the vaccination period pertained to them -Facilitators to flu vaccine: 1. Believing flu is a serious health risk; 2. Prevention against a severe form of flu; 3. Increased age and +chronic health conditions increased rate; 4. HCP recommendation (rely on HCP for information and guidance- 65% did NOT have a HCP talk about the vaccine with them); 5. Experienced the flu; 6. Convenience (if vaccine available then will vaccinate); 7. Promotion through messages, reminders, advertising media (Provider want information about vaccine administration and safety) -Barriers: 1. Not susceptible (both consumer and provider); 2. Did not feel recommendations applied to them; 3. Flu vaccine not effective; 4. Adverse effects	-Qualitative and might not reflect general population -Only pertaining to KAB for flu vaccine	-Level V -High quality

			from the vaccine; 5. Other measures were more effective than the vaccine; 6. Personal experience with flu (able to fight it off) -HCP: 1. Was not aware the importance of vaccines in high risk populations; 2. Saw flu as a manageable disease; 3. Did not see themselves as possible spreader of flu		
Facilitators of Increasing Vaccination Rates					
Author & Date	**Evidence Type**	**Sample, Sample Size, Setting**	**Study findings that help answer the EBP Question**	**Limitations**	**Evidence Level & Quality**
Rhodes et al. (2017)	Cohort Study	Examined 12 HIV quality indicators by comparing ID specialist only, generalist only, or ID specialist and generalist	-n=1,565 -ID and generalist group achieved higher quality measures in immunizations -All groups improved in HIV quality indicators rates compared to previous reports	-Cannot be generalized to the populations because HIV is a specific care management	-Level III -Good quality
Suryadevara et al. (2014)	Cross Sectional Study (surveyed families)	Families were surveyed that accessed services at the Golisano Children's Hospital in Rochester, New York between 12/2013-4/2014 about the pertussis vaccine.	-n=864 families surveyed -298 stated their PMD recommended Tdap while 455 said their PMD discussed the Tdap vaccine -711 stated physicians were the #1 source for information about the vaccine	-Only one specific hospital so not generalizable -Only surveyed families who had children -Most of the participants were female (88%)	-Level III -Good quality

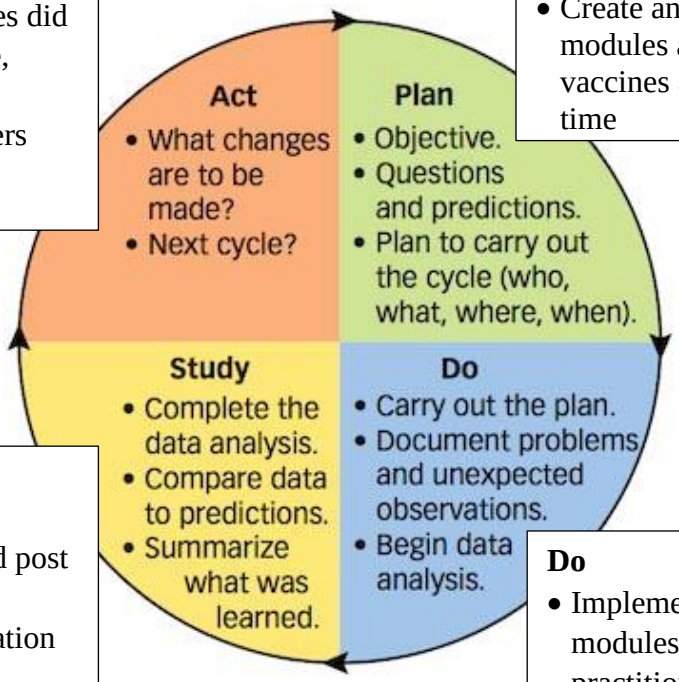
			-759 received their vaccine at the doctor's office -Talking with physicians about Tdap increased uptake and knowledge about the disease		
Wheldon et al. (2017)	Cross Sectional Study (mailed questionnaire)	Surveyed pediatric and family medicine physicians to assess degree which they discuss sexual orientation and HPV vaccination in men 22-26 years old.	-n=770 (51% responded) -Only 13.6% discussed sexual orientation and HPV vaccination -24.5% discussed neither -60.5% stated they discussed one or the other -Physicians that discussed both (high potential group) had more knowledge about HPV when compared to physicians who did neither	-Response rate 51% -Did not assess if physicians were uncomfortable with asking about sexual orientation	-Level III -Good quality

Appendix C

Plan-Do-Study-Act Cycle

Plan
- Objective: To increase knowledge about the recommended vaccines for PLWH
- Create pre and post test module to measure outcome
- Create an educational modules about the different vaccines and administration time

Act
- Disseminate results found in this project
- If education modules did increase knowledge, incorporate into the curriculum at Rutgers University



Study
- Perform statistical analysis on pre and post test scores
- Assess if the education module increase knowledge

Do
- Implement the education modules in nurse practitioner students at Rutgers University
- Document issues with data collecting process
- Collect pre-test and post test scores

(Google Image, 2018)

Appendix D

Flyer for Recruitment

Vaccines: Give Them a Shot

This research will assess the baseline knowledge about recommended vaccines for people living with HIV (PLWH). The intervention will be education modules presented in a video format between a mock provider and a patient that discusses each vaccines available on Canvas. Information discussed will include vaccine indications, contraindications, and schedule. A post test will be given after to assess if the education modules increased knowledge about these vaccines.

Eligibility: Currently enrolled at Rutgers University as a family or adult-gero nurse practitioner student in the primary care track

Location: Canvas platform through Rutgers University

Time Commitment and Benefits: Approximately 30 minutes and pending 0.5 CEUs

Contact Information:

Mung (Susie) Lo

Susiel13@sn.rutgers.edu

Appendix E

Consent Process Document

CONSENT TO TAKE PART IN A RESEARCH STUDY

TITLE OF STUDY: Vaccines: Give Them a Shot
Principal Investigator: Mung Lo, BSN, RN, PCCN

This consent form is part of an informed consent process for a research study and it will provide information that will help you decide whether you want to take part in this study. It is your choice to take part or not. After all of your questions have been answered and you wish to take part in the research study, you will be asked to sign this consent form. You will be given a copy of the signed form to keep. Your alternative to taking part in the research is not to take part in it.

Who is conducting this research study and what is it about?
You are being asked to take part in research conducted by Mung Lo who is a Rutgers graduate student in the School of Nursing. The purpose of this study is to increase knowledge about the recommended vaccines for people living with HIV (PLWH).

What will I be asked to do if I take part?
The study will take about 1 hour to complete it. We anticipate approximately 80 subjects will take part in the study.

What are the risks and/or discomforts I might experience if I take part in the study?
There is no potential, immediate, or long term physical, psychological, social, financial, or reproductive risks involved in participating in this study. Personal information and identifiers will not be collected in this study. You can withdraw from the study at any time. If you decided to quit before you finish the study, your answer will NOT be recorded.

Are there any benefits to me if I choose to take part in this study?
There no direct benefits to you for taking part in this research. You will be contributing to knowledge about all the recommended vaccines for people living with HIV.

Will I be paid to take part in this study?
You will not be paid to take part in this study.

How will information about me be kept private or confidential?
All efforts will be made to keep your responses confidential. We will use the electronic Canvas platform to collect information regarding the study which include demographic information, pre-test scores, post test scores, and evaluation survey. Data collected will be sent to the Center for Professional Development and returned to the primary investigator in a spreadsheet format. The data is held at the Center for Professional Development for 6 years and destroyed after that time. We will not receive any information that can identify you or other subjects. Data from this study will be analyzed. Study findings are professionally presented or published after analysis is complete. No information that can identify you will appear in any professional presentation or publication

What will happen to information I provide in the research after the study is over?
The information collected about you for this research will not be used by or distributed to investigators for other research.

What will happen if I do not want to take part or decide later not to stay in the study?
Your participation is voluntary. If you choose to take part now, you may change your mind and withdraw later. If you do not proceed on to the post test after completing the modules, your responses will not be recorded. This study will not affect your course grade or status as a student. Professors will not be made aware of your participation or withdrawal from the study. However, once you submit, your responses cannot be withdrawn as we will not know which ones are yours.

Who can I call if I have questions?
If you have questions about taking part in this study, you can contact the Principal Investigator: Mung Lo, School of Nursing, susiel13@sn.rutgers.edu. You can also contact my faculty advisor: Dr. Thomas Loveless at tjl116@sn.rutgers.edu
If you have questions about your rights as a research subject, you can call the IRB Director at: Newark HealthSci (973)-972-3608 or the Rutgers Human Subjects Protection Program at (973) 972-1149 in Newark.

Please download or print out this consent form if you would like a copy of it for your files.

If you do not wish to take part in the research, you may exit the study at this time or select 'I Do Not Agree' on the next quiz.

If you do wish to take part in the research, please select 'I agree' after reading the following:

By beginning this research, I acknowledge that I am 18 years of age or older and have read and understand the information. I agree to take part in the research, with the knowledge that I am free to withdraw my participation in the research without penalty. Do you agree to participate in this study?

I Agree | I Do Not Agree

Appendix F

Demographic Information Obtained

1. Are you in the family or adult-gerontology primary care track?
    a. Family
    b. Adult-gerontology
2. Are you in the HIV specialization program at Rutgers University?
    a. Yes
    b. No
3. How many semesters of clinicals have you completed?
    a. 0 (zero)
    b. 1-2
    c. 3-4
    d. >4

Appendix G

Pre and Post Test Questions

1. Mark is a 40 year old male newly diagnosed with HIV. His CD4 count is 196, viral load is 40,000. Which of the following vaccines are contraindicated at this time?
    a. Annual influenza vaccine
    b. **MMR**
    c. Meningococcal vaccine
    d. Hepatitis A vaccine
    e. **Varicella vaccine**
    f. **Zostavax (Herpes zoster vaccine)**
2. Dan received Prevnar 13 on 1/2/2018. What is the time schedule for Pneumovax 23?
    a. 2 weeks later and 2 years later
    b. 6 months later and 2 years later
    c. **8 weeks later and 5 years later**
    d. 6 weeks later and 5 years later
3. Which of the following are indications to give PLWH the hepatitis A vaccine?
    a. IV drug use
    b. Chronic liver disease
    c. Traveler
    d. MSM
    e. **All of the above**
4. Which of the following are considered valid proof of immunity against MMR? Select ALL that apply.

a. **Patient was born before 1957**

b. Patient states he has received the vaccine.

c. **Laboratory evidence of immunity**

d. **Patient has documentation of receiving the vaccine**

e. Patient is a healthcare worker

5. Donna received her Pneumovax 23 on 2/3/2017. When can she receive Prevnar 13?

a. 4/3/2017

b. **2/3/2018**

c. 8/3/2018

d. 2/3/2022

6. What is the age limit and vaccine schedule for the human papillomavirus vaccine?

a. **Up to 26 years of age and at 0 month, 1-2 months, and 6 months**

b. Up to 18 years of age and at 0 month, 2 months, and 12 months

c. Up to 25 years of age and at 0 month, 1 month, and 5 months

d. Up to 21 years of age and at 0 month, 2 months, and 6 months

7. Which of the following is <u>NOT</u> a method of verifying varicella immunity?

a. Documented receipt of the 2 dose varicella vaccines

b. Born in the United States before 1980

c. **Patient states he had chickenpox as a child**

d. Healthcare provider diagnosis of varicella or zoster

e. Laboratory evidence of immunity

8. What serogroups are covered by the primary series for meningococcal vaccine and how many months apart should the vaccine be given?

a. Serogroups A, B, W, and Y; 6 months apart

b. Serogroups B, C, W, and Y; 4 months apart

c. Serogroups A, B, W, and Y; 1 month apart

d. **Serogroups A, C, W, and Y; 2 months apart**

9. How often should PLWH be vaccinated for the meningococcal vaccine?

a. Every 3 years

b. **Every 5 years**

c. Every 7 years

d. Every 10 years

10. What levels should be done after a hepatitis B vaccine series is finished?

a. HBsAg (hepatitis B surface antigen)

b. Anti-HBc (total hepatitis core antibody)

c. **Anti-HBs (hepatitis B surface antibody)**

d. IgM anti-HBc (IgM antibody to hepatitis B core antigen)

11. The live-attenuated influenza vaccine is contraindicated for all PLWH. True or False?

a. **True**

b. False

12. How many years apart should two Pneumovax 23 vaccines be?

a. Every 3 years

b. **Every 5 years**

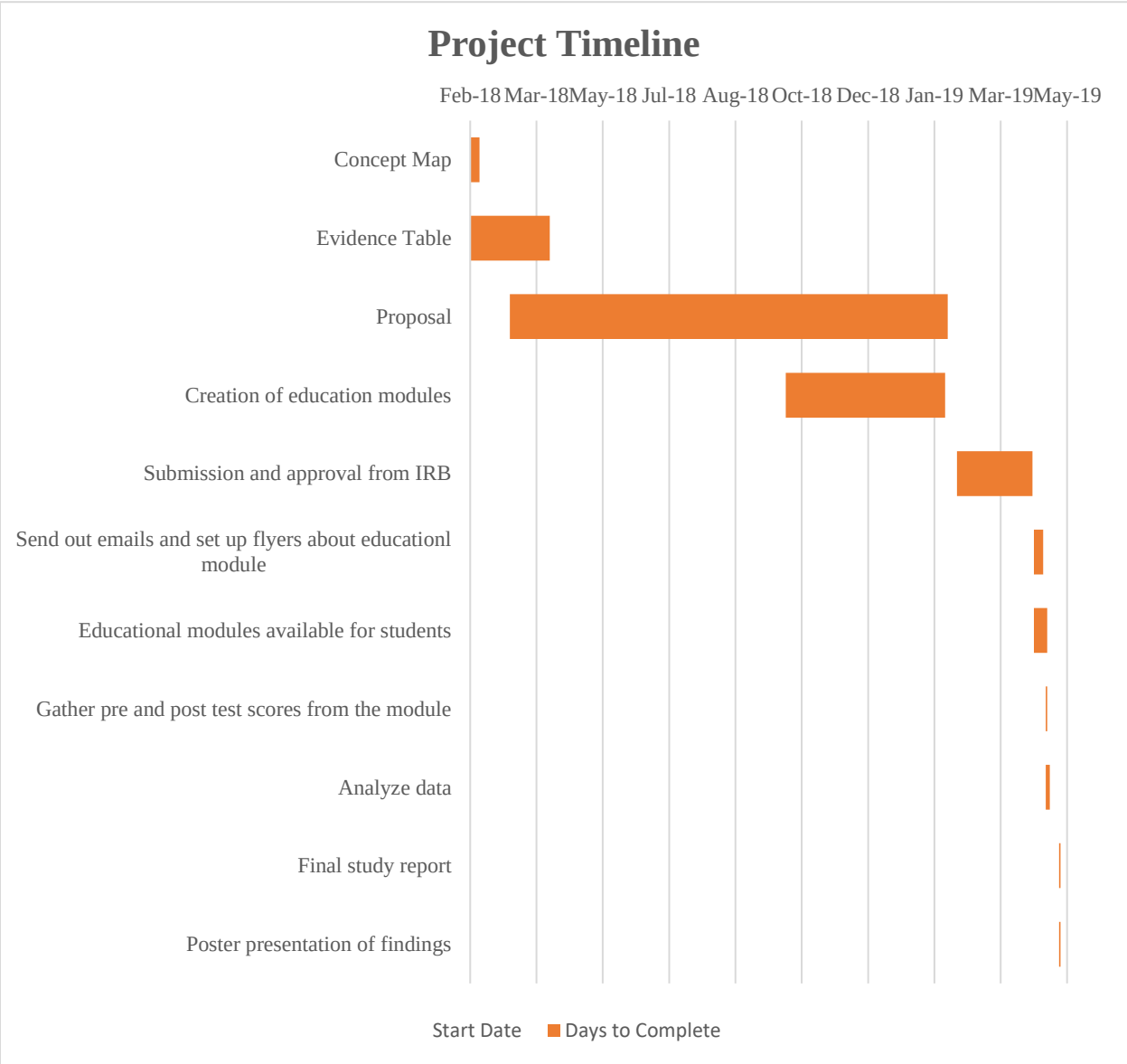
c. Every 7 years

d. Every 10 years

13. Jane has received her Tdap vaccine and wants to know how often she needs to receive the Td booster. What should the provider tell Jane?
    a. Every 3 years
    b. Every 5 years
    c. Every 7 years
    d. **Every 10 years**
14. CD4 count <200 is a contraindication to receiving Shingrix, true or false?
    a. True
    b. **False**
15. Which of the following is a contraindication to receiving the MMR vaccine? Select ALL that apply.
    a. **CD4 count <200**
    b. Fever after a previous dose of MMR
    c. **Life threatening reaction to neomycin**
    d. Allergy to bacitracin

Appendix H

Proposed Timeline



Appendix I

Evaluation Form

RUTGERS

Title: Vaccines: Give Them a Shot

Date

Activity Evaluation Form

To assist us in evaluating the effectiveness of this activity and to make recommendations for future educational offerings, please take a few moments to complete this evaluation form. Your response will help ensure that future programs are informative and meet the educational needs of all participants. **CE credit letters will only be issued upon receipt of this completed evaluation form.**

Please indicate your profession/background (check only one):

☐ MD/DO ☐ MSN/BSN/RN ☐ PA ☐ APN/NP ☐ Resident/Fellow
☐ PharmD/RPh ☐ Researcher ☐ Administrator ☐ Student ☐ Other, specify
_____

Did you participate in this activity with other members of your interprofessional health care team?

☐ Yes ☐ No ☐ Not applicable

What was your primary motivation for participating in this activity? (Check one)

☐ Learn about advances in my field
☐ Acquire strategies to personally deal with patient problems or challenges
☐ Obtain information to address areas of patient care within my team, department or institution that are in need of improvement
☐ Meet continuing education requirements of my employer/specialty board/licensing board
☐ Other; specify _____

LEARNING OBJECTIVES

Having completed this activity, are you better able to	**Strongly Agree**				**Strongly Disagree**
Understand the need for vaccines in an immunocompromised population	5	4	3	2	1

Identify the recommended vaccines for PLWH	5	4	3	2	1
Educate PLWH about each vaccine and its associated diseases	5	4	3	2	1
Identify the different administration schedule for each vaccine	5	4	3	2	1
Use the knowledge gained from these educational modules to put into your clinical practice	5	4	3	2	1

If you do not feel confident that you can achieve the above objectives to some extent, please describe why not.

Based on the content of the activity, what will you do differently in the care of your patients and/or regarding your professional responsibilities? (Check one)

- ☐ Implement a change in my practice/workplace
- ☐ Seek additional information on this topic
- ☐ Implement a change in my practice/workplace and seek additional information on this topic
- ☐ Do nothing differently; Current practice/job responsibilities reflect activity recommendations
- ☐ Do nothing differently; Content was not convincing
- ☐ Do nothing differently; System barriers prevent me from changing my practice/workplace

If you anticipate changing one or more aspects of your practice and/or professional responsibilities, please briefly describe how you plan to do so.

What impact will this activity have on your interprofessional collaborative practice? (Check all that apply)

Having completed this activity, you are better able to:

- ☐ Work with individuals of other professions to maintain a climate of mutual respect and shared values
- ☐ Use the knowledge of your own role and those of other professions to appropriately assess and address the health care needs of patients

☐ Communicate with patients, families, health professionals in a manner that supporting a team approach to the maintenance of health prevention and treatment of disease

☐ Perform effectively on teams to plan, deliver, and evaluate patient/population-centered care

☐ Other: specify _____

☐ No impact; this activity did not address interprofessional collaborative practice

If you plan to change your practice and/or professional responsibilities, may we contact you in 2 months to see how you are progressing?

☐ Yes. Please provide your email address

_____

☐ No

☐ I don't plan to make a change.

OVERALL EVALUATION	**Strongly Agree**				**Strongly Disagree**
This education:					
Increased my understanding of the subject	5	4	3	2	1
Will help me collaborate with other health care professionals to improve patient outcomes	5	4	3	2	1
Was evidence based and scientifically balanced	5	4	3	2	1
Was free of commercial bias or influence	5	4	3	2	1
Met my expectations	5	4	3	2	1

What issues are you experiencing in your practice and/or professional responsibilities that could be addressed in future programming?

Please provide additional comments pertaining to this activity and any suggestions for improvement.

If you requested ADA accommodations, were they met to your satisfaction?

- ☐ Not applicable
- ☐ Yes
- ☐ No; please explain:

Appendix J

Demographic Survey Results (n=54)

Are you in the family or adult-gerontology primary care track?

Family: 41 (75.9%)
Adult-Gerontology: 13 (24.1%)

Are you in the HIV specialization program at Rutgers University?

Yes: 11 (20.4%)
No: 43 (79.6%)

How many semesters of clinicals have you completed?

0 (zero): 27 (50%)
1-2: 10 (18.5%)
3-4: 10 (18.5%)
>4: 7 (13%)

Appendix K

Pre and Post Test Scores

	Minimum	Maximum	Mean	Standard Deviation
Pre Test Score	4 (20%)	20 (100%)	11.31 (56.55%)	3.612
Post Test Score	5 (25%)	20 (100%)	15.37 (76.85%)	3.466