

SHINGRIX EDUCATION FOR PROVIDERS

A Scholarly Project

Submitted to the

Faculty of Liberty University

In partial fulfillment of

The requirements for the degree

Of Doctor of Nursing Practice

By

Lindsey Hanks Buzzeo

Liberty University

Lynchburg, VA

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ABSTRACT

Shingles is a prevalent disease within the overall population, and incidence in North America continues to increase. Shingles is commonly found in older adults 60 years of age and older and can recur two or three times. Shingrix was released in 2017 as a recombinant vaccine for prevention of shingles. Despite its benefits, this vaccine has not been recommended by many prescribing providers. Research has shown that an effective education program improves attitudes and misconceptions related to vaccines and can increase prescribing rates. An education program was created to share with prescribing providers to improve overall knowledge and recommendation rates for the vaccine. This formal education program was designed for prescribing providers for review in a 30-minute seminar. To determine overall effectiveness, the program was piloted in a primary care office setting in Central Virginia. The program was found to increase overall knowledge and appeared to increase the likelihood of recommendation. This evidence-based practice project was consistent with established research indicating that when a prescribing provider is informed about a vaccine, he or she is more likely to discuss it with patients. Patients consider their prescribing provider's opinion seriously when making decisions about vaccines, including Shingrix.

Keywords: chickenpox, herpes zoster, immunization, recombinant zoster vaccine, shingles, Shingrix vaccination, varicella zoster virus, Zostavax, vaccine hesitancy, vaccine education

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List of Abbreviations

Centers for Disease Control (CDC)

Electronic Medical Record (EMR)

Evidence-Based Practice (EBP)

Human Papilloma Virus (HPV)

Institutional Review Board (IRB)

Postherpetic Neuralgia (PHN)

Randomized Controlled Trial (RCT)

Varicella Zoster Virus (VZV)

SECTION ONE: INTRODUCTION

Shingles is a prevalent disease that is caused by the herpes zoster virus (Bresse et al., 2013). This condition typically presents with symptoms of blistering rash, localized pain, numbness, localized burning, and itching. Patients may also present with headache, nausea, and chills (Bresse et al., 2013). This disease occurs in 2 to 4.6 cases per 1,000 individuals in patients ages 50–79 and 10 to 12.8 cases per 1,000 individuals in patients 80 years and older.

Postherpetic neuralgia (PHN) is a common complication of shingles. Among those who are diagnosed with shingles, 20% of patients 60 to 65 years of age and 30% of patients older than 80 years of age are diagnosed with PHN. The Shingrix vaccine is a new, attenuated (weaker) immunization that offers protection against the shingles virus (Chan et al., 2018). Prior to Food and Drug Administration approval on October 23, 2017, the live vaccine Zostavax was the best prevention against shingles (GlaxoSmithKline, 2017). Shingrix is more than 90% effective in preventing shingles and PNH in all populations and poses less risk than the live immunization, Zostavax (Bharucha, Ming, & Breuer, 2017).

This vaccine is a priority for providers to be educated about because it was released for public use less than two years ago (GlaxoSmithKline, 2017). Due to its recent release, many patients are not aware of the immunization. In addition, providers are less likely to recommend the vaccine because of time constraints during wellness visits. Providers may not have previously researched the vaccine and therefore may not feel comfortable recommending it. Another issue that may result in provider hesitancy to recommend the Shingrix vaccine is the cost. According to GoodRx (2018), the average price of the Shingrix vaccine is approximately \$184.71. The vaccination is given in a two-dose series two to six months apart, and the total cost of the Shingrix vaccine is \$381.67 (GoodRx, 2018). Many insurance companies were previously

not covering the vaccine, but recent changes have led to coverage by almost all commercial insurances (Centers for Disease Control [CDC], 2018).

Although this vaccine is effective at protecting individuals from disease, compliance rates for Shingrix are low. Since the Shingrix immunization was newly released in 2017, it is possible that patients are unaware that they can have greater protection against the shingles virus. The purpose of this scholarly project was to educate health care providers on the benefits of the new Shingrix vaccine and increase vaccine recommendations to their patients.

Background

The prevalence of shingles is approximately 30% of the population, and 10% of these individuals will develop PHN (Friesen, Chateau, Falk, Alessi-Severini, & Bugden, 2017). The incidence in North America is between three and five people per 1,000 yearly (Kawai, Gebremeskel, & Acosta, 2014). The incidence for patients age 60 and older is 10 per 1,000 individuals. Herpes zoster can also recur in second or third episodes, but the incidence for these occurrences is unknown (CDC, 2018). One to four percent of individuals are hospitalized related to complications, and 96 deaths per year have herpes zoster designated as the cause. Herpes zoster rates have been increasing gradually over time (CDC, 2018). While a specific factor has not been directly linked to the increase, a consideration is the introduction of the varicella (chickenpox) vaccine. Some cohorts may experience an increase in shingles due to the varicella vaccine (Rafferty, McDonald, Qian, Osgood, & Doroshenko, 2018). However, most countries have indicated an increase regardless of varicella immunization compliance (Rafferty et al., 2018).

Varicella zoster virus (VZV) can be spread through direct contact when an infected individual has active lesions. In addition, hospital protocol requires airborne precautions for

immunocompromised individuals and disseminated infections to prevent airborne transmission. The lesions are infectious until they are dry and crusted over (CDC, 2018). This allows transmission to individuals without previous exposure to VZV to become infected. These individuals can present with a varicella outbreak following this exposure, which then can emerge as herpes zoster during reactivation. Individuals who have been infected with VZV or who have been vaccinated for varicella could develop this condition (CDC, 2018). Those who have active lesions are advised to limit contact with others until they are dry to prevent transmission.

The most significant risk factor for shingles is previous exposure to VZV. Currently in the United States, 99.5% of individuals 40 years of age and older have been exposed to the virus, making them more likely to develop shingles (CDC, 2018). Risk also increases as immunity to the virus declines and could be related to aging, immunodeficiency, immunosuppression, or current medications (CDC, 2018). Immunosuppression and immunodeficiency may occur due to leukemia, lymphoma, a bone marrow transplant, HIV, medications including steroids, or chemotherapy. An individual over the age of 50 is more likely to develop shingles, and risk continues to increase with aging. Studies have shown that women are more likely to develop this condition than men. In addition, individuals who are Caucasian are more likely to develop herpes zoster than those who are African American (CDC, 2018).

When VZV initially enters the body, it has an impact on the sensory neurons and skin. The virus then becomes latent in the neuronal ganglia and stays in the ganglia permanently (Friesen et al., 2017). The virus typically reactivates in a single ganglion, classically causing moderate to severe pain and a maculopapular rash that follows along the dermatome (Friesen et al., 2017). The rash typically appears with vesicles over the course of three to five days and then begins to dry and crust over within two to four weeks (CDC, 2018). The rash may also present

in a second nearby dermatome, and the most common area of appearance is the thoracic dermatome (CDC, 2018). Typically, the rash does not cross midline; however, some individuals may develop a more diffuse rash impacting three dermatomes or more. In addition to pain, a patient may complain of itchiness or a tingly sensation at the site. Patients may also admit generalized malaise, headache, and photophobia during the prodrome of the virus (CDC, 2018).

A mild complication of scarring or darkened pigmentation at the area of the rash may occur (CDC, 2018). The most common complication, which impacts 10% of individuals who are diagnosed with herpes zoster, is PHN (Friesen et al., 2017). PHN is a pain syndrome that persists after herpes zoster has resolved due to inflammation or virus-induced nerve damage (Friesen et al, 2017). Other complications that may occur include ophthalmic involvement accompanied by acute or chronic ocular sequelae, bacterial infection of lesions, cranial and peripheral nerve palsies, and, in severe cases, visceral involvement (CDC, 2018).

Prior to the introduction of the Shingrix vaccine, Zostavax was recommended by the CDC for protection against herpes zoster (CDC, 2018). It is administered to patients 50 years of age and older (MerckVaccines, 2018). It contains a live-attenuated VZV, or a weaker version of the virus, to expose the patient's body to the virus and result in the manufacturing of specific antibodies. It is given as a single dose subcutaneously. It has a large side effect profile and cannot be given to those who are pregnant or immunocompromised (MerckVaccines, 2018).

Shingrix is a recombinant vaccine that is given intramuscularly in two doses two to six months apart (Deshpande, 2018). Each dose is a 0.5 mL injection (Deshpande, 2018). Patients that are recommended to receive the vaccine are older than 50 years of age (CDC, 2018). Patients who have had shingles in the past are encouraged to receive the vaccination as soon as possible, as long as the acute infection has resolved. One dose allows protection for life.

Patients should still receive Shingrix even if they have received Zostavax in the past. Common side effects associated with the immunization include redness and edema at the injection site (CDC, 2018). Other side effects that are associated with Shingrix include fatigue, muscle aches, headache, chills, fever, stomach pain or nausea. The vaccine should not be administered if the patient has ever had a severe allergic reaction such as anaphylaxis to a component of the vaccine or the initial dose of Shingrix. Severe allergic reactions are uncommon and may present as symptoms including hives, facial swelling, increased heart rate, dizziness, and weakness (CDC, 2018).

Problem Statement

According to the CDC (2018), Shingrix is more than 90% effective at preventing shingles and long-term nerve pain. Despite the promising benefits of the new vaccine, many health care providers are failing to routinely recommend vaccines to their patients. Patients have stated if their provider discussed the immunization with them, they would be more likely to receive it (Ridda, MacIntyre, & Lindley, 2009). Targeted interventions focusing on education for medical providers with prescriptive authority has led to increased knowledge and improved vaccination rates for patients (Ridda et al., 2009).

Purpose of the Project

The purpose of this project was to educate health care providers in a Central Virginia internal medicine practice about the new Shingrix vaccine and increase recommendation of the vaccine to their patients as a result. By assessing knowledge before and after the educational program, the project coordinator determined the impact of the educational program. In addition, the project coordinator was planning to utilize a pre- and post-education chart review to assess

provider recommendations of the vaccine. Due to unexpected factors, the project coordinator was unable to collect this data.

Clinical Question

The clinical question was, “Does a Shingrix education program for health care providers in a Central Virginia internal medicine practice, vs no formal education program, lead to increased overall knowledge for prescribing practitioners and increased recommendations for patient vaccination?”

SECTION TWO: LITERATURE REVIEW

Search Strategy

An extensive search of the literature has been performed using the “search anything” tool bar on the Liberty University Library page. Due to the vast number of articles related to this topic, the project coordinator needed to apply filters and search effective keywords (Moran, Burson, & Conrad, 2017). Key words utilized in article searches include *provider hesitancy*, *Shingrix*, *barriers to vaccination*, *vaccination education for providers*, *shingles vaccination*, and *immunization education*. Initially, thousands of articles were identified related to the topic of the shingles vaccine. Databases that were subsequently searched include PubMed, Ebsco, PubMed, and CINAHL. Articles that were not published within the last 10 years were omitted by the exclusion criteria. Other specific inclusion and exclusion criteria were not implemented, but mainly articles that focused on education for providers about vaccination were chosen. Articles about the Shingrix vaccine and its efficacy were also included to assist in development of the educational program and to support the need for providers to recommend the vaccination to their patients. Twenty-four articles were considered to support the implementation of the project.

Critical Appraisal

To ensure that the evidence supports the scholarly project, the articles have been critically appraised with Melnyk's system of hierarchy (University of Michigan Library, 2019). Articles have been analyzed systematically to consider level of evidence, strengths, and weaknesses of the evidence. The study sample, methodology, and results have also been considered (Rousch, 2015). The articles have been included that best support this scholarly project. A table of evidence has been included in Appendix A.

Clinical practice guidelines. A recombinant zoster vaccine (Shingrix) has been available in the US since 2017 and is recommended by the CDC and the Advisory Committee on Immunization Practices as the preferred shingles vaccine (CDC, 2018). Shingrix is recommended for healthy adults 50 years and older in a two-dose series separated by two to six months. The injection is given in the upper arm. The two doses of Shingrix are more than 90% effective in preventing shingles and PHN. Patients may receive the Shingrix vaccine even if they were previously vaccinated with Zostavax. Serologic testing to evaluate for the presence of previous varicella infection is not indicated prior to vaccination with Shingrix (CDC, 2018).

Systematic reviews. A systematic review is an analysis of all relevant randomized controlled trials (RCTs) and evidence-based clinical guidelines (Hall & Roussel, 2014). Systematic reviews were considered to support the need for immunization with the Shingrix vaccine. Bharucha et al. (2017) conducted a systematic review of three different studies which focus on the general population, the elderly, and HIV-infected individuals. The purpose of this study was to provide critical appraisal of current evidence regarding Hz/Su, or Shingrix. The results of this study state that "Shingrix is the preferred vaccine, over Zostavax (zoster vaccine live), a shingles vaccine in use since 2006" (Bharucha et al., 2017, p. 6). The study further

indicated vaccine efficacy for HZ/Su [Shingrix] for participants over 50 years of age appeared to decrease with time (Bharucha et al., 2017) from 96.6% at year 1 to 87.9% at year 4; however, the authors concluded that the difference was not statistically significant and longer-term studies are needed (Bharucha et al., 2017). In addition, Bharucha et al. (2017) stated that HZ/Su [Shingrix] appears to effectively protect against VZV.

Paterson et al. (2016) reviewed 185 articles about vaccine hesitancy among health care providers and the influence of their knowledge and vaccination behavior on their recommendations. The researchers found that knowledge about vaccines, including their efficacy and safety, helped to build health care providers' confidence in vaccines as well as their willingness to recommend vaccines to others (Paterson et al., 2016). Key recommendations from the study included more training or information support on vaccine risks and benefits, more patient communication tools for health care providers, and the strengthening of trust between health care providers and health authorities (Paterson et al., 2016).

Sadaf, Richards, Glanz, Salmon, and Omer (2013) conducted a systematic review of 25 studies to identify interventions for reducing parental vaccine refusal and vaccine hesitancy. The study found there was no evidence to support a specific intervention, but studies consistently supported that any type of educational intervention with providers had the ability to increase patient immunization (Sadaf et al., 2013).

Randomized controlled trials (RCTs). An RCT includes a randomized control group and randomized experimental group. The experimental group is exposed to an intervention, and impact of the intervention is compared to the control group (Hall & Roussel, 2014). Articles were considered that highlight the effectiveness of the vaccine and determine the impact of provider education on vaccination. In an RCT to determine the effectiveness of the Shingrix

vaccine in different age groups (older than 50 years and older than 70 years), the Shingrix vaccine was found to be effective for all patients 50 years of age and older and should be recommended by providers (Elliott & Chan, 2018). Another study discussed the efficacy of the Shingrix vaccine in which 29,000 subjects were studied globally to determine the effectiveness of the vaccine. The researchers concluded that the vaccine was more than 90% effective in all populations (Oakes, 2017). Another study conducted by GlaxoSmithKline determined that Shingrix indicated almost 70% efficacy in patients with a stem cell transplant. The purpose of this study was also to identify the effectiveness of the vaccine (“GSK Phase III Study,” 2017).

In another RCT, Krieger, Castorina, Walls, Weaver, and Ciske (2000) sought to determine the impact that additional education can have on vaccination rates. Participants were 65 years of age from a senior center. One group was given additional educational materials on the pneumonia vaccine. When comparing the groups, it was found that immunization rates increased as a result of pamphlets and other educational materials distributed to the participants. The results indicated that materials provided to patients have an impact on decision making related to vaccines, and providers should distribute these materials to their patients (Krieger et al., 2000).

Dubé et al. (2016) studied research network members and health care providers to identify the opinion of vaccination experts and health professionals related to the definition, scope, causes, and consequences of vaccine hesitancy in Canada. Two separate surveys were administered to randomized groups. All parties were concerned about the decline of vaccination rates overall in Canada, but many providers stated that they felt improperly counseled to advise vaccine hesitant patients (Dubé et al., 2016). This study supports the fact that many providers feel improperly educated to speak with vaccine-hesitant individuals and that they require further

education. Another RCT was conducted in Japan to determine the impact of the varicella vaccine on the occurrence of herpes zoster. Patients were randomized from 43 clinics in Japan and were determined to be at higher risk for shingles related to varicella vaccination and prevalence (Toyama & Shiraki, 2018). This reinforces the need for the shingles vaccine in the community.

Quasi-experimental. Quasi-experimental studies include research from trials that include an intervention but are not randomized (Hall & Roussel, 2014). MacDougall et al. (2015) conducted a study with surveys and focus groups to assess knowledge of patients and providers related to vaccine preventable disease. Knowledge related to vaccination was lacking in both group, which supports the need for further education for providers overall (MacDougall et al., 2015).

Clark, Jackson, Hodges, Gilliam, and Lane (2015) conducted a quasi-experimental study to understand the impact that vaccination education can have on a specific population. The study participants included patients who were at risk for pneumonia and were treated in a presurgical center. Targeted education with flyers was utilized as the intervention, which led to increased vaccination rates. The researchers concluded that if patients are given the appropriate education materials by their health care providers, they are more likely to be vaccinated (Clark et al., 2015).

Jones et al. (2012) conducted a research study to identify factors that influenced parents vaccinating their children. For this study, 1,367 parents of children at 1,000 schools across Colorado, Massachusetts, and Washington were surveyed. While patients have increased access to health information online and through social media, research confirms that most parents obtain and utilize information given to them by medical professionals. Additionally, the authors concluded that if providers prioritize their own vaccination status, they are more willing to

encourage their patients to pursue immunization (Jones et al., 2012). If patients and family view vaccinations in a positive light, they are more likely to stay up to date with their own vaccination status. A negative attitude toward vaccination influences patients and families to avoid updating their immunization status. In addition, patients and families with negative attitudes may impact the decision of others (Jones et al., 2012). The authors confirmed that providers need additional support and guidance to help educate their patients and their parents.

Kaplan-Weisman, Waltermaurer, and Crump (2018) conducted a study to determine if targeted interventions could increase shingles vaccination rates. A physician provided targeted education to 103 participants from a local homeless shelter. Although the sample size was small, the study results indicated that provider understanding of vaccinations and targeted education was associated with an increased uptake for vaccination in vulnerable populations (Kaplan-Weisman et al., 2018). If the provider feels more prepared to discuss information with their patients, education for patients is improved, and therefore vaccination levels are increased.

Prioli et al. (2018) studied the knowledge base of older adults related to vaccines. Forty-five participants in a senior care setting were questioned about vaccines, and knowledge related to vaccines was minimal. The study recommended that education be improved in different settings for patients and that providers take on a larger role in ensuring that their patients are informed (Prioli et al., 2018).

Educating new providers such as medical students is also correlated with immunization compliance (Schnaith et al., 2018). Schnaith et al. (2018) provided 101 medical students with an educational program catered to them to determine if the program would increase the likelihood of the students advising their patients to be vaccinated for human papilloma virus (HPV). The medical students indicated that following the educational program, they were more likely to

recommend the HPV vaccine. The study results indicate that provider education increases the likelihood of the provider to recommend the vaccination. In addition, Suryadevara, Bonville, Cibula, and Domachowske (2019) conducted a study to determine if provider, health care staff, patient, and parent education about the vaccine and cancer prevention improved compliance with the HPV vaccination. The study included providers and patients from six pediatric offices in upstate New York. The results indicated that vaccination rates for HPV increased by at least 10% in three practices and at least 5% in three practices. The study indicated that increased provider education about the benefits of vaccination improves overall vaccination rates. Another study by Perkins et al. (2015) tried to identify if an educational program with providers increased overall vaccination rates for HPV in pediatric patients. Educational sessions were conducted with the providers who volunteered, and vaccination rates were compared for patients in a control group against those whose providers received education. Girls who were patients of the providers in the intervention group were more likely to be vaccinated when compared with girls in the control group. Vaccination rates for the boys stayed about the same when compared with the control group. The study results indicate that more provider education has a positive impact on immunization. Patients of providers who received the education were more likely to be vaccinated.

Reiter, Stubbs, Panozzo, Whitesell, and Brewer (2011) conducted a study to determine the impact that education related to vaccination could have on the population. The sample included parents, school staff, and health care staff. The study results indicated that knowledge was improved following targeted education. This study indicates that education related to immunization is important for the community to ensure educated decision making from patients and parents (Reiter et al., 2011). Another study was performed by Leask et al. (2012) to identify

different parental attitudes about vaccination and how providers felt would be best to educate parents. The study included 112 articles and then surveyed 103 immunization providers. Five specific parental opinions regarding vaccinations were identified, and providers determined that a guiding-style discussion was helpful in talking to parents. The researchers concluded that there were still areas for improvement identified in provider knowledge.

Real et al. (2017) conducted a study with 45 residents working at the Cincinnati Children's Hospital Medical Center pediatric primary care center to identify the impact of a virtual reality educational program related to vaccines. The intervention group received the virtual reality training. The study results showed a decrease rate of vaccine refusal for the patients of the residents that were enrolled in the educational program. The researchers concluded that improved provider education increases providers' personal knowledge and leads to increased vaccination rates (Real et al., 2017).

Other evidence. Articles from systematic reviews of qualitative studies, quantitative studies, and expert opinions are included in this section. Qualitative studies present nonnumerical data correlated with an intervention (Hall & Roussel, 2014). Expert opinion is information presented by a credible source related to the topic (Hall & Roussel, 2014). An article by Bowser (2017) discusses how 15 experts were asked to vote to determine if the Shingrix vaccine should be recommended to patients. The advisory panel voted to recommend the Shingrix vaccine over the Zostavax when it was released (Bowser, 2017). The Shingrix vaccine was also supported by the CDC and recommended by experts affiliated with the European Union (Zacks Equity Research, 2018).

Qualitative research indicates the need for increased education for providers and confirms the positive impact that it has on patients (Busby, 2018). In coming to this conclusion, Busby

(2018) surveyed residents of British Columbia to examine reasons behind the decreased rates of adult vaccination in Canada. Patients who were vaccinated stated that their health care provider recommended it to them. People that indicated they were not vaccinated felt as though they did not have access to all recommended vaccines.

Loehr and Savoy (2016) discussed methods to encourage vaccine-hesitant patients and families and to address their concerns. The authors stated, “Cultural pressure, misinformation, and fear of harm are a few reasons why patients may hesitate to agree to vaccination” (Loehr & Savoy, 2016, p. 95). Models have been proposed on managing vaccine hesitancy, including the three Cs (Confidence, Complacency, Convenience), the CASE approach (Corroborate, About me, Science, Explain/Advise), and the 3 As (Ask, Acknowledge, Advise). They concluded that research supports the physician’s recommendation as the most important reason a patient accepts an immunization (Loehr & Savory, 2016).

In another qualitative study, Ridda et al. (2009) interviewed elderly patients admitted to an 800-bed hospital to identify attitudes toward vaccination and determine why many individuals were not immunized. Patients interviewed stated that one of the reasons that they did not consider the vaccination was that their provider did not recommend it. In addition, patients were afraid to develop the illness from the vaccine (Ridda et al., 2009). The authors concluded that providers are not consistently recommending immunizations to their patients according to the guidelines.

A descriptive study was utilized by Jacobson, St. Sauver, and Rutten (2015) to discuss the best response to vaccine hesitancy from parents and patients. The researchers examined existing systematic reviews related to this topic. Findings from the study that were indicated to improve vaccination rates include usage of point-of-care reminders, reminder recall, provider

positive attitudes about vaccination, and communications and standing orders implemented by the physician. Further studies indicate that vaccinated health care providers are more likely to recommend vaccination to others. The authors stated that primary prevention is best supported through education by the patient's health care provider (Jacobson et al., 2015).

Synthesis

Vaccinated health care providers. If providers prioritize their own vaccination status, they are more willing to encourage their patients to pursue immunization (Jones et al., 2012). The provider can also share with the patient or family that their own immunization status is up to date (Jacobson et al., 2015). If a provider is willing to personally experience the potential side effects related to immunization, the patient and family is more likely to trust his or her recommendations (Jacobson et al., 2015). Due to the impact of the provider's immunization status on patient compliance, the prescribing provider should continue to update his or her immunization status as necessary.

Patient attitudes. Another factor that supports vaccination is positive attitudes about vaccination by patients (Jacobson et al., 2015). A recent study was conducted to determine the impact of the patient and family's attitudes on vaccination (Jones et al., 2012). If patients and family view vaccinations in a positive light, they are more likely to stay up to date (Jones et al., 2012). A negative attitude toward vaccination influences patients and families to avoid updating their immunization status. In addition, patients and families with negative attitudes may impact the decisions of others.

Vaccine recommendations by health care providers. Patients have stated that if their provider discussed an immunization with them, they would be more likely to receive it. Many patients who are not vaccinated state that they did not pursue vaccination because their primary

care provider did not discuss it with them (Ridda et al., 2009). Prioritizing discussions about updating vaccination will lead to increased immunization compliance (Clark et al., 2015). By increasing provider education, the project coordinator hoped to improve the number of providers that recommend the vaccine to their patients.

Preparedness of providers. As indicated in the study that focused on education for medical students, many providers feel unprepared to recommend a vaccination to their patients (Schnaith et al., 2018). In addition to medical students, many practicing providers may not feel educated enough to recommend a vaccine (MacDougall et al., 2015). The Shingrix vaccine is a recently released vaccination and providers may not feel as though they are prepared to discuss the risks and benefits with patients and families. Further education for providers is indicated to have a positive impact on immunization (Perkins et al., 2015).

Interventions to increase vaccine uptake by health care providers. Overall immunization rates have been lower when compared to the previous decade, but targeted interventions focusing on education for providers has been able to lead to increased knowledge and in turn improve vaccination rates for patients (Ridda et al., 2009). Interventions include a focused education program for providers and health promotion education (Perkins et al., 2015). All studies that included a specific education program resulted in an increase in vaccination rates.

Conceptual Framework

The Iowa Model was implemented within this scholarly project and started by analyzing the triggers that were present, leading to the creation of the evidence-based practice (EBP) project (Hall & Roussel, 2014). The integral steps that are associated with the Iowa Model in research include identifying a trigger, determining organizational priority, formulating a team,

examining the evidence, implementing a change into practice, and analyzing the outcomes (Hall & Roussel, 2014). Permission was provided by the University of Iowa Department of Nursing to utilize the Iowa Model for this scholarly project; see Appendix B.

While the other models provide effective policy change, they do not allow for thorough evaluation throughout the process. It is important that a successful screening and education program is formulated to ensure that resources are utilized effectively (Hall & Roussel, 2017). The Iowa Model allows for evaluation and stepwise change to ensure that any issues with a new policy are identified and solved.

Considering current issues and existing research allows for practice change in a procedural fashion (Hall & Roussel, 2014). There are both problem- and knowledge-based triggers identified related to this topic, and the Iowa Model effectively evaluates them and the potential opportunities for change. The knowledge-based trigger was identified when the project coordinator was informed about the release of the new vaccine. The problem-based trigger was identified at the practice setting because the project coordinator completed clinicals at the setting and determined that the vaccine was not regularly being recommended by providers. These triggers are the reason that this specific change was a focus within this setting (Hall & Roussel, 2014).

In addition to the existing triggers, the Iowa Model also considers the drawbacks and benefits of a change to the health care organization as a whole (Hall & Roussel, 2014). This is identified in the Iowa Model as determining the organizational priority. The organizational priority is to provide excellent care for life. By prioritizing education for providers about the Shingrix vaccine, the project coordinator is supporting vaccine compliance for patients. This

ensures that the goals of the project coordinator match that of the health care organization before the change.

A team was created in order to support the implementation of the project (Hall & Roussel, 2014). New ideas and changes in a practice setting should be supported by others, as an idea that is supported by a group will be more successful. Support by a group allows for effective uptake of a change in practice (Hall & Roussel, 2014). The project coordinator recruited the office manager and a lead physician to support development of the project.

The project coordinator then considered existing literature (Hall & Roussel, 2014). If research had not been adequate or indicated that a different change would have been more favorable, then the project would have been put on hold (Hall & Roussel, 2014). The project coordinator evaluated the literature with an extensive search utilizing the identified key terms. This provided reinforcement from other studies that the proposed change would be effective, leading to better patient care.

After the evidence is analyzed, the change can then be tested in practice. Typically, a change is tested as a pilot and occurs on a smaller scale (Hall & Roussel, 2014). The pilot stage is utilized to ensure that the new process is effective. This EBP project was implemented as a pilot because it was integrated into one internal medicine practice. The practice is a part of a care network, and implementing the project in one setting is considered a pilot. Seven providers were included in the pilot stage. This stage was monitored to determine if adjustments to the process should be implemented (Hall & Roussel, 2014).

After the pilot change in practice occurred, the project coordinator evaluated if the change would be effective in the setting and on a larger scale (Hall & Roussel, 2014). This involved the coordinator analyzing the outcomes and considering the information obtained.

Thoroughly analyzing the outcomes allowed the project coordinator to confidently support a change of practice. The project coordinator has analyzed the results of the pilot study.

This concludes the six-step process to effectively integrate a change in practice (Hall & Roussel, 2014). Throughout the project, evaluation and monitoring occurred, and new research related to the topic will also be considered. The main strength of this model is the investigation of the research and reevaluation of the change; however, an EBP project that follows the Iowa Model typically requires more time and resources when compared to other models.

Summary

Immunization is a priority to support health promotion in patients. The Shingrix vaccination has been recommended by the Food and Drug Administration, and studies have continually supported its effectiveness (Bharucha et al., 2017). Due to its effectiveness, it should be recommended for all patients over the age of 50 who are at risk for developing shingles (Bharucha et al., 2017). Considering the development of vaccine hesitancy, providers have the responsibility to educate their patients.

The purpose of this literature review was to identify evidence-based strategies to help increase Shingrix vaccinations. Research indicates that providers feel unprepared and may require further education before recommending a new vaccination to others. Targeted educational programs for providers have been portrayed as an effective intervention to improve compliance with vaccination. An educational program focused on the Shingrix vaccine is suspected to also have a positive impact. The literature review supports the need for this scholarly project, whose purpose is to educate health care providers in a Central Virginia internal medicine about the new Shingrix vaccine and subsequently increase recommendation of the

vaccine to patients. The scholarly project utilized the Iowa Model throughout all the phases of the project to implement and evaluate a practice change.

SECTION THREE: METHODOLOGY

Design

The purpose of this scholarly project was to determine if the implementation of a Shingrix educational program for health care providers would increase their knowledge of the vaccine and increase recommendation of the vaccine to their patients. This scholarly project was conducted as an EBP project and utilized the Iowa Model of Evidence-Based Practice. The project design was nonexperimental and was based on previously identified triggers and an extensive literature search. The project used a provider educational intervention with up-to-date guidelines to encourage providers to discuss and endorse the Shingrix vaccine to the recommended patient population.

The project coordinator presented an educational program for the providers which included information about shingles and the current CDC Guidelines for the Shingrix vaccine. A pretest and posttest consisting of 17 questions each were utilized to determine the provider's knowledge of shingles and the Shingrix vaccine. The project coordinator planned to audit patient charts according to predetermined criteria four weeks prior to the educational program and then four weeks after the program to determine if there was an increase in provider recommendation for the Shingrix vaccine. However, on the day of the educational program, the project coordinator was alerted by two of the participants that collecting the data from their electronic medical record (EMR) was going to pose a problem. Elaboration on the EMR problem will be provided in the Intervention section.

Measurable Outcomes

1. After completion of the educational program and feedback, providers will demonstrate an increase in knowledge about the Shingrix vaccine. This will be evidenced by an increase in scores on the provider posttest.
2. After completion of the educational program, providers will indicate an improvement of opinion toward the vaccine and an increase in intent to recommend the Shingrix vaccine to their patients, as evidenced by 90% or greater of participants answering “very likely” to recommend the Shingrix vaccine.
3. After completion of the chart audit, providers will demonstrate an increase in recommendations for the Shingrix vaccine over a four-week period posteducation, as compared to the same time frame prior to the educational program.

Setting

The educational program was conducted at a Central Virginia internal medical practice associated with a large hospital system in the area. The office is located approximately eight miles from the city’s downtown area and cares for patients throughout the area. The office comprises 18 providers total including medical doctors, nurse practitioners, and physician’s assistants who treat patients 18 years of age and older. They provide patients medical care by utilizing assessment, diagnostic testing, prescription medication, treatment, and referrals.

The primary care is affiliated with a large nonprofit hospital and health care system located in Central Virginia. The corporation has a large network of primary care practices, family practices, and specialists. The entire corporation is committed to excellent care. By promoting the new Shingrix vaccine, the project coordinator supported this commitment.

The internal medicine office operates with 18 providers including both medical doctors and nurse practitioners. While the office is part of the larger organization, it still functions fairly independently. Key stakeholders primarily include the 18 providers that are employed at this location. One of the physicians helped to direct the project. The letter of support provided by the office manager is included in Appendix C. The recruitment letter is included in Appendix D.

Population

The population of Central Virginia includes different cultures and ethnicities. The internal medicine practice is able to service this area effectively and provide quality patient-centered care. The initial population that was evaluated in this scholarly project included the providers that are employed by this corporation. The total number of providers that were invited to participate was 18. The sample that is included is a convenience sample (Moran et al., 2017).

Inclusion criteria for the patient chart review was anticipated to include patients who were over the age of 50 who presented for their annual wellness examination. In addition, the patient needed to be a resident of the Central Virginia region and be a patient at the internal medicine practice. The final inclusion criterion required the patient's annual wellness examination to occur one month prior to the educational program or one month following the educational program.

Ethical Considerations

The scholarly project coordinator and project chair completed extensive research ethics training to ensure protection of human subjects through the Collaborative Institutional Training Initiative and were awarded a certificate of successful completion (see Appendix E). The project coordinator continuously reviewed all aspects of this scholarly project to ensure ethical standards were maintained throughout the implementation. The scholarly project was submitted to the

Liberty University Institutional Review Board (IRB) for approval. Approval from the Liberty University IRB was obtained, and a copy of the approval form is in Appendix F. In addition to submission to Liberty University's IRB, the project coordinator submitted to the site's parent organization's IRB for approval. The project coordinator received approval from the organization's IRB, and the approval letter is included in Appendix G.

During the collection of data, the confidentiality of the provider was ensured. No identifying information was obtained from the providers on the pretest or the posttest. The surveys were completed anonymously. Data obtained within this project will be kept for three years and then deleted.

Data Collection

Data were obtained from the medical providers on the pretest and posttest during the educational intervention at the Central Virginia internal medicine practice. The data collected will be discussed in the results section and be highlighted as they relate to outcomes and objectives (Rousch, 2015). Quantitative comparative data were obtained to investigate the differences between the knowledge base of the providers prior to and after the educational program (Moran et al., 2017). An improvement in knowledge after the educational program would meet measurable outcome one. Data were also collected related to the provider's intent to recommend the Shingrix vaccine. This allowed the project coordinator to evaluate the achievement of measurable outcome two.

Measurable outcome number three was to be met utilizing data from a preintervention chart review and a postintervention chart review to compare providers' recommendation of the Shingrix vaccine. The project coordinator was planning to collect data four weeks prior and four weeks following the educational intervention. Patient data were unable to be collected due to

unforeseen circumstances with the practice EMR. This will be discussed in greater detail in the Project Intervention section. The project coordinator planned to use this data to determine if measurable outcome three was achieved. The implementation of three measurable outcomes assisted the project coordinator in determining the change in provider knowledge and recommendation.

Tools

Demographic survey. A demographic survey was created to determine influencing factors related to provider knowledge. These factors include age, years of practice, and areas of practice. The survey also questioned the participants' attendance at an in-service about the Shingrix vaccine. The demographic survey is included in Appendix H.

Pre- and posttest tools. A pretest and posttest were developed by the project coordinator based on the CDC guidelines for Shingrix vaccination. These surveys were created to understand the change in providers' knowledge after the educational session. Surveying the providers allowed the project coordinator to collect reliable data for analysis. These tests were created with the use of Epiform 7 software. Seventeen multiple-choice knowledge and opinion questions surveyed the level of general information about shingles and the Shingrix vaccine held by the providers. The same survey was administered prior to and following the intervention. The pretest and posttest are included in Appendix I.

Retrospective audit tool. The project coordinator developed an audit tool to evaluate the impact of the educational program four weeks prior to and four weeks after the intervention. The tool is included in Appendix J. This tool was not used in the project since the chart analysis did not take place.

Intervention

The educational intervention was introduced to the provider group via 30-minute PowerPoint presentation. The educational program was designed to provide information to the providers on shingles and the Shingrix vaccine. Seven providers from the Central Virginia internal medicine practice attended and completed the pretest, posttest, and the educational intervention. It was stressed to the providers that the vaccine should result in decreased occurrence of the disease.

In presenting the educational program, the project coordinator discussed all the points that were covered by the pretest and posttest. General knowledge about shingles was included as well as a comparison of Zostavax and Shingrix. Efficacy, contraindications, side effects, and dosing were all highlighted in the program. The providers were educated on their positive impact on patient decisions regarding vaccination. The CDC guidelines for Shingrix were also discussed. Cost and availability of the vaccine were included in the program as well as insurance coverage. At the conclusion of the educational program, time was provided for participant questions. The PowerPoint slides created for the educational program are included in Appendix K.

The internal medicine practice recently updated their EMR system. This adjustment has prevented the providers and nurses from tracking immunizations effectively. Consultation with providers and scribes indicated that they are recommending the Shingrix vaccine to their patients but have not found a consistent area to chart this discussion. Due to the lack of consistency, providers stated that they are not recording this information in the EMR. In addition, patients do not require a prescription for the vaccine, so providers are less likely to enter this information.

Timeline

Preparation. During this stage, the project coordinator completed research, finalized the proposal, and implemented changes necessary before the implementation phase of the scholarly project.

1. By May 1, 2019, complete primary defense with Dr. Moore
2. By May 1, 2019, submit proposal to Liberty University's IRB
3. By June 1, 2019, submit proposal to site IRB

Implementation. During this stage the project coordinator presented, the Shingrix educational program to the medical staff at the internal medicine practice in Central Virginia. Along with the presentation, a pretest and posttest were administered to the providers. Due to unexpected circumstances with the practice's EMR, the project coordinator was unable to complete the chart reviews.

1. By August 1, 2019, conduct preliminary chart review
2. By August 1, 2019, complete provider educational program
3. By August 15, 2019, conduct follow-up chart review

Evaluation. The EBP was evaluated utilizing the pretest and posttest data gathered during the educational intervention. The data were analyzed and are reported in the results section.

1. By August 15, 2019, analyze postinterventions
2. By August 20, 2019, send scholarly project to the editor
3. By August 31, 2019, conduct the final defense with Dr. Moore
4. By September 1, 2019, complete final revisions and send to Scholars Crossing
5. By September 1, 2019, disseminate the information to involved stakeholders

Cost-Benefit Analysis

A budget for implementation of this scholarly project was not required because there was no cost associated. The project coordinator fulfilled the education intervention and did not receive any pro rata payment for her services.

Data Analysis

Analysis of descriptive statistics included data from the pretest and posttest. Data were evaluated with the use of SPSS software to analyze measurable outcomes for the project. Charts were created to compare the differences in demographics, answers on the pretest and posttest, and intent to prescribe the Shingrix vaccine.

Measurable outcome 1. The project coordinator reviewed the pretest and posttest results after the educational intervention. The project coordinator utilized SPSS to review and analyze the results on both tests and the demographic results. Through SPSS, the project coordinator conducted a *t* test to assess for any statistically significant differences in knowledge between the pretest and posttest.

Measurable outcome 2. The project coordinator assessed the providers' intent to recommend the Shingrix vaccine via the posttest. The project coordinator utilized SPSS to assess the posttest intent by performing an independent t-test. The researcher sought to identify if the provider education had an influence on provider intent to recommend the Shingrix vaccine.

Measurable outcome 3. The project coordinator was unable to gather any usable data to meet outcome 3 since the information was not available in the practice EMR. Therefore, this measurable outcome was not achieved. This unexpected barrier was discussed in the intervention section and is detailed in the limitations.

SECTION FOUR: RESULTS

Seven provider participants responded to the invitation to attend the educational intervention. The providers were 18 years of age and older and were employed by the identified Central Virginia internal medicine practice. The seven participants ($N = 7$) completed the pretest, observed the educational program, and completed the posttest with a response rate of 100%. Six out of seven provider participants completed the demographic survey. The seven provider participants met the inclusion criteria of being a current prescribing provider of the internal medicine office and over 18 years of age.

Descriptive Statistics

Table 1 details the results of the demographic survey and highlights the frequency of each answer. Additionally, it includes the data that are missing from the demographic survey. Four participants (57%) were male, and three (43%) were female. The remaining demographic information is found in Table 1.

Table 1

Participant Demographics

Variable	Frequency	%*
Age		
31–40	1	14.3
41–50	2	28.6
51–60	2	28.6
60 and older	1	14.3
Years of licensure		
0–3	2	33.3
8–11	2	33.3
16 or more	2	33.3
Primary area of practice		
Primary care	5	83.3
Family care	1	16.7

Note. $N = 6$

*Response totals do not equal 100% due to rounding.

Table 2 displays the results of the pretest scores related to knowledge on the topic. The questions that were answered incorrectly most frequently by participants are included. The pretest included 12 knowledge questions and five opinion questions. On the pretest, there were several common misconceptions identified. The questions most frequently answered incorrectly were questions three (What is the average percentage of patients that have postherpetic neuralgia after a shingles diagnosis?), six (How effective is Shingrix in preventing the disease?), seven (What are the contraindications for the Shingrix vaccine?), nine (Administration is safe for individuals who are immunocompromised), and 11 (Medicaid plans cover the Shingrix vaccine).

Table 2

Pretest Results

Question	Frequency	%
3		
Correct	4	57.1
Incorrect	3	42.9
6		
Correct	5	71.4
Incorrect	2	28.6
7		
Correct	2	28.6
Incorrect	5	71.4
9		
Correct	2	28.6
Incorrect	5	71.4
11		
Correct	4	57.1
Incorrect	3	42.9

Table 3 highlights the number of total correct answers for each provider participant within the pretest. The scores for the knowledge section range from zero to 12, the highest possible score. One individual (14.3%) scored nine or above on the knowledge portion, indicating that the individual was educated about the Shingrix vaccine and shingles. However,

85.7% of individuals achieved less than nine questions correctly, indicating that their knowledge related to shingles and the Shingrix vaccine could be improved.

Table 3

Frequency of Correct Answers on the Pretest

Number correct	Frequency	%*
5	1	14.3
6	1	14.3
7	2	28.6
8	2	28.6

**Response totals do not equal 100% due to rounding.*

Table 4 shows the frequency of answers for knowledge questions included on the posttest. All seven providers correctly answered at least 10 out of 12 of the posttest questions. Tables for questions that all seven providers answered correctly are not included. The question answered incorrectly most frequently was question nine, “Administration is safe for individuals who are immunocompromised.” The project coordinator discussed the CDC guidelines related to immunization for immunocompromised individuals but also discussed recent studies that have shown it is safe for that population within her education program. This may have caused confusion with the providers attending the seminar. Question three, “What is the average percentage of patients that have postherpetic neuralgia after a shingles diagnosis?” was the only other question answered incorrectly.

Table 4

Posttest Results

Question	Frequency	%
3		
Correct	6	85.7
Incorrect	1	14.3
9		
Correct	4	57.1
Incorrect	3	42.9

Table 5 highlights the number of total correct answers for each provider participant within the posttest. The highest possible score for questions in the knowledge section was 12. All participants scored nine and above on the knowledge portion, indicating that they were educated about the Shingrix vaccine and shingles. No individuals achieved less than nine questions correctly on the posttest, which indicates that participant knowledge related to shingles and the Shingrix vaccine improved.

Table 5

Frequency of Correct Answers on the Posttest

Correct answers	Frequency	Percent
11	4	57.1
12	3	42.9
Total	7	100.0

Table 6 showcases the frequency of answers which indicated the providers' likelihood of recommending the vaccine in the pretest. One question asked participants how confident they were in discussing the vaccine with patients utilizing a Likert scale which included very confident, confident, slightly confident, and not confident. Four individuals (57.1%) answered that they felt very confident or confident. Another question using a Likert scale which included

very likely, likely, somewhat likely, and not likely as response options in asking providers how likely they were to recommend the vaccine. All individuals answered that they were very likely or likely to recommend the vaccine. The final question asked providers to respond true or false to whether they had specific talking points when discussing the Shingrix vaccine. Five (71.4%) of participants answered that they had specific talking points about the Shingrix vaccine.

Table 6

Pretest Opinion

Likelihood	Frequency	%
Very likely	4	57.1
Likely	2	28.6
No response	1	14.3

Table 7 displays the frequency of answers for the providers' likelihood of recommending the vaccine. The providers answered questions with the Likert scale and answer options included very confident, confident, slightly confident, and not confident as well as very likely, likely, somewhat likely, and not likely. The final question asked providers "true or false" if they have specific talking points when discussing the Shingrix vaccine. All individuals answered that they felt very confident or confident with vaccine recommendations. 100% of valid answers chose that the participant was very likely or likely to recommend the vaccine. All participants answered that they had specific talking points about the Shingrix vaccine.

Table 7

Posttest Opinion

Likelihood	Frequency	%
Very likely	6	71.4
Likely	1	14.3
No response	1	14.3

Measurable Outcome 1

The first measurable outcome of the project was to determine the difference between the provider scores on the pretest and the posttest after the educational intervention. After completion of the educational program and feedback, providers demonstrated an increase in knowledge about the Shingrix vaccine. This was evidenced by an increase in scores on the provider posttest. To identify the impact of the provider educational session, the project coordinator compared the frequency of correct answers in the pretest and posttest.

The project coordinator utilized the independent samples *t* test to compare the providers' knowledge before and after the educational intervention. The pretest and posttest means, standard deviations, and standard error means were recognized. Tables 8 and 9 highlight the comparison of the obtained data.

Table 8

Mean, Standard Deviation, and Standard Error of Provider Knowledge Scores

Test	Correct	<i>M</i>	<i>SD</i>	<i>SEM</i>
Pretest	7	7.2857	1.60357	.60609
Posttest	7	11.4286	0.53452	.20203

Note. $p < .0005$.

Table 9

Independent T-test for Provider Knowledge

	Levene's test		t test for equality of means					95% CI	
	F	Sig.	t	df	Sig. (2-tailed)	M difference	SE difference	Lower	Upper
Equal variances assumed	3.575	.083	-6.485	12	.000	-4.14286	.63888	-5.53485	-2.75086
Equal variances not assumed			-6.485	7.317	.000	-4.14286	.63888	-5.64039	-2.64532

Measurable Outcome 2

Determining the impact of the provider educational session, the project coordinator compared the providers' opinion of and intent to recommend the vaccination prior to and following the educational intervention. Achievement of this measurable outcome was determined by the accomplishment of 90% of providers stating that they would be "very likely" to recommend the vaccine. The 90% target outcome was not achieved because only 83.3% of valid answers were indicated as "very likely." While this measurable outcome was not met, there was an increase in those who indicated that they were "very likely" to recommend the vaccine. These results indicate possible clinical significance. Six providers answered that they would be "very likely" to recommend the vaccine, one provider indicated "likely" to recommend the vaccine, and one provider did not respond.

Measurable Outcome 3

The project coordinator had planned to conduct a chart audit to demonstrate an increase in recommendations of the Shingrix vaccine over a four-week period posteducation as compared

to the same time frame prior to the educational program. Providers were expected to demonstrate an increase in recommendations for the Shingrix vaccine over a two-week period posteducation as compared to the same time frame prior to the educational program. Patient criteria for the chart review was to include individuals who were enrolled as patients at the internal medicine practice, were 50 years of age or older, and were presenting for an annual wellness exam during the defined time frame.

The chart review was cancelled when the project coordinator learned there was insufficient EMR data related to Shingrix vaccination to allow for an effective analysis of this outcome. Therefore, measurable outcome 3 was not met due to this unexpected factor.

SECTION FIVE: DISCUSSION

The scholarly project was created to identify the impact of a provider education program and assess provider knowledge about the Shingrix vaccine. The project coordinator had a positive impact on provider recommendation of the immunization as evidenced by the posttest results. Demographic factors were also considered due to their influence on provider knowledge and opinion. The results indicate statistical significance for an increase in provider knowledge and reconfirmed the need for this evidence-based education intervention. The literature review revealed extensive findings related to the Shingrix vaccine and existing vaccine educational interventions. The strengths, limitations, and implications for practice related to this scholarly project are discussed to provide future direction for research and practice.

Strengths

The pretest and posttest surveys were a cost-effective method used within this scholarly project. The methodology provided for ease of pretest and posttest data collection. The project coordinator completed the educational intervention with no financial assistance from the health

care organization where the EBP project was conducted or an outside organization. Costs were minimal and included printing and paper for the surveys. Data that were collected from the pretest and posttest efficiently. The project coordinator was able to compile and analyze the data effectively to determine significance. Based on the results, two of the project's three measurable outcomes were met. Education on the new Shingrix vaccine increased the postintervention knowledge of all the providers that participated in the educational program. Posteducation, all providers either stated they were "very likely" or "likely" to recommend the Shingrix vaccine to their patients.

Limitations

The most significant limitation related to this scholarly project was the lack of pre- and post-intervention patient data from the EMR. The project coordinator was unable to complete the chart review as previously planned; therefore, the project lacked the evaluation data to compare preintervention to postintervention provider recommendations of the Shingrix vaccine. The health care organization recently switched to a new EMR. This adjustment has prevented the providers and nurses from tracking immunizations effectively.

Health information from the previous charting system was scanned into the patients' new records, but the system is not capturing the information on the scanned document. The provider or nurse needs to enter each immunization manually for each patient to accurately track his or her vaccine status. In addition, the Shingrix vaccine currently has limited availability, so providers are writing paper prescriptions for their patients rather than e-prescribing the vaccine. The Shingrix vaccine is currently available at pharmacies without a prescription, so many providers are discussing the immunization with their patient but are not noting this discussion in the EMR.

Project data show the significance of the educational program in affecting the provider's increased knowledge of and increased intent to recommend the Shingrix vaccine. However, another limitation of the project was the small sample size of providers who participated in the educational program. Providers were selected through convenience sampling and were invited, but not required, to attend the presentation.

Implications for Practice and Research

The Shingrix vaccine has been indicated by research as more than 90% effective for prevention against the herpes zoster virus, but due to its recent release, many providers have not been educated on the vaccine and are wary to recommend it to their patients (CDC, 2018). This scholarly project demonstrates the effectiveness of further education for providers about the Shingrix immunization. Targeted interventions for immunization education lead to an increase in provider knowledge, a change of provider opinion toward the vaccination, and an increase in provider recommendation of the vaccination (Ridda et al., 2009).

Patients have indicated that their most trusted resource for health care information is their primary care provider. If the patient's primary care provider recommends the vaccine, the patient is more likely to pursue the immunization. Shingles is a financial burden to the United States health care system, and by the implementation of targeted vaccine education for providers, the burden can be lessened. In-services about shingles for providers should be more accessible. In addition, further research should be completed on educational programs that are specific to the Shingrix vaccine as well as other new vaccines or medications. The project coordinator did not identify any studies that include education for providers about the Shingrix immunization.

Sustainability

Outcomes and data obtained from the scholarly project will be monitored in the original location (Hall & Roussel, 2014). The educational program has been shared with the office manager. The manager was informed that she can distribute the PowerPoint to the staff as a reference. In addition, the PowerPoint presentation was shared with the lead physician in hopes that he will share it when he trains new providers at his practice location. Appropriateness of the scholarly project will be considered before integrating the project on a greater scale within the defined setting (Hall & Roussel, 2014). The project has been successfully completed in one internal medicine office location, and this project coordinator is hoping to implement the education program in her area of future practice.

Dissemination Plan

The project coordinator is planning on partnering with the office manager at the internal medicine practice and one of the physicians to inform health care providers of the findings of the scholarly project. In addition, the medical director will be notified of the results. A document has been compiled to send to the office manager including the results tables and will be sent via email to distribute to the staff. The target audience of the email will primarily include physicians, nurse practitioners, nurses, and physician assistants. The scholarly project will be submitted to Liberty University's Scholars Crossing to reach a larger audience, and the project manager's manuscript will be submitted to the *Vaccine* journal.

CONCLUSION

This scholarly project validates the need for further research and indicates the positive impact of a focused educational intervention for providers. Due to the continuous influx of information in health care, providers need to prioritize continuing education. Education on the

Shingrix vaccine was highlighted due to its recent release as well as its efficacy. Currently, prescribing providers and patients are limited by the availability of the vaccine. There is a supply and demand imbalance, but the manufacturing company is continuing to respond to the needs of the patient population. As the vaccine becomes more readily available, providers should be prepared to discuss the immunization, side effects, cost, and insurance coverage. Following education about the Shingrix vaccine, prescribing providers indicated that they were more likely to recommend the immunization. Improved education increases a prescribing provider's confidence and discussion points with patients.

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<https://www.merckvaccines.com/Products/Zostavax>

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Effectiveness of a provider-focused intervention to improve HPV vaccination rates in boys and girls. *Vaccine, 33*(9), 1223–1229. doi:10.1016/j.vaccine.2014.11.021

Prioli, K., Formal, R., Schafer, J., Harris, L. F., Jackson, F., Vertsman, R., & Pizzi, L. (2018).

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- Schnaith, A. M., Evans, E. M., Vogt, C., Tinsay, A. M., Schmidt, T. E., Tessier, K. M., & Erickson, B. K. (2018). An innovative medical school curriculum to address human

papillomavirus vaccine hesitancy. *Vaccine*, 36(26), 3830–3835.

doi:10.1016/j.vaccine.2018.05.014

Suryadevara, M., Bonville, C. A., Cibula, D. A., & Domachowske, J. B. (2019). Cancer prevention education for providers, staff, parents, and teens improves adolescent human papillomavirus immunization rates. *The Journal of Pediatrics*, 205, 145–152.

doi:10.1016/j.jpeds.2018.09.013

Toyama, N., & Shiraki, K. (2018). Universal varicella vaccination increased the incidence of herpes zoster in the child-rearing generation as its short-term effect. *Journal of Dermatological Science*, 92(1), 89–96. doi:10.1016/j.jdermsci.2018.07.003

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Appendix A

Levels of Evidence

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
Bharucha, T., Ming, D., & Breuer, J. (2017). A critical appraisal of “Shingrix”, a novel herpes zoster subunit vaccine (HZ/Su or GSK1437173A) for varicella zoster virus. <i>Human Vaccines & Immunotherapeutic, 1</i> 3(8), 1789–1797. doi:10.1080/21645515.2017.1317410	Shingrix is the first time a subunit vaccine is available and has been indicated as effective.	Three studies that focus on the general population, elderly, and HIV infected individuals	A systematic review of three different studies	The vaccine indicated strong efficacy in all populations	Level 1: Systematic review	Study did not investigate all potential aspects of the population.	Yes. Supports the claim to providers that the immunization should be considered with eligible candidates.
Bowser, A. D. (2017). In close vote, advisory panel prefers Shingrix over Zostavax. <i>Internal Medicine News, 50</i> (19). Retrieved from	Experts were asked to vote to determine if the Shingrix vaccine should be	Fifteen experts were included.	An expert opinion	Experts voted that the Shingrix vaccine	Level 6: Descriptive study	An expert panel does not reflect as high of a level of evidence.	Yes. It supports the idea that providers should be recommending the Shingrix vaccine.

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
https://www.mdedge.com/internalmedicine	recommended to patients.						
Busby, C. (2018). <i>Not just for kids: How to improve adult vaccination uptake in Canada</i> (Commentary No. 509). Retrieved from C. D. Howe Institute website: https://www.cdhowe.org/sites/default/files/attachments/research_papers/mixed/Commentary_509.pdf	Examine reasons behind the decreased rates of adult vaccination in Canada	Residents of British Columbia	Surveys were distributed according to immunization status and reasons for their status.	Patients who were vaccinated stated that their health care provider recommended it to them. People that indicated they were not vaccinated felt as though they did not have access to the vaccine.	Level 4: Correlational Design	Study was completed in Canada, and demographics and population could have an impact on patient's actions and attitudes.	Yes. Indicates that education related to the vaccine from the provider has an impact on the patient's actions.

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
Clark, R. C., Jackson, J., Hodges, D., Gilliam, B., & Lane, J. (2015). Improving pneumococcal immunization rates in an ambulatory setting. <i>Journal of Nursing Care Quality, 30</i> (3), 205-211. doi:10.1097/ncq.000000000000110	Understand the impact that vaccination education can have on a specific population	Patients at risk for pneumonia who were treated in a pre-surgical center	Quasi-experimental design which evaluated the results of educational flyers.	Targeted education with flyers led to increased vaccination levels.	Level 3: Quasi-Experimental Design	Investigates education catered to pneumococcal education rather than Shingles.	Yes. If patients are given the appropriate education materials by the health care provider, they are more likely to be vaccinated.
Dubé, E., Gagnon, D., Ouakki, M., Bettinger, J. A., Guay, M., Halperin, S., . . . Canadian Immunization, R. N. (2016). Understanding vaccine hesitancy in Canada: Results of a	“To identify the views of Canadian vaccination experts and health professionals concerning the definition,	52 research networks members and 98 health care providers completed the first survey, and	Two separate surveys were administered to randomized groups	All parties were concerned regarding the decline of vaccination rates overall in Canada, but many	Level 2: Randomized controlled trial	Study was located in Canada and also considered opinions from research	Yes, supports that providers feel improperly educated to speak with vaccine hesitant individuals and that they require further education.

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
consultation study by the Canadian immunization research network. <i>PLoS One</i> , 11(6). doi:10.1371/journal.pone.0156118	scope, causes, and consequences of vaccine hesitancy in Canada” (Dubé et al., 2016, p. 1).	53 research networks members and 80 health care providers		providers stated that they felt improperly counseled to advise vaccine hesitant patients.		networks members.	
Elliott, J. C. (2018). Zoster vaccine recombinant adjuvanted (Shingrix). <i>Infectious Disease Alert</i> , 37(4). Retrieved from https://www.reliasmedia.com/newsletters/18/issues/76568	Determine effectiveness of Shingrix vaccine in different age groups.	Study groups were separated into individuals older than 50 years and individuals older than 70 years	A randomized controlled trial	The vaccine was found to be effective in all populations.	Level 2: Randomized controlled trial	The study excluded those who were immunocompromised or had previously been diagnosed with Shingles	Yes. This study indicates that the vaccine is effective in those over 50 years of age and should be recommended.
Friesen, K. J., Chateau, D., Falk, J., Alessi-Severini, S., & Bugden, S. (2017). Cost of shingles: Population based	To identify the health care system burden caused by shingles	Costs related to shingles April 1, 1997 to March 31, 2014 were considered	This data was collected with the implementation of administrative	The recent increase in shingles diagnoses has increased the financial	Level 5: Case control studies	Study was only conducted in the province of Manitoba	Yes, indicates that the cost related to shingles is a great burden on the health care system, and an

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
burden of disease analysis of herpes zoster and postherpetic neuralgia. <i>BMC Infectious Diseases</i> , 17. doi:10.1186/s12879-017-2185-3		for Manitoba, Canada	healthcare data from the province of Manitoba, Canada	burden related to shingles.			intervention to decrease these costs would be beneficial
GSK phase III study supports safety & efficacy of Shingrix in preventing shingles in auHSCT patients [Clinical report]. (2017). PharmaBiz. Retrieved from http://www.pharmabiz.com/	Determine Shingrix's efficacy in patients who have undergone a stem cell transplant	1846 subjects from 28 different countries	A randomized controlled trial that determined efficacy.	Indicated almost 70% efficacy in patients with a stem cell transplant	Level 2: Randomized controlled trial	Only focused on patients with stem cell transplant	Yes, indicates that providers can recommend this vaccine to this specific population
Jacobson, R. M., St. Sauver, J. L., & Rutten, L. J. F. (2015). Vaccine hesitancy. <i>Mayo Clinic Proceedings</i> , 90(11), 1562–1568.	To discuss the best response to vaccine hesitancy from parents and patients	Available data regarding vaccine hesitancy	Examined existing systematic reviews related to the topic	Usage of point of care reminders, reminder recall communications and standing	Level 6: Descriptive study	Low level of evidence does not as strongly support a change in practice.	Yes, supports the need for further provider intervention related to vaccination.

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
doi:10.1016/j.mayocp.2015.09.006.				orders implemented by the physician would help improve			
Jones, A. M., Omer, S. B., Bednarczyk, R. A., Halsey, N. A., Moulton, L. H., & Salmon, D. A. (2012). Parents' source of vaccine information and impact on vaccine attitudes, beliefs, and nonmedical exemptions. <i>Advances in Preventive Medicine, 1</i> (8). doi:10.1155/2012/932741	To identify factors that influenced parents vaccinating their children	1367 parents	1,000 schools across Colorado, Massachusetts, Missouri, and Washington separated by vaccine uptake	The most common resource of vaccine related information is obtained from the patient's provider	Level 3: Quasi-Experimental	Limited to the population located in specific states	Yes, supports the notion that most parents are obtaining information from providers. Therefore, providers need additional support and guidance.
Kaplan-Weisman, L., Waltermaurer, E., & Crump, C. J. (2018). Assessing and improving zoster vaccine uptake in a	To determine if targeted interventions could increase shingles	103 patients based from a local homeless shelter	A cohort study that targeted homeless patients located in a nearby shelter	Targeted education by a physician as well as providing the opportunity	Level 3: Quasi-experimental Study	It was limited to a smaller sample that was concentrated	Yes. Indicates that provider understanding and targeted education for patients

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
homeless population. <i>Journal of Community Health.</i> doi:10.1007/s10900- 018-0517-x	vaccination rates			increased vaccination rates		in a specific area.	increases vaccination rates.
Kawai, K., Gebremeskel, B. G., & Acosta, C. J. (2014). Systematic review of incidence and complications of herpes zoster: Towards a global perspective. <i>BMJ Open</i> , 4(6). doi:10.1136/bmjopen- 2014-004833							
Krieger, J. W., Castorina, J. S., Walls, M. L., Weaver, M. R., & Ciske, S. (2000). Increasing influenza and pneumococcal immunization rates: A randomized controlled study of a senior	Determine the impact that additional education can have on vaccination rates.	Randomized participants 65 years and older who were participants in a local senior center.	A randomized controlled trial that provided selected participants with additional educational materials.	Immunization rates increased as a result of pamphlets and other educational materials that were	Level 2: Randomized Controlled Trial	This is a smaller study that was concentrated at one location. This study focuses on	Yes. This indicates that distributed materials that are provided to patients from a trusted location have an impact on decision making

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
center-based intervention. <i>American Journal of Preventive Medicine</i> , 18(2), 123-131. doi:10.1016/s0749-3797(99)00134-8				distributed to patients.		education for pneumonia.	related to vaccines. Providers should provide these materials to their patients.
Leask, J., Kinnersley, P., Jackson, C., Cheater, F., Bedford, H., & Rowles, G. (2012). Communicating with parents about vaccination: A framework for health professionals. <i>BMC Pediatrics</i> , 12(1). doi:10.1186/1471-2431-12-154	To identify different parental attitudes about vaccination and to identify which ways providers felt would be best to educate them	112 articles related to this topic were reviewed and then 104 immunization providers were surveyed	A systematic review related to the topic was initially completed, and then surveys were administered	Five specific parental opinions regarding vaccination were identified and then providers identified more frequently that a guiding style was helpful	Level 3: Quasi-Experimental	The sample was not randomized.	Yes, while most providers indicated that a guiding style discussion with the patient was most helpful, there were still areas for improvement identified in provider knowledge.
Loehr, J., & Savoy, M. (2016). Strategies for Addressing and Overcoming Vaccine Hesitancy. <i>American</i>	To discuss methods to encourage vaccine hesitant	None identified	Research relating to how to address concerns of	Strong favorable recommendations regarding	Level 6: Descriptive study	Low level of evidence	Yes, indicates that further education for providers is necessary.

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
<i>Family Physician</i> , 94(2), 94–96. Retrieved from https://www.aafp.org/journals/afp.html	patients and families		vaccine hesitant parents was identified	vaccination can help influence decisions			
MacDougall, D. M., Halperin, B. A., MacKinnon-Cameron, D., Li, L., McNeil, S. A., Langley, J. M., & Halperin, S. A. (2015). The challenge of vaccinating adults: Attitudes and beliefs of the Canadian public and healthcare providers. <i>BMJ Open</i> , 5(9). doi:10.1136/bmjopen- 2015-009062	Assess knowledge of patients and providers related to vaccine preventable diseases	4023 patients were surveyed and 62 were involved in focus groups and 1167 providers were surveyed and 45 were in the focus groups	Both surveys and focus groups were utilized to determine knowledge of providers and the public	Knowledge related to vaccination was lacking in both study groups	Level 3: Quasi- experimental	This is a convenience sample. Data was obtained from providers and patients that reside in Canada.	Yes, it supports the need for further evidence for providers overall.
Oakes, K. (2017). New shingles vaccine earns FDA panel nod: Shingrix shows 91.3% efficacy in seniors. <i>Internal Medicine News</i> , 50(16), 1+.	To determine the efficacy of the Shingrix vaccine.	29,000 subjects globally	A randomized controlled trial determining effectiveness	The vaccine was more than 90% effective in all populations.	Level 2: Randomized controlled trial	There was a smaller group of subjects that were concentrated	Yes. This article supports the efficacy of the vaccine, and therefore indicates that providers

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
Retrieved from https://www.mdedge.com/internalmedicine						in the United States.	should offer it to their patients.
Paterson, P., Meurice, F., Stanberry, L. R., Glismann, S., Rosenthal, S. L., & Larson, H. J. (2016). Vaccine hesitancy and healthcare providers. <i>Vaccine, 34</i> (52), 6700-6706. doi:10.1016/j.vaccine.2016.10.042	To evaluate the influence of the health care provider's opinion on vaccination rates	310 articles were included	An evaluation of existing research related to the topic was considered	Many factors including preparedness,	Level 1: Systematic review	Considers many different factors rather than just knowledge related to vaccines	Yes, supports the need to educate providers to increase vaccine uptake.
Perkins, R. B., Zisblatt, L., Legler, A., Trucks, E., Hanchate, A., & Gorin, S. S. (2015). Effectiveness of a provider-focused intervention to improve HPV vaccination rates in boys and girls. <i>Vaccine, 33</i> (9), 1223-1229.	To identify if an educational program with providers increased overall vaccination rates for the HPV vaccine in pediatric patients.	3961 girls and 6910 boys from two community health centers in an inner city neighborhood	Educational sessions were conducted with the providers who volunteered from the selected offices, and vaccination rates were compared for patients in the	Girls who were patients at the intervention practice were more likely to be vaccinated when compared with the control group.	Level 3: Quasi-Experimental study	Study was not randomized and was only focused in one inner city neighborhood.	Yes, this indicates that more provider education has a positive impact on immunization. Patients of providers who are educated were more likely to be vaccinated.

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
doi:10.1016/j.vaccine.2014.11.021			control group against those whose providers received education.	Vaccination rates for boys stayed about the same when compared with control.			
Prioli, K., Formal, R., Schafer, J., Harris, L. F., Jackson, F., Vertsman, R., & Pizzi, L. (2018). Baseline knowledge about vaccines and vaccine-preventable diseases among older adults: Preliminary baseline analysis of the vaccine education through pharmacists and senior centers (VEPSC) study. <i>Value in Health, 21</i> . doi:10.1016/j.jval.2018.04.1031	To determine the knowledge base of older adults related to vaccines.	45 older adults present in a senior care setting	Cohort study that surveyed a group of elderly citizens living in a senior care facility.	Determined that knowledge related to vaccines in general was minimal.	Level 3: Quasi-experimental study	Study was limited to a small study group located in one area	Yes. Education can be improved in many different settings for patients by better education. Providers can take on a larger role to ensure that their patients are informed.
Real, F. J., DeBlasio, D., Beck, A. F.,	To identify the impact of a	45 residents who are	Chosen interventional	There was a decreased	Level 3; Quasi-	Study was not	Yes, it indicates that improved

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
Ollberding, N. J., Davis, D., Cruse, B., ... Klein, M. D. (2017). A virtual reality curriculum for pediatric residents decreases rates of influenza vaccine refusal. <i>Academic Pediatrics, 17</i> (4), 431–435. doi:10.1016/j.acap.2017.01.010	virtual reality educational program related to vaccine	working at Cincinnati Children’s Hospital Medical Center (CCHMC) pediatric primary care center (PPCC).	group that received virtual reality training was compared to control group	rate of vaccine refusal for the patients of the residents that were enrolled in the educational program	experimental study	randomized and controlled.	provider educational increases their personal knowledge and leads to increased vaccination rates.
Reiter, P. L., Stubbs, B., Panozzo, C. A., Whitesell, D., & Brewer, N. T. (2011). HPV and HPV Vaccine education intervention: Effects on parents, healthcare staff, and school staff. <i>Cancer Epidemiology, Biomarkers & Prevention, 20</i> (11).	To determine the impact that education related to vaccination could have on the population.	Sample included parents, school staff, and health care staff	A cohort study that focuses on three different groups and their education.	Indicated that knowledge was improved following targeted education.	Level 3: Quasi-experimental study	Study was limited to those subjects available. Examines education related to HPV rather than Shingles.	Yes. Indicates that education related to immunization is important for the community to ensure educated decision making from patients and parents.

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
doi:10.1158/1055-9965							
Ridda, I., Macintyre, C., & Lindley, R. (2009). A qualitative study to assess the perceived benefits and barriers to the pneumococcal vaccine in hospitalized older people. <i>Vaccine</i> , 27(28), 3775-3779. doi:10.1016/j.vaccine.2009.03.075	Identify attitudes towards vaccination, and determine why many individuals were not immunized	Elderly patients who were admitted to an 800-bed hospital	Open ended interviews were conducted to determine why patients received or refused vaccination.	Patients stated that one of the reasons that they did not consider the vaccination was because their provider did not recommend it. In addition, patients were afraid to develop illness.	Level 6: Descriptive study	This is a lower level of evidence and obtained data from open ended interviews.	Yes. This is a lower level of evidence, however, indicates that providers are not consistently recommending immunizations to their patients according to guidelines.
Sadaf, A., Richards, J. L., Glanz, J., Salmon, D. A., & Omer, S. B. (2013). A systematic review of interventions for reducing parental vaccine refusal and	Identify methods to address parental refusal of vaccines	25 different studies relating to this topic	Systematic review of data obtained	Evidence was not as convincing to support a specific intervention, but most studies	Level 1: Systematic review	Most of the studies evaluated by the systematic review were descriptive studies, and	Yes. Reminders for physicians and provider based education programs were among the interventions that were evaluated,

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
vaccine hesitancy. <i>Vaccine</i> , 31(40), 4293-4304. doi:10.1016/j.vaccine.2013.07.013				indicated that an intervention improved parents' intention to vaccinate their children		therefore lower level of evidence	and this supports that change.
Schnaith, A. M., Evans, E. M., Vogt, C., Tinsay, A. M., Schmidt, T. E., Tessier, K. M., & Erickson, B. K. (2018). An innovative medical school curriculum to address human papillomavirus vaccine hesitancy. <i>Vaccine</i> , 36(26), 3830-3835. doi:10.1016/j.vaccine.2018.05.014	To determine if an educational program catered to medical students would increase the likelihood of them advising their patients to be vaccinated for HPV	101 medical students enrolled at the University of Minnesota	Pre-survey and post-survey were administered accordingly	Medical students indicated that following the educational program that they were more likely to recommend the HPV vaccine	Level 3: Quasi-experimental study	Study was limited to one group of students, and sample was not randomized	Yes, indicates that provider education increases likelihood of the provider to recommend the vaccination.
Suryadevara, M., Bonville, C. A., Cibula, D. A., & Domachowske, J. B.	To determine if provider, health care staff, patient	46 providers from 6 pediatric offices in	A 2-phase program was implemented where	Vaccination rates for HPV increased by at least 10%	Level 3: Quasi-Experimental	Study only includes six pediatric offices.	Yes, indicates that increased provider education about the benefits of

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
(2019). Cancer prevention education for providers, staff, parents, and teens improves adolescent human papillomavirus immunization rates. <i>The Journal of Pediatrics</i> , 205. doi:10.1016/j.jpeds.2018.09.013	and parent education about the vaccine and cancer prevention improved compliance with the HPV vaccination	upstate New York and their patients	providers and staff are educated, and a patient and parent education program is conducted.	in three practices and increased by at least 5% in five practices.		Study is only located in a suburban area in New York.	vaccination improves overall vaccination rates.
Toyama, N., & Shiraki, K. (2018). Universal varicella vaccination increased the incidence of herpes zoster in the child-rearing generation as its short-term effect. <i>Journal of Dermatological Science</i> . doi:10.1016/j.jdermsci.2018.07.003	Determine the impact that varicella vaccination has on herpes zoster in Japan.	Patients randomized from 43 clinics in Japan	Randomized controlled selection of subjects	Indicated that shingles has increased related to the varicella vaccine.	Level 2: Randomized controlled trial	Study is located only in Japan	This indicates that shingles has increased related to varicella vaccination and it is important that both providers and patients are aware.
Zacks Equity Research. (2018, January 28). Glaxo's	To determine if the Shingrix	Experts affiliated with the	Expert opinion discussed the efficacy and	Experts determined that they	Level 6: Descriptive study	An expert opinion is not as	Indicates that the EU also supports marketing and

Article Title, Author, etc. (Current APA Format)	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would Use as Evidence to Support a Change? (Yes or No) Provide Rationale.
shingles vaccine Shingrix gets positive CHMP opinion. Retrieved from https://www.zacks.com/	vaccine is safe to market	European Union	marketability of the Shingrix vaccine	would recommend the vaccine according to the research found.		indicative of a practice change as a trial or systematic review.	recommendations from the providers for patients to be vaccinated.

Appendix B

You have permission, as requested today, to review and/or reproduce The Iowa Model of Evidence-Based Practice to Promote Quality Care (Revised 1998). Click the link below to open.

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Citation: Titler, M. G., Kleiber, C., Steelman, V. J., Rakel, B.A., Budreau, G., Everett, L. Q., ...Goode, C. J. (2001). The Iowa model of evidence-based practice to promote quality care. *Critical Care Nursing Clinics of North America*, 13(4), 497-509.

In written material, please add the following statement:

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Please contact UIHCNursingResearchandEBP@uiowa.edu or 319-384-9098 with questions.

Appendix C
Site Approval Letter

April 29, 2019

Attention: IRB
Liberty University
Lynchburg, Virginia

IRB Members:

Lindsey Buzzco, Liberty University Doctor of Nursing Practice Student (Principal Investigator) and Dr. Vickie Moore, DNP, FNP-C, Assistant Professor of Nursing, and DNP Scholarly Project Chair (Faculty Chair) have proposed to conduct Lindsey Buzzco's Doctor of Nursing Practice Scholarly Project: Shingrix Education for Providers.

[REDACTED] is committed to providing excellent, comprehensive care for our patients, facilitated by the pursuit of quality improvement. Lindsey Buzzco's Doctor of Nursing Practice Scholarly Project reflects our commitment that every patient receives optimal quality health care.

[REDACTED] is pleased to support Lindsey Buzzco's scholarly project: Shingrix Education for Providers.

Feel free to contact me if I can be of further assistance.

Respectfully,

[REDACTED]

Practice Administrator

[REDACTED]

Appendix D

Recruitment Letter

3/29/2019

[REDACTED]

Dear Provider of [REDACTED]:

As a graduate student in the Doctoral of Nursing Practice Program at Liberty University, I am conducting research as part of the requirements for a doctoral degree. The purpose of my research is to identify if a Shingrix education program for providers leads to increased overall knowledge for practitioners, and increased recommendations for patient vaccination, and I am writing to invite you to participate in my study.

If you are 18 years of age or older, and are willing to participate, you will be asked to take a pre-test, observe an educational program, and take a posttest. It should take approximately thirty minutes for you to complete the procedures listed. Your participation will be completely anonymous, and no personal, identifying information will be collected.

To participate, please let the researcher know you would like to be involved.

A consent document is attached to this letter for the live education program. The consent document contains additional information about my research, please sign the consent document and return it to me at the time of the live education program.

If you choose to participate, you will be provided with a complimentary luncheon during the educational program.

Sincerely,

Lindsey Buzzeo
Liberty University DNP/FNP Student

Appendix E

Collaborative Institutional Training Initiative Certificate



Completion Date 05-Sep-2018
Expiration Date 04-Sep-2021
Record ID 21120264

This is to certify that:

Lindsey Hanks

Has completed the following CITI Program course:

Biomedical Research - Basic/Refresher (Curriculum Group)
Biomedical & Health Science Researchers (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Liberty University



Verify at www.citiprogram.org/verify/?w518db08e-5610-4918-9c8f-3a21e3a55e0c-21120264

Appendix F**Liberty University IRB Approval****LIBERTY UNIVERSITY.**
INSTITUTIONAL REVIEW BOARD

May 21, 2019

Lindsey Buzzeo

IRB Application 3817: Shingrix Education for Providers

Dear Lindsey Buzzeo,

The Liberty University Institutional Review Board has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study does not classify as human subjects research. This means you may begin your research with the data safeguarding methods mentioned in your IRB application.

Your study does not classify as human subjects research because evidence-based practice projects are considered quality improvement activities, which are not considered “research” according to 45 CFR 46.102(d).

Please note that this decision only applies to your current research application, and any changes to your protocol must be reported to the Liberty IRB for verification of continued non-human subjects research status. You may report these changes by submitting a new application to the IRB and referencing the above IRB Application number.

If you have any questions about this determination or need assistance in identifying whether possible changes to your protocol would change your application’s status, please email us at irb@liberty.edu.

Sincerely,

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
Research Ethics Office

LIBERTY
UNIVERSITY.

Liberty University | Training Champions for Christ since 1971

Appendix G

Site IRB Approval Letter

<p style="text-align: right;">[REDACTED] Institutional Review Board</p> <p><u>EXEMPT RESEARCH CHECKLIST</u> Version 6, February 19, 2019</p> <hr/> <p>Date: 7/8/2019</p> <p>[REDACTED] IRB #: [REDACTED]</p> <p>IRB of Record _____</p> <p>Facility: [REDACTED]</p> <p>Principal Investigator: Lindsey Buzzeo</p> <p>Email address: [REDACTED]</p> <p>Phone number: [REDACTED]</p> <p>Title of Research Project/Study Title: Shingrix Education for Providers</p> <p>Supplemental documentation is required for consideration of exemption status.</p>	<p style="text-align: center;">Appendix H</p> <p>[REDACTED] IRB</p> <p>Received (date): 7/9/19</p> <p>Action:</p> <p>Approved Exempt 7/10/19 Category 3</p>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------

	True	Not True
Criteria that must be met for the research to be determined to be consistent with IRB ethical standards.		
The research holds out no more than minimal risk to subjects.	x	
Selection of subjects is equitable.	x	
If there is recording of identifiable information, there are adequate provisions to maintain the confidentiality of the data.	x	
This study does not require an Informed Consent Form completed on the subjects. If you have checked "Not True" because your study requires consent of subjects, please stop and complete the full IRB application.	x	
There are adequate provisions to maintain the privacy interests of subjects.	x	

	True	Not True
Checklist Statements		
Category 1 – For Educational Settings		
1. The research will only be conducted in established or commonly-accepted educational settings including but not limited to schools and colleges. (May include other sites where educational activities regularly occur.)		
2. The research will involve only normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.		
3. The research will not involve individuals as participants who are known to be prisoners.		
4. The research is not subject to FDA regulations.		
Category 2 – For Educational Tests, Surveys, Interviews, Public Behavior Observation:		

5. The research will involve only the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior.		
<i>Address statement 6 only if the research will involve children as participants. If children will NOT participate, state N/A and continue with statement 7.</i>		
6. The procedures will be limited to the use of educational tests (cognitive, diagnostic, aptitude, achievement) or observation of public behavior where the investigator will NOT participate in the activities being observed.		
7. The information obtained from educational tests, survey procedures, interview procedures or observation of public behavior will be recorded in such a manner that human subjects CANNOT be identified, directly or through identifiers linked to the subjects. <i>"True" to either statement 7 or 8 will qualify for exemption provided that statements 9 and 10 are true.</i>		
8. Any disclosure of the human subjects' responses outside the research could NOT reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.		
9. The research will <u>not</u> involve individuals as participants who are known to be prisoners.		
10. The research is not subject to FDA regulations.		
Category 3 – For Educational Tests, Surveys, Interviews, Public Behavior Observation of Public Officials:		
11. The research will involve only the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior AND the human subjects are elected or appointed public officials or candidates for public office. (Applies to senior officials such as mayor or school superintendent rather than a police officer or teacher.) <i>"True" to either statement 11 or 12 will qualify for exemption provided that statements 13 and 14 are true.</i>	X	
12. The research will involve only the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior AND federal statute(s) require without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.	X	
13. The research will <u>not</u> involve individuals as participants who are known to be prisoners.	X	
14. The research is not subject to FDA regulations.	X	
Category 4 – For Existing Data, Documents and Specimens:		
15. The research will involve only the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens. ("Existing" means existing before the research is proposed to the IRB to determine whether the research is exempt. All materials to be reviewed currently exist at the time of this exemption request.)		
16. The sources of the existing data, documents, records or specimens are publicly available OR the information will be recorded by the investigator in such a manner that participants cannot be readily identified either directly or through identifiers (such as a code) linked to		

them.		
17. The research will <u>not</u> involve individuals as participants who are known to be prisoners.		
18. The research is not subject to FDA regulations.		
Category 5 – For Public Benefit or Service Programs (Federal):		
19. The project is a research or demonstration project conducted by or subject to the approval of a (federal) Department or Agency head and which is designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those public benefit or service programs.		
20. The research will <u>not</u> involve individuals as participants who are known to be prisoners.		
21. The research is not subject to FDA regulations.		
22. The program under study delivers a public benefit (e.g., financial or medical benefits as provided under the Social Security Act) or service (e.g., social, supportive, or nutrition services as provided under the Older Americans Act).		
23. The research or demonstration project will be conducted pursuant to specific federal statutory authority.		
24. There is no statutory requirement that the project be reviewed by an IRB.		
25. The project does not involve significant physical invasions or intrusions upon the privacy of participants.		
26. The exemption has authorization or concurrence by the funding agency.		
Category 6 – For Taste and Food Quality and Consumer Acceptance Studies:		
27. The research involved only a taste and food quality evaluations or a food consumer acceptance study in which (i) wholesome foods without additives will be consumed OR (ii) food will be consumed that contains a food ingredient, agricultural chemical or environmental contaminant that is at or below the level found to be safe by the Food and Drug Administration or is approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.		
28. The research will <u>not</u> involve individuals as participants who are known to be prisoners.		
Emergency Use of an Unapproved Test Article (i.e., a drug, device or biologic that is not FDA-Approved)		
The activity involves emergency use of an investigational drug, device or biologic. Such an activity is not exempt from IRB review. However, this emergency use may occur prior to IRB review and approval (see Category A and B in the Emergency Use Policy for details.) Note that such an emergency use must be reported to the IRB within five business days.		
The activity does not meet with DHHS definition of “research.”		

Signature of Principal Investigator:

Lindsey Buzzeo
Typing my name on the line above constitutes an electronic signature.

Printed Name

Lindsey Buzzeo

Date: 7/8/2019

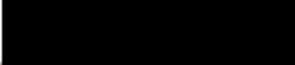
FOR THE IRB REVIEWER ONLY:

Is the activity exempt? YES [] NO []

Does the research meet the standards of ethical conduct? YES [] NO []

Which exemption category or categories apply to the activity? 3

Approved by IRB Exempt Committee (date): July 10, 2019

Signature of IRB Reviewer:  DNP, NNP-BC
Typing my name on the line above constitutes an electronic signature.

Printed Name  DNP, NNP-BC

Date 7/10/2019

Appendix H
Demographic Survey

1. How old are you?
 - a. 20-30 years
 - b. 31-40 years
 - c. 41-50 years
 - d. 51-60 years
 - e. 60 years and older

2. How many years have you been licensed as a provider?
 - a. 0-3 years
 - b. 4-7 years
 - c. 8-11 years
 - d. 12-15 years
 - e. 16 years or more

3. What is your primary area of practice?
 - a. Primary care
 - b. Family care
 - c. Pediatrics
 - d. Other specialties

4. Have you ever practiced in any of the following areas? (select all that apply)
 - a. Primary care
 - b. Family care
 - c. Pediatrics
 - d. Other specialties

5. Have you attended an in-service education program on the shingrix vaccine in the past?
 - a. Yes
 - b. No

Appendix I

Pretest and Posttest

1. How does shingles typically manifest in a patient according to the Centers for Disease Control (CDC)?
 - a. Unilateral vesicular lesions along a thoracic dermatome
 - b. Disseminated papular lesions
 - c. Localized nummular lesions
 - d. Linear ulcerated lesions
2. What age is an individual at risk to be diagnosed with Shingles?
 - a. 40 years of age and older
 - b. 50 years of age and older
 - c. 60 years of age and older
 - d. 70 years of age and older
3. What is the average percentage of patients that have postherpetic neuralgia after a shingles diagnosis?
 - a. 5-10%
 - b. 11-15%
 - c. 16-20%
 - d. 21-25%
4. The Shingrix vaccine is different from the Zostavax vaccine because it contains live attenuated herpes zoster.
 - a. True
 - b. False

5. What is the population age that is recommended to receive the Shingrix vaccination?
 - a. 40 years of age and older
 - b. 50 years of age and older
 - c. 60 years of age and older
 - d. 70 years of age and older

6. How effective is Shingrix in preventing the disease?
 - a. 90%
 - b. 80%
 - c. 70%
 - d. 60%

7. What are the contraindications for the Shingrix vaccine? (Select all that apply)
 - a. Have ever had a high fever with the Shingrix vaccine
 - b. Have received the Zostavax vaccine
 - c. Have ever had a severe allergic reaction to the Shingrix vaccine
 - d. Currently are diagnosed with Shingles
 - e. Currently are taking antiviral medications

8. What are common side effects associated with the vaccine? (Select all that apply)
 - a. Arm pain at the site of injection
 - b. Muscle pain
 - c. Headache
 - d. Fever
 - e. Abdominal pain and nausea

9. Administration is safe for individuals who are immunocompromised.
 - a. True
 - b. False
10. Medicare Part D covers the Shingrix vaccine.
 - a. True
 - b. False
11. Medicaid plans cover the Shingrix vaccine.
 - a. True
 - b. False
12. Private insurances vary on their coverage of the Shingrix vaccine.
 - a. True
 - b. False
13. How confident are you when discussing vaccine recommendations with your patients?
 - a. Very confident
 - b. Confident
 - c. Slightly confident
 - d. Not confident
14. How likely are you to recommend the Shingrix vaccine to your patients?
 - a. Very likely
 - b. Likely
 - c. Somewhat likely
 - d. Not likely

15. How confident do you feel answering your patient's questions about the vaccine?
- a. Very confident
 - b. Confident
 - c. Slightly confident
 - d. Not confident
16. How confident do you feel discussing the vaccine with a patient who has refused?
- a. Very confident
 - b. Confident
 - c. Slightly confident
 - d. Not confident
17. You have specific talking points when discussing the vaccine with patients who have refused the Shingrix vaccine?
- a. True
 - b. False

Appendix J

Patient Number	Age Older than 50 Years	Inclusion Criteria: Annual Wellness Visit	Exclusion Criteria: Contraindications for the Shingrix Vaccine	Provider Recommended vaccine
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Appendix K

Provider Presentation



COMMON PRESENTING SIGNS & SYMPTOMS

- Unilateral vesicular rash presenting along a dermatome (CDC, 2018).
- Rash is typically painful
- Prodromal symptoms
 - Malaise
 - Headache
 - Photophobia

(CDC, 2018a).

CONTRAINDICATIONS

- If the patient has ever had a high fever related to the vaccine
- If the patient has ever had a severe allergic reaction to the vaccine
- If the patient is currently diagnosed with shingles
- If the patient is currently taking antiviral medication
- If the patient is pregnant
- If the patient is immunocompromised

(CDC, 2018b).

WHY SHINGRIX?

- Previous shingles vaccination, Zostavax, was a live attenuated vaccine
- Shingrix is not a live vaccine
- Vaccine is recommended for patients 50 years of age and older
- Shingrix is on average 90% effective at preventing development of the disease



(Bharucha, Ming, & Breuer, 2017).

RISK FACTORS AND COMPLICATIONS

- 50 years of age and older are at risk
- Increased age leads to increased risk of development
- Postherpetic neuralgia
 - Persistent pain after disease process has resolved
 - 11-15% of patients on average develop this complication

(CDC, 2018a).

SIDE EFFECTS

- Arm pain at the site of injection
- Muscle pain
- Headache
- Fever
- Abdominal pain and nausea

INSURANCE AND SHINGRIX

Private insurances vary

- Many cover the vaccine, some require a copay

Medicare Part B does not cover the vaccine

Medicare Part D covers the shingles vaccine

- Patient may have to pay a portion of it as a copay or pay the money for the vaccine upfront and be reimbursed

Medicaid does not cover the vaccine

(CDC, 2018b).

-
- HealthMap Vaccine Locator
 - Shingrix Vaccine Locator
 - Shows pharmacies that have had the Shingrix vaccine in stock for the past three months
 - Includes a map with pharmacies and addresses

HOW TO LOCATE THE VACCINE

VACCINE HESITANCY

- Anti-vaxxer attitude (Sadaf et al., 2013).
- Value of provider recommendation (Paterson et al., 2016).
- CASE approach

