

ASSOCIATIONS BETWEEN HUMAN PAPILLOMAVIRUS VACCINE HESITANCY AND  
RESISTANCE AND SOCIAL MEDIA ENGAGEMENT

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**Title**

Associations Between Human Papillomavirus Vaccine Hesitancy and  
Resistance and Social Media Engagement

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## ABSTRACT

Human Papillomavirus (HPV) is one of the most common sexually transmitted infections worldwide. More than 13 million Americans are infected each year. Typically, HPV infections will resolve without treatment, and many infected individuals are asymptomatic. However, in some cases, these infections can lead to penile, oral, vaginal, cervical, and/or anal cancer. With the rise in HPV infection rates, the need for vaccination is crucial in prevention of HPV-related infections and cancers. The CDC recently changed HPV vaccine guidelines to include individuals ages 27-45. Regardless of guideline changes, HPV vaccination rates are lower than other recommended vaccines, which may be due to antivaccination campaigns.

The purpose of the practice improvement project was to identify attitudes, beliefs, and barriers towards HPV vaccination and sources of vaccine information among residents, ages 18-45, in a rural North Dakota county. The project was conducted between May 2023 and June 2023. Participants completed an online survey via Qualtrics to assess views, social media usage, influences, and any potential barriers to HPV vaccination. Each participant who completed the survey were provided links to websites for further information on HPV and the vaccine.

Over 30% (n=9) of the 28 participants utilized search engines for their health and vaccine information, while 29% (n=8) utilized their primary care provider. Approximately 5% (n=2) of the participants utilized social media sites for their health and vaccine information. A majority (n = 18; 64.3%) of participants report they would receive the HPV vaccine if recommended by a provider. Rural providers were educated on survey results and determined that changes within their practice were needed to increase HPV vaccination rates. Providers identified the importance of increasing HPV vaccine uptake to help better serve their community. These providers planned to display an HPV infographic within their clinic and continue to offer the HPV vaccine at annual

wellness visits. Continued HPV vaccine education provided by healthcare professionals is imperative to enhance HPV vaccine confidence and uptake, which has the potential to reduce morbidity and mortality associated with HPV and HPV-related cancers.

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To the NDSU DNP Class of 2024, Cheers!

## **DEDICATION**

I would like to dedicate this disquisition to my family. To my husband Shane, you are one amazing human. Thank you for your continued love, sacrifice, and support. I appreciate and love you more than you know. You have helped me become a better wife and mother than I ever could have imagined. To my daughter Blake, thank you for making me a mother and teaching me to keep things simple. I hope this journey has showed you the representation of hard work, dedication, and success. I will always be your number one supporter and cheerleader. I love you!

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## **CHAPTER 1: INTRODUCTION**

### **Background and Significance**

The Human papillomavirus (HPV) vaccine is one of two vaccines that are currently approved for use to prevent cancer (Centers for Disease Control and Prevention [CDC], 2022a). The HPV vaccine has proven to be efficacious in preventing HPV infections and related cancers since its introduction in 2006 (CDC, 2022b). While the safety and efficacy of the HPV vaccine has been accepted, the HPV vaccine is increasingly being perceived as unsafe by patients, which may lead to vaccine hesitancy and refusal. Delayed or inadequate vaccination has numerous consequences for families and children, including increased preventable HPV-related disease, medical costs, hospitalizations, and deaths. Currently, 27% of men and 53.6% of women between ages 18-26 have completed the HPV vaccine series, (Boersma and Black 2020). Rates for men and women ages 27-45 have not been made available given the recent change in HPV vaccine guidelines.

One factor that may be contributing to increased vaccine hesitancy and refusal is social media. Many posts on social media have been analyzed and identified as containing negative messages towards HPV vaccination (Ortiz et al., 2019). Dunn et al. (2015) conducted a study focusing on the amount of negative social media posts related to HPV vaccination and suggested there may be a specific user(s) who may have the ability to influence others to refuse vaccines through misinformation. Additionally, Argyris (2021) found that social media can influence the decision to seek or refuse vaccinations. Social media has rapidly grown as a complete news source and engagement with negative or anti-vaccine posts within social media sites have been correlated with negative impacts on vaccination beliefs and uptake.

Given the continued presence of social media and potential spread of misinformation, further efforts are necessary to identify where patients receive HPV vaccine information and to determine which sources are viewed as credible. Efforts towards educating health professionals regarding sources of vaccine information and common patient attitudes and beliefs towards HPV vaccination may help professionals tailor the vaccine conversation to reduce misbeliefs, as well as enhance confidence and uptake of the HPV vaccine, which has the potential to reduce HPV-related morbidity and mortality and improve overall health outcomes.

### **Significance**

One of the objectives of Healthy People 2030 is to prevent the contraction and spread of disease by increasing vaccination rates (United States Department of Health and Human Services, 2022). One goal of the Healthy People 2030 initiative is for 80% of adolescents ages 13-15 to be vaccinated against HPV. Healthy People 2023 currently shows that 54.5% of adolescents in the United States have completed the HPV vaccination series, which is a 6.5% increase from 2018. A second objective in the Healthy People 2030 initiative is to “reduce infections due to human papillomavirus (HPV) types prevented by the 9-valent” (Gardasil 9) HPV vaccine in adults, ages 20-34” (para 3). The status of this objective is baseline only, though the most recent data shows 15.1% of individuals ages 20-34 had at least 1 HPV serotype prevented by the HPV vaccine.

Recent studies have shown that adults between the ages of 18 and 26 have become more apt to receive the HPV vaccine; Boersma and Black (2020) found that HPV vaccination rates within this age group have almost doubled within the past five years. In 2013, only 22.1% of adults have received either one or more doses of the HPV vaccine and in 2018, that number increased to 39.9%. Approximately 57.7% of teens in the United States, both male and female,

have received at least two or more doses of the HPV vaccine (CDC, 2022e). Within North Dakota, about 60% of adolescents ages 13-17 have completed the full HPV series (North Dakota Health and Human Services, 2023). Within this rural North Dakota county, about 10% adults, ages 18-26 have completed 2 or more doses of the HPV vaccine, while only 4% adults, ages 27-45 have completed at least 2 doses of the HPV vaccine (Bisch-Steinke, 2023). While the prevalence of adolescents vaccinated against HPV has been increasing, HPV vaccine completion in both adolescents and adults rates are still low in comparison to other scheduled vaccines, such as Hepatitis A and B (HepA) (HepB), Measles, Mumps, Rubella (MMR), and the Meningococcal vaccine (MenACWY). Despite efforts from clinicians and public health officials to increase HPV vaccination uptake, there still appears to be barriers to this vaccine specifically.

One barrier to HPV vaccination is misinformation and antivaccination campaigns, which are often spread through social media. In fact, social media has been providing a direct avenue for misinformation with the click of a button. While reputable resources are also available, the potential epidemic of social media misinformation has left many individuals wondering if getting the HPV vaccine is right for them or their dependents. Historically, rural areas have been found to be vaccine confident, indicating that rural populations were more apt to receiving vaccinations; however, Manganello et al. (2023) found that vaccine confidence among rural populations is decreasing.

### **Problem Statement**

HPV vaccine misinformation is easily spread through social media and may lead to an increase in vaccine hesitancy and reduced uptake of the HPV vaccine. Understanding attitudes towards the HPV vaccine and where the general public receives information about the HPV vaccine is important to help health professionals tailor educational messages and reduce

misbeliefs that are spread from antivaccination campaigns, which can enhance vaccine confidence.

### **Purpose**

The purpose of this practice improvement project was to assess attitudes towards HPV vaccination among residents, ages 18-45, in a rural North Dakota County and identify sources of vaccine information. The practice improvement project also focused on promoting reputable vaccine resources through social media. Health professionals working within the county were educated on residents' attitudes towards HPV vaccination. Intent to change practice as a result of identified attitudes and vaccine information sources was assessed, as positive practice changes have the potential to improve HPV vaccination uptake.

### **Objectives**

The practice improvement project was guided by the following objectives:

1. Assess attitudes, beliefs, barriers and influences towards the HPV vaccination among residents ages 18-45 in rural North Dakota.
2. Identify exposure to social media messages related to HPV vaccinations among residents in a rural North Dakota County.
3. Educate health professionals on attitudes towards HPV vaccination and sources of vaccine information among residents living in their respective rural North Dakota County and assess intent to change practice due to the information learned.
4. Distribute evidence-based HPV information through social media messages and platforms targeted toward residents in a rural North Dakota County.

## CHAPTER 2: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

An extensive literature review was aimed towards the problem statement. Chapter Two includes a description of the theoretical framework and a review of the literature on Human Papilloma Virus (HPV) vaccine resistance and hesitancy, as well as social media usage in relation to vaccine hesitancy.

Initial literature searches were focused within the Cochrane Database of Systematic Reviews (Cochrane) database through the North Dakota State (NDSU) Health Sciences Library (HSL) website. Subsequent literature searches were conducted via the NDSU HSL and included Cumulative Index to Nursing and Allied Health Literature (CINAHL) Complete, PubMed, American Psychological Association (APA) PsycInfo, Sociological Abstracts and finally, a generalized search through the NDSU HSL. Resources also became available through past student dissertations and presentations.

Specific search terms submitted through each database included “Human Papilloma Virus,” “vaccine refusal,” “vaccine hesitancy,” “parents,” “social media,” “media,” “quadrivalent HPV vaccine efficacy,” and “health literacy.” Inclusion criteria includes articles from 2016 through 2023, with the exception of one journal published in 2002. Due to the significant findings of prevention strategies in the article, this was included within the review of literature. Additional inclusion criteria included written in the English language, and peer-reviewed, full-text journal articles.

### List of Definitions

**Vaccine** - The term vaccine as a “preparation that is used to stimulates the body’s immune response against diseases” (CDC, 2022f, para. 2). It is important to understand the definition of vaccine, as this is the focus of this dissertation.



**Social Media** - Social Media can be defined as a platform where users of the specific social media platform can share information, videos, and personal content (Merriam-Webster, 2022).

**Vaccine Confidence** - Vaccine confidence is described as the belief that vaccines are safe, effective, and can be a part of a trustworthy medical system. To aid in the act of becoming vaccine confident, healthcare providers must take time to listen and adequately address all questions and concerns presented (CDC, 2022h).

## **Literature Review**

### **Human Papillomavirus**

Human papillomavirus (HPV) is now known as the most common sexually transmitted infection (STI) (CDC, 2022a). In 2018, over 43 million HPV infections were noted, and most of these cases involved individuals who were in their late teens and early twenties. HPV is comprised of small-double stranded DNA that has the ability to infect the epithelium (CDC, 2022b). Due to its omnipresence of over 200 distinct types, HPV will affect almost most individuals sometime in their lives. HPV is typically spread through skin-to-skin contact, more specifically through anal, oral, or vaginal intercourse with an individual who is infected with the virus (CDC 2022a). Additionally, there is potential to transmit HPV during vaginal delivery. Many individuals who have an active HPV infection do not experience any symptoms, and individuals who do experience symptoms typically do not have symptoms until months or years after the initial infection. Regardless of the onset of symptoms, an individual who is infected with HPV can still spread the virus.

Approximately 90% of HPV infections will spontaneously clear on their own (CDC, 2022a). If the individual is unable to clear the infection, symptoms may arise in many different

forms. These forms may include anogenital warts, precancerous cells, and anogenital (vulva, vagina, penis and anus), cervical, or oropharyngeal cancers (CDC, 2022b). Low-risk or non-oncogenic HPV serotypes, such as HPV 6 and 11, can lead to epithelial cell abnormalities in the cervix, anogenital warts, and respiratory tract papillomas. High-risk or oncogenic serotypes operate as carcinogens that lead to the development of HPV-related cancers. These high-risk types include, HPV 16, 18, 31, 33, 45, 52, and 58. HPV serotypes 16 and 18 account for roughly 66% of cervical cancers, while HPV 31, 22, 45, 52, and 58 are responsible for an additional 15% of HPV-related cervical cancers (CDC, 2022b). While HPV infection does increase cancer risk, individuals who are infected with high-risk HPV infections do not always develop cancer.

## **Screening**

There can be a multi-dimensional approach to preventing HPV infections and HPV-related cancers, including vaccinations, limiting sexual encounters and exposures, consistent protection usage with condoms or barriers, and routine cervical screenings. It is important to note that with correct and consistent condom use, HPV-related infections can be decreased by almost 80% (Manhart & Koutsky, 2002).

Routine pelvic screenings and Papanicolaou (Pap) tests have proven to help prevent HPV-related complications. Pap tests look for changes at the cellular level of the cervix that may be considered precancerous (CDC, 2022c). The CDC guidelines recommend for women to start HPV screening at age 21 with a Pap test. If there is no evidence of abnormal or precancerous cells, screening should be completed again in three years. If abnormal or precancerous cells are present, providers will follow ASCCP guidelines for further screening. For women, ages 30-65 years of age, there are 3 different screening strategies, which include primary HPV testing, HPV testing alongside the Pap test (co-testing), or a Pap test only. The timeline as to when individuals

should be tested next depends on the type of test performed and results found. Women should have routine primary HPV testing done every five years if results are normal. If co-testing is performed and results are normal, women can wait five years until their next screening. Women who opt for Pap testing only, can wait three years in between testing if their results are normal. Once over the age of 65, women do not need to be screened on a routine basis and informed decision-making with patient and provider input is recommended.

According to the CDC (2022d), there are no current approved HPV tests for men, nor is there recommended routine screening. Men who are at higher risk for developing anal cancers have the option to be screened through anal Pap testing. Men who are at higher risk of developing an HPV infection include men who are immunocompromised and men who receive anal sex.

### **HPV Vaccine**

Receiving vaccinations is important in helping protect the human body against diseases. Vaccinations help boost the body's natural immune system to fight off viruses and bacteria that have potential to cause deadly diseases. There are multiple age groups in which vaccines are recommended, ranging from newborn (0 months) to adulthood (>18 years old). Vaccinations may also protect others from vaccine-preventable diseases. People who are too young (newborns), elderly, or immunocompromised may not be able to receive certain vaccines (CDC 2022g). In this case, herd immunity is important in protecting people within a community. While vaccines do not offer 100% protection from diseases, herd immunity does substantially protect people who are unable to receive vaccines (WHO, 2020).

There are currently three clinically developed vaccines that protect against and target a plethora of HPV serotypes. These vaccines are indicated to prevent initial HPV infection and

complications (Cox & Palefsky, 2022). Current HPV vaccines available include human papillomavirus bivalent vaccine (Cervarix), human papillomavirus quadrivalent vaccine (Gardasil), and human papillomavirus 9-valent vaccine (Gardasil 9). The quadrivalent vaccine specifically targets HPV serotypes 6, 11, 16, and 18, which is significant because HPV serotypes 16 and 18 are considered “high-risk.” The 9-valent vaccine targets HPV serotypes 6, 11, 16, and 18, but also covers other high-risk serotypes including HPV 31, 33, 45, 52, and 58. The bivalent vaccine targets HPV serotypes 16 and 18 and is only distributed in China. Additionally, the bivalent vaccine has recently received prequalification from the World Health Organization (WHO) to be distributed to countries with limited resources and access to medical care. The 9-valent HPV vaccine is currently the only HPV vaccine available within the United States and has been approved to aid in the prevention of HPV-related cancers such as cervical, vulvovaginal, anal, oropharyngeal, and anogenital cancers, as well as dysplastic and precancerous lesions (WHO, 2022).

The 9-valent HPV vaccine consists of recombinant DNA comprised of HPV L1 capsid proteins (CDC 2022b). These L1 proteins are manufactured throughout fermentation utilizing *Sarccchomyces cerevisiae* yeast, which is the main component in the vaccine. Once the vaccine is administered, the L1 proteins will then amass into non-infectious and non-oncogenic groups known as virus-like particles (VLPs). The HPV vaccine is currently administered via intramuscular injection and should not be given to individuals with significant allergies to aluminum, as this is a significant adjuvant within the 9-valent vaccine.

### ***HPV Vaccine Schedule***

The current guidelines for HPV vaccination include initiating vaccination for both males and females starting at ages 11 or 12 years. Individuals can be vaccinated at as young as 9 years

of age, especially individuals who are victims of sexual abuse or assault (CDC, 2022b). “Catch-up” vaccination is recommended for individuals who are ages 13-26 years who have not been adequately vaccinated (have not received more than one dose). Individuals who are between the ages of 27 and 45 should discuss with their provider if receiving HPV vaccinations would be beneficial. The HPV vaccine is not currently recommended for individuals over the age of 45.

Individuals may not achieve a therapeutic effect if they currently have an HPV infection, such as warts or lesions, during the time the HPV vaccine is administered. Therefore, optimal vaccination initiation and administration is before any exposure to HPV via sexual contact (CDC 2022b). However, catch-up vaccinations may still be effective even if the individual has been previously exposed. If previously exposed to HPV, the vaccine may provide less benefit, but can still prevent and protect against other HPV serotypes the individual may not have been exposed to earlier in life (CDC 2022b).

HPV vaccines may be administered in either a two- or three-dose series depending upon age and comorbid conditions (CDC 2022b). Males or females under who receive an initial valid dose before their 15<sup>th</sup> birthday can complete a two-dose series. The two-dose schedule is as follows: first valid injection followed by a second and final dose 6 to 12 months after initial injection. If the second dose is administered at 5 months of initial dose, this can be considered valid, though if second dose is administered less than 5 months after the initial dose, a third dose should be administered at least 12 weeks after second dose and 6 to 12 months after the first dose. The two-dose series follows a 0, 6-12-month schedule.

Individuals who have received their initial dose after their 15<sup>th</sup> birthday or have pre-existing conditions are required to complete a three-dose series. The three-dose series is as follows: dose one is administered after 15<sup>th</sup> birthday followed by the second dose, 1-2 months

later. Finally, the third dose should be administered six months after the first dose (CDC 2022b). The three-dose series follows a 0, 1-2, 6-month schedule. The HPV vaccine has been shown to be well tolerated with a favorable safety profile (Thompson, 2022).

“Prevaccination assessments” are not required prior to the administration of any HPV vaccine (CDC 2022b). Worldwide, the Advisory Committee on Immunization Practices (ACIP) does not currently prefer one approved vaccine over another. The selection and administration of a specific vaccine depend on location and availability. The 9-valent vaccine is the preferred HPV vaccine within the United States. Once an individual is fully vaccinated (completion of either two-dose or three-dose series), the ACIP does not recommend re-vaccination with another or different HPV vaccine.

### ***HPV Vaccine Safety***

Since the initial licensure of the HPV vaccines, over 135 million doses have been administered within the United States (Sheth & Chang, 2022). While worldwide, over 270 million doses of the HPV vaccine have been administered. Vaccine safety trials noted minimal adverse effects and continued safety studies have supported safety results from initial trials.

A study conducted by Kamolratanakul and Pitisuttihum (2021) concluded that there appeared to be no clinical significance in the amount of serious adverse events after administration of the HPV vaccine. The risk of anaphylaxis from the HPV vaccine was found to be approximately 0.3-3 cases per million doses. According to the Global Advisory Committee on Vaccine Safety (GACVS), Vaccine Adverse Events Reporting System (VAERS), and the Vaccine Safety Datalink (VSD), there are no significant links to long-term disorders with the HPV vaccine, including Guillain-Barré syndrome, complex regional pain syndrome (CRPS), Bell’s Palsy, postural orthostatic tachycardia syndrome (POTS), premature ovarian insufficiency,

primary ovarian failure, and venous thromboembolism. While receiving the HPV vaccine is contraindicated in pregnancy, there has yet to be a link between adverse outcomes during pregnancy.

### ***HPV Vaccine Efficacy***

HPV vaccination has made a significant impact in decreasing amount of HPV infections and complications from types 6, 11, 16, and 18. In fact, Basu et al. (2021) found promising results that included a 95.4% efficacy against HPV types 16 and 18. Baandrup et al. (2021) found that vaccinated women less than 21 years of age had a 50% reduction rate in HPV-related genital warts compared to women who were unvaccinated. In areas with low to moderate vaccination rates, vaccinated individuals did have a reduction in HPV-related genital warts, though these numbers were nowhere near the 50% reduction rate. Unvaccinated men and women also had a decrease in HPV-related genital warts and cancers due to herd immunity.

Sheth and Chang (2022) also found that HPV vaccinations were efficacious in preventing HPV infections and related cancers. The quadrivalent vaccine demonstrated an 87% efficacy rate against HPV types 6, 11, 16 and 18 along with a greater than 98% efficacy rate against external genital lesions and cervical intraepithelial neoplasia (CIN +2). The 9-valent vaccine showed a 95% efficacy rate against persistent HPV infections, as well as 97% efficacy rate against high grade disease. Data has also shown that women who did not complete the full HPV vaccine series still had high efficacy rates against HPV infections and related complications.

### **Vaccine Hesitancy**

Many people doubt HPV vaccine efficacy and the benefits, which is causing a decrease in the number of people getting vaccinated and increasing vaccine hesitancy (Vrdelja et al., 2018). Contributing factors to HPV vaccine hesitancy include common misbeliefs related to the HPV

vaccination, negative attitudes towards HPV vaccination, and misinformation and antivaccination campaigns, which are often spread through social media and other non-credible sources of vaccine information.

### ***Misbeliefs Related to HPV Vaccination***

HPV vaccination concerns and myths have present since the recommendation of the vaccine in 2006. Many of these myths and concerns stem from lack of HPV knowledge (Traumberger et al., 2022). A common misconception in adults is they currently are or have been sexually active and the vaccine is not appropriate at this point. While it is true that there are higher efficacy rates with HPV vaccination prior to exposure, individuals who have been previously exposed to HPV can still receive the vaccine and experience protection against certain serotypes of HPV (Sheth & Chang, 2022).

Taumberger et al. (2022) identified nine common HPV vaccination myths including the belief that there is no need for vaccination if routine PAP smears are completed, which is not accurate as screening is secondary prevention to identify pre-cancerous or cancerous lesions. HPV vaccination is efficacious in primary prevention. Safety and adverse effects of the HPV vaccine were also a significant concern. Common misbeliefs included that HPV vaccination can lead to ovarian failure, autoimmune disease, neurological disease, and death. Kamolratanakul & Pitisuttihum (2021) have found that the most common adverse effects associated with HPV vaccination are injection site pain and syncope with no association towards chronic disease or long-term adverse effects.

### ***Attitudes Towards HPV Vaccination***

Assessing attitudes towards the HPV vaccine can also guide future research to improve vaccine rates. A study conducted by Pitts et al. (2017) assessed attitudes among college men, and



many of the participants noted a lack of necessity for the HPV vaccine due to lack of knowledge on the contagiousness and severity of HPV infections. It was also noted that many participants felt that the HPV vaccine series was seen as inconvenient. Traumberger et al. (2022) found a common attitude related to HPV vaccination was that individuals who are not sexually active do not need to receive the HPV vaccine. Thompson (2022) noted that with increased education on HPV-related facts, attitudes towards HPV vaccination may improve along with HPV vaccination rates.

Alber et al. (2020) concluded that provider education and recommendation can be clearly linked to HPV vaccine uptake. Tung, Machalek, and Garland (2016) discussed that providers are a trusted source of HPV-related information. While primary care providers and nurses are trusted sources of health-related information, the information has to be presented in order individuals to be autonomous in their decision to or not to vaccinate. Finally, Zimet et al. (2010) discovered that 30% of 19–26-year-old women reported having conversations with their providers about HPV and the HPV vaccine and acting on their providers' recommendation. Assessing attitudes towards HPV vaccination and ensuring tailored, fact-based education from nurses and primary care providers is critical in increasing HPV vaccine uptake.

### ***Social Media Influence***

Vaccine hesitancy has been an issue even before social media was first introduced, though its prevalence has recently surged. Research has been conducted in the last two to three years on social media influences and vaccine hesitancy. Ortiz et al (2019) identified HPV-related posts on social media messages found on YouTube and determined that roughly 57% of the HPV-related posts were considered to be “anti-vaccine.” Additionally, Al-Uqdah et al. (2022) found that utilizing social media outlets as a source of potential vaccine information was directly

associated with vaccine hesitancy. Niu et al. (2020) explored if individuals who utilize social media believed that the HPV vaccine was effective in preventing HPV complications and related cancers and found that 33.7% of participants felt the HPV vaccine was effective, while 60.2% did not know if the HPV vaccine was effective. In addition to questions about the effectiveness of the HPV vaccine, patients also report safety concerns as a reason for declining the HPV vaccine, and Sheth and Chang (2022) suggest that an increased social media presence may be a contributing factor to the increased concerns.

Due to the nature of social media, information can be obtained within seconds, and social media users may not be able to determine if the information is from a credible or noncredible source. Social media platforms may have disclaimers on vaccine misinformation. While Guidry et al. (2020) found that limiting vaccine-related information on the social media site Pinterest decreased misinformation, the amount of available factual information was also limited. Exposure to misinformation within these social media platforms can be overwhelming and may only take minutes of exposure to misinformation on social media for individuals to become vaccine hesitant (Al-Uqdah, et al., 2022). Therefore, exposure to misinformation on social media sites can make a significant impact on vaccine beliefs and uptake. Healthcare providers play a pivotal role in reducing vaccine hesitancy through discrediting misinformation and anti-vaccination campaigns. Through the provision of accurate and credible vaccine information, healthcare providers have the opportunity to protect the health of patients, families, and communities.

### **Strategies to Reduce Vaccine Hesitancy**

While social media has the potential to spread misinformation, credible and reliable information can also be spread at rapid rates. The key to reaching social media users is how the

information is presented. Social media information may be received in a positive way if the information is geared towards personalized benefits rather than societal benefits (Michigan State University, 2021). This form of neuromarketing has been utilized throughout recent decades but can be highly effective. Posts are also going to be well received if there are visual aspects that promote the information in a short amount of time, such as videos, photos, memes, emojis, or a simple infographic. The CDC is currently implementing a “Vaccinate with Confidence” campaign that provides resources for health officials, medical providers, healthcare personnel, local community leaders and teachers to help collaborate and engage with members of their community to help increase vaccination awareness, knowledge and confidence (CDC, 2021). By utilizing tools within this campaign, healthcare providers and healthcare personnel have the ability to cater to the needs of their communities and customize a reputable yet effective strategy to increase HPV vaccination rates.

Healthcare providers play an important role in increasing vaccine confidence by providing vaccine education and guidance for patients and their family members (Shen & Dubey, 2019). Therefore, providing education and clinical guidance for primary care providers (PCP) is essential. Using open-ended questions, empathy, and affirmations towards patient and/or parent concerns may help improve vaccine confidence (Reno et al., 2018).

Niu et al. (2020) found that health-related social media usage showed an increase in HPV awareness and knowledge, which led to an increase in HPV vaccine uptake. While misinformation can be quickly spread via social media, it is important to note that evidence-based information can be distributed just as quickly. HPV-related health campaigns may play a role in HPV vaccine uptake. By creating concise and effective social media posts, there is potential for viewers to be positively influenced and may lead to increased HPV vaccination

rates. While evidence-based social media posts are imperative to reach mass audiences, patient-provider communication must be incorporated as well. Providers utilizing patient-centered communication accompanied with motivational interviewing can enhance HPV vaccine confidence. Utilizing patient-centered communication also allows the patient to become autonomous in their decision on receiving the HPV vaccine. By creating a personalized recommendation, patients have the sense of confidence and self-efficacy.

### **Summary**

There is a critical need in preventing the spread of misinformation, specifically misinformation found within social media sites and platforms. Much of the research that was analyzed throughout this literature review suggests that there are a multitude of barriers as to why individuals become vaccine hesitant, though it is important to determine if exposure to misinformation via social media is now becoming a more prevalent barrier. Continued educational efforts of healthcare providers and public health officials is imperative to battling vaccine hesitancy. Providing credible and accurate information to individuals in a way that is easily comprehended, but more importantly, easily attainable is essential to increasing vaccine uptake.

### **Theoretical Framework**

Nola Pender's Health Promotion Model (HPM) is the theoretical framework that was utilized to guide this project. The purpose of the HPM is to "assist nurses in understanding the major determinants of health behaviors as a basis for behavioral counseling to promote healthy lifestyles" (Pender, 2011, p. 2). The HPM is considered to have a direct lineage to the Social Cognitive theory, which states that in order to create a behavior change, a person must alter the way they think. Two of the HPM beliefs are focused on interpersonal influences and situational

influences. It is imperative that we further examine the impact of these influences and if they do, in fact, lead to a behavior change as the Social Cognitive Theory implies.

Pender identifies interpersonal influences as cognition-concerning behaviors that arise from families, peers, and healthcare providers (Pender, 2011). Situational influences are defined as personal perceptions that can facilitate or deter certain behaviors, such as the surrounding environment. This directly relates to the practice improvement project, as it was essential to assess specifically if interpersonal and/or situational influences affect vaccine intent.

The HPM also discusses perceived benefits to action (Pender, 2011). These beliefs can be linked back to interpersonal and situational influences. This was linked to the project because patients were asked where they obtain their health information from in the patient-distributed survey. Evidence-based information and misinformation can be spread via social media at rapid rates and can reach large audiences with one post. Evidence-based distributed information on HPV and the HPV vaccine can potentially lead to a decrease in HPV infections and HPV-related cancers via social media and may allow the viewer to identify personal benefits upon and after vaccination. Pender also discusses perceived barriers to action within the HPM. This is clearly linked to the project, as participants were asked to determine what barriers were present, if any, in receiving the HPV vaccine.

Key concepts of the HPM include the person, health, illness, environment, and nursing collaboration (Pender, 2011). The HPM focus is specific to eight beliefs, and these beliefs are then assessed by the nurse and help assists their patients in changing behaviors. These beliefs include:

1. Perceived benefits of action
2. Perceived barriers to action

3. Perceived self-efficacy
4. Activity-related affect
5. Interpersonal influences
6. Situation influences
7. Commitment to the plan of action
8. Competing demands and preferences of the patient

In addition to the beliefs, 14 theoretical propositions are also included within the HPM to help provide a foundation for health behaviors (Pender, 2011). These propositions include:

1. Beliefs, affect, and adoption of a health-promoting behavior is influenced by previous behaviors, as well as inherited and acquired personal characteristics.
2. People will engage in behaviors from which they believe they will benefit.
3. Perceived barriers can inhibit a person's commitment to behavior change and drive other behaviors.
4. Perceived self-efficacy increases the likelihood that a person will commit to and perform a behavior.
5. Perceived self-efficacy leads to a decreased perception of barriers to conducting a behavior.
6. A positive attitude towards a behavior leads to improved perception of self-efficacy.
7. Association between positive emotions and a behavior increases the probability of commitment to and action towards that behavior.
8. People are more likely to engage in health-promoting behaviors when a significant other engages in, is expectant of, and enables the behavior.

9. Interpersonal influence by family, peers, and health care providers can contribute to an individual's engagement in health-promoting behavior.

10. Situational influences can contribute to an individual's participation in health-promoting behavior.

11. The greater the commitment to a health-promoting plan of action, the more likely this will occur over time.

12. When competing demands require immediate attention, commitment to a health-promoting plan is less likely to result in the desired behavior.

13. When other actions are more attractive, commitment to a health-promoting plan is less likely to result in the desired behavior.

14. People are able to alter their own thoughts, affect, interpersonal influences, and situational influences to create an environment conducive to health-promoting behavior.

The HPM connected to the project and by facilitating behavioral changes, such as seeking HPV vaccinations, barriers to vaccination were identified, as well as how individuals were motivated or inhibited from making behavioral changes (Pender, 2011). To increase vaccination uptake and decrease vaccine hesitancy, we must anticipate the 14 theoretical propositions that are being utilized within this cohort. Also, addressing the eight beliefs within the HPM, ultimately allowed the coinvestigator to better promote the HPV vaccine.

The HPM (Pender, 2011) was used to guide questions in both the survey that was distributed to rural patient populations, but also to rural health care providers and rural public health officials. Further examination of patient survey questions and how they can be linked to the theoretical framework can be found in Table 1.

**Table 1***Patient Distributed Survey Questions Relating to Theoretical Framework*

<b>Question</b>	<b>Response Option</b>	<b>Theoretical Framework Beliefs</b>	<b>Theoretical Framework Propositions</b>
The most recent time you looked for general information about your health, what sources did you use?	A. Primary care provider B. Religious leader C. Friends D. Relatives E. Social media F. Search engine G. Center for Disease Control (CDC) H. I have never looked for general health information for myself I. Other; please describe	5, 6	14
Which of the following influenced your decision whether to receive the HPV vaccination?	A. Family/Friend B. Doctor C. Clergy D. Social Media E. Other; please describe	5, 6	5, 8, 10, 14
I have seen positive messages and benefits on HPV vaccination on social media sites	A. Strongly agree B. Somewhat agree C. Somewhat disagree D. Strongly disagree	1, 3, 6	2, 6, 8, 10, 13, 14
I have seen negative messages and harmful effects on HPV vaccination and social media sites	A. Strongly agree B. Somewhat agree C. Somewhat disagree D. Strongly disagree	1, 3, 6, 8	13, 14
Social Media has influenced to or not to receive the HPV vaccine	A. Strongly agree B. Somewhat agree C. Neither agree or disagree D. Somewhat disagree E. Strongly Disagree	4, 6	2, 6, 7, 8, 9, 10, 14



**Table 1***Patient Distributed Survey Questions Relating to Theoretical Framework (Continued)*

<b>Question</b>	<b>Response Option</b>	<b>Theoretical Framework Beliefs</b>	<b>Theoretical Framework Propositions</b>
What barriers to the HPV vaccine have you experienced? Select all that apply	A. Unable to find vaccination location B. Cannot go to appointments during the day C. Transportation issues D. Pressure from others to not be vaccinated E. Concerns about vaccine safety and/or side effects F. I have not experienced any barriers G. Other; please specify	2, 7, 8	3

## **CHAPTER 3: METHODS**

### **Overall Project Design**

The purpose of this practice improvement project was to assess attitudes towards HPV vaccination among residents, ages 18-45, in a rural North Dakota County and identify sources of vaccine information. Patient attitudes and knowledge of HPV vaccination, as well as sources of vaccine information, were assessed via online survey to those who willingly participate. Health professionals working within the county were educated on residents' attitudes and barriers towards HPV vaccination. Intent to change practice as a result of identified attitudes and vaccine information sources was assessed. The practice improvement project focused on promoting reputable vaccine resources through social media.

The Iowa Model of Evidence-based Practice was applied to facilitate the development and implementation of the patient distributed survey and post-educational survey. See Appendix A and B.

### **Objectives**

The practice improvement project was guided by the following objectives:

1. Assess attitudes, beliefs, barriers and influences towards the HPV vaccination among residents ages 18-45 living in a rural North Dakota County
2. Identify exposure to social media messages related to HPV vaccinations among residents in a rural North Dakota County
3. Educate health professionals on attitudes towards HPV vaccination and sources of vaccine information among residents living in their respective rural North Dakota County and assess intent to change practice among health professionals.

4. Distribute evidence-based HPV information through social media messages and platforms targeted toward residents in a rural North Dakota County

### **Setting**

The setting of this project took place in a rural town within the Southcentral region of North Dakota. According to the United States Census Bureau (2022), this Southcentral County has approximately 2,369 residents, with roughly 45% of individuals between the ages of 18-64, and about 7% of residents are considered to be a minority group, such as Black or African American, American Indian, Asian and Hispanic or Latino. The average age for residents within this county is 46.6 years old, and the average number of individuals residing in one house number of 2.30. Approximately 89% of residents have completed a high school graduate degree or higher, while 19% of residents have completed a bachelor's degree or higher. The median household income is roughly \$52,419, though it is important to note that 14.2% of residents are considered to be "persons in poverty" (United States Census Bureau, 2022).

Participants in the project included residents within the county, as well as health professionals at a local clinic and a local district health office. Residents within the county were voluntarily recruited to participate in an online survey through flyers distributed at the local clinic, district health office and their respective social media platforms. The local clinic is a two-room clinic, with two nurse practitioners and one registered nurse. The local district health unit consists of two public health officials.

### **Sample/Sample Size/Recruitment**

An online Qualtrics survey was developed to assess residents' attitudes towards HPV vaccination and barriers to vaccination (See Appendix C). Recruitment of participants to the survey occurred through infographs (See Appendix D). The infographs with survey information

and a QR code were distributed to both implementation sites and was displayed on the front door of the district health unit, the local bulletin board near the entrance of the family practice clinic, and the family practice clinic exam rooms. Social media posts were created and distributed via the district health unit and family practice clinic social media platforms, with a hyperlink that takes the participant directly to the Qualtrics survey. Hashtags were used to help increase interaction within the social media posts. These hashtags included #hpv, #hpvvaccine, #hpvawareness, and #gardasil. Willingness to complete the survey indicated participant consent as well as participants were required to provide consent via a single Qualtrics question prior to starting the patient survey. Upon completion of the survey, participants had the option to willingly provide contact information to be entered into a drawing for a \$20 Amazon gift card.

To target the population of interest, the following inclusion criteria was created:

1. Current rural Southeast district residents between the ages of 18-45
2. Able to read and understand English independently
3. Have access to a smartphone or computer with internet access
4. Participants who have already received the HPV vaccine were not excluded from the project.

An educational session was conducted with the nurse practitioners, public health officials, and the registered nurse five weeks after the patient survey closed to share information on attitudes towards HPV vaccination, sources of vaccine information, and barriers to HPV vaccination. During the educational session, the survey results were distributed, presented, and discussed. Strategies for improving HPV vaccination and effective social media messaging were also incorporated into the educational session. There was a period after the educational presentation for additional questions that were presented to the co-investigator. All questions and

comments were answered and addressed after the educational presentation. Coffee and pastries were also provided to those in attendance. Individuals who were unable to attend were provided the patient survey results, the post survey education session PowerPoint (Appendix E) as well as additional contact information if any questions come forth in the future.

Results from the patient distributed survey were distributed via e-mail to providers and public health officials for further use. After the presentation conclusion, an e-mail that included a post educational session survey, strictly for individuals who attended the presentation, was distributed (Appendix F). The post educational session survey consisted of three questions, alongside a question indicating their consent to take the survey. Questions within the post educational survey determined if the attendee found the presentation helpful, if there is any intent to change future practice, and a free text box that allowed the participant to discuss their future practice changes.

### **Implementation Plan**

To understand patient attitudes towards HPV vaccination, an online Qualtrics survey was developed. This survey included questions regarding demographics of the individuals participating, social media usage, and where health information is obtained and received, as well as knowledge and attitudes towards HPV and the HPV vaccine. The survey design builds upon Al-Uqdah's (2022) work entitled "Associations Between Social Media Engagement and Vaccine Hesitancy." Permission was granted to use similar questions from the surveys (See Appendix G). In addition to Al-Uqdah's survey, Mangello et al. (2022) developed a survey for the work in "HPV and COVID-19 vaccines: Social Media use, confidence, and intentions among parents living in different community types in the United States." Permission was granted from Al-Uqdah and Manganello to modify survey design and questions. (See Appendix G).

This infographic with a standardized QR code was displayed within a rural healthcare facility and district health unit for a total of five weeks. Two infographics within the family practice clinic were displayed within patient exam rooms. A third infographic was displayed on the front doors of the district county health office. Finally, an electronic infographic with a direct link to the patient survey was distributed to the rural family practice clinic and district county health office. The infographics were then displayed via the district county health office and family practice clinic Facebook pages with the hashtags #hpv, #hpvvaccine, #hpvawareness, #gardasil. Once the survey window closed, information from the survey was distributed to healthcare providers and healthcare officials via educational session and residents within the city via social media.

Supplemental HPV resources were available for patient participants upon completion of the survey (See Appendix H). These resources provided more in-depth information regarding both HPV and the HPV vaccine. A separate area for participants to willingly submit contact information, such as e-mail, was created for participants to be placed into a drawing to win an Amazon gift card. Two individuals were selected and received a \$20 Amazon gift card via e-mail. Post survey results were distributed to both nurse practitioners at the rural family practice clinic and the district health unit. After the educational session, healthcare officials were asked to complete a questionnaire to determine if they intend to make any changes to their practice based on the information provided and resident survey results.

Questions within the patient survey will address the project objectives as follows:

- Attitudes: Questions 12 - 13
- Barriers: Question 15
- Influences and Exposure: Questions 9, 10, 11 & 14

- Social Media Exposure: Questions 5-8
- Demographics: Questions 1-3

An educational session was provided for the nurse practitioners, public health officials, and the registered nurse. A PowerPoint presentation was created to highlight each question and their results from the patient distributed survey. Coffee and treats were provided prior to the presentation for added incentive. The PowerPoint presentation consisted of each question and its results, a conclusion section that highlighted where providers can potentially improve their practice and when to discuss the HPV vaccine. A question and answer session was conducted post-presentation, and all questions were answered to the best of the co-investigator's ability.

The educational session discussed the results of the patient distributed survey, ultimately helping these providers and officials understand attitudes towards HPV and the HPV vaccines, where their patients and residents obtain their medical health information and ultimately, if social media has influenced their decisions on if they will or will not receive the HPV vaccine. A post-educational survey was distributed to determine if these providers and healthcare officials plan to make changes in their practice based off the information provided. The provider survey was available for 1 week via Qualtrics and was distributed through e-mail once the educational session was complete. The three-question provider and health official survey assessed if providers and health officials found the information presented to be helpful within the post-educational survey with a "yes," "no," or "unsure" option. If the providers and health officials have an intent to modify their future practice based on the results of the patient survey utilizing a Likert scale with options including "strongly disagree," "disagree," "neither agree or disagree," "agree," and "strongly agree." Finally, question three within the provider and health official

survey included a free text box that let the provider or health official discuss how they will change their future practice if applicable (See Appendix I).

### **Timeline**

The timeline for project implementation is as follows:

1. Fall 2022: Conduct review of literature
2. Spring 2023: Create Qualtrics survey
3. Spring 2023: Evaluate theoretical framework and apply to project
4. Spring 2023: Develop infograph and social media post
5. Spring 2023: Conduct proposal meeting
6. Spring 2023: Submit request for project approval by NDSU's Institutional Review Board (IRB)
7. Spring/Summer 2023: Distribute infograph and release Qualtrics survey
8. Summer 2023: Analyze patient distributed survey results
9. Summer 2023: Conduct post educational survey session for providers and public health officials
10. Summer 2023: Release provider survey
11. Summer 2023: Analyze provider survey results
12. Fall 2023: Disseminate project at the NDNPA Pharmacology Conference
13. Fall 2023: Conduct final defense meeting

### **Evaluation/Outcomes/Data Analysis**

Data was collected from both the patient survey and the post-educational session survey completed by healthcare providers and district health unit officials. The patient survey included questions on demographics, attitudes, beliefs, barriers, and influences that have an impact on



their decision to receive the HPV vaccine. The data collected from the patient survey was shared to the local healthcare providers and public health officials. A post-educational session survey created through Qualtrics was distributed to providers and public health officials via e-mail; to assess if any providers or officials have an intent to change their current practice with respect to HPV and the HPV vaccine. Both the patient survey and provider survey remained anonymous. Participants within the patient distributed survey had the ability to provide their e-mail address to be in a drawing for an Amazon gift card; however, their answers were not linked to their email address. Data was collected in aggregate form, and responses were acquired via anonymous response setting within Qualtrics. A logic model was developed to help easier demonstrate the components of the project and the potential outcomes as shown in Table 2.

**Table 2***Logic Model*

<b>Inputs</b>	<b>Activities</b>	<b>Outputs</b>	<b>Outcomes</b>	<b>Impact</b>
Academic & Practice partnership	Develop online survey for rural Southcentral County residents ages 18-45	Collect patient survey results	Identify and understand beliefs, attitudes, barriers and influence associated with HPV and the HPV vaccine	Enhanced resident knowledge encompassing HPV and the HPV vaccine
Graduate Committee Members	Distribute online patient survey within family practice clinic and rural District Health Office	Store patient survey results in Xcel spreadsheet		
DNP Student		Develop patient survey analysis report via Xcel spreadsheet	Increased knowledge of rural Southcentral County residents surrounding HPV and the HPV vaccine	Enhanced provider knowledge on barriers, beliefs, attitudes and influences surrounding HPV and the HPV vaccine
NDSU software (Qualtrics)	Resident completion of Qualtrics survey			
Southcentral rural county residents ages 18-45	Provide reputable and evidence-based resources on HPV and the HPV vaccine		Increased knowledge of providers and public health officials on resident beliefs, attitudes, and influences on HPV and the HPV vaccine	Increased HPV vaccine awareness in rural residents
	Obtain and analyze results of patient survey			
	Distribute patient survey results to local district health unit and family practice facility		Increased motivation to seek information on HPV and HPV vaccine	Increased HPV vaccine uptake within Southcentral County
	Hold post patient survey educational session for healthcare providers and public health officials			Reduce HPV infections and HPV associated cancers

## **Protection of Human Subjects**

The human subjects involved within this project included residents of a rural North Dakota County. Participation was completely voluntary and did not require any patient identification. Women and minorities were not excluded from this study, though no children were included within this project. The statistics obtained did not require and/or use any personal identifiers. Protection of human subjects occurred through the North Dakota State University Institutional Review Board (Appendix J). Participants were voluntarily recruited using infographs within each designated site, social media outlets, and word of mouth communication. As an added incentive, there was a drawing for two \$20 amazon gift cards for participants that completed the survey and willingly provided contact information.

## **CHAPTER 4: RESULTS**

### **Survey Response**

A total of 31 participants submitted responses. Of the 31 participants, three responses were discarded due to lack of completion. The remaining 28 responses were fully complete. Therefore, a total of 28 responses were analyzed utilizing simple analytics, such as mean, median, and mode via Qualtrics software.

Approximately 92.86% (n=26) of the participants indicated their gender was female, and 7.14% (n=2) of the participants indicated they were male. Over 60% (n=17) of participants indicated that they were between the ages of 35-45, while 32.14% (n=9), indicated they were between the ages of 25-34. Of the 28 participants, 7.14% (n=2) indicated that they were between the ages of 18-24. Regarding level of education, 10.71% (n=3) of the participants were high school graduates or had completed some form of trade school. Approximately 35.71% (n=10) of participants had completed some college, while 28.57% (n=8) had received a bachelor's degree, and 25.00% (n=7) had obtained a master's degree or higher. Of the 28 responses, 71% (n=20) participants submitted their e-mail address to be entered into the Amazon gift card giveaway.

### **Objective One**

Objective one was aimed at assessing attitudes, beliefs, barriers, and influences on HPV vaccination. Survey questions 9, 10, 11 and 14 were utilized to identify influences and exposure to the HPV vaccine within their primary care providers office or clinic. Questions 12 & 13 identified participants' attitudes and beliefs towards the HPV vaccine, and question 15 identified any barriers that may be present in regard to the HPV vaccine.

Question 9 identifies if social media has influenced their decision to or to not receive the HPV vaccine. Most participants (57.14%, n = 16) responded they strongly disagree that social

media has influenced their decision to receive the HPV vaccine. Eleven participants (39.29%) responded they neither agree nor disagree; finally 1 participant (3.57%) responded that social media had influenced their decision to or not to get the HPV vaccine.

Question 10 identifies what specifically influenced whether participants would receive the HPV vaccine. Most participants (64.29%; n=18) identified that their doctor influenced their decision regarding the HPV vaccine, while 10.71% (n=3) noted family/friends and 3.57% (n=1) noted social media influenced whether they would receive the HPV vaccine. Approximately 21.43% (n=6) of participants selected “other” and were prompted to submit their influence via free text box. Free text box responses were a mixture of primary care providers and friends (n = 2), research (n = 1) and personal experiences with the HPV vaccine (n = 1). Question 11 identifies if participants have been exposed to messages about the HPV vaccine within health care facilities with 82.14% (n=23) of participants reporting “yes” they have seen messages about the HPV vaccine within their clinic or local healthcare facility. A smaller number of participants (10.71%; (n=3) reported “no” they have not seen messages about the HPV vaccine within their clinic or local healthcare facility, and 7.14% (n=2) of the participants were unsure if they had been exposed to HPV vaccine related messages within a healthcare facility or their local clinic. Question 14 identifies healthcare provider influences; this question specifically asks “if my primary care provider recommended the HPV vaccine, I would get it”. 46.43% (n = 13) of participants strongly agreed they would receive the HPV vaccine if their primary care provider recommended it. 17.86% (n = 5) of participants agreed, they would receive the HPV vaccine if it was recommended by their primary care provider. 14.29% (n = 4) of participants neither agreed or disagreed with this statement, 3.57% (n = 1) disagreed with this statement, and 17.86% (n = 5)

of participants strongly disagreed with this statement. Results for influences and exposure are shown in table 3.

**Table 3**

*Influences and Exposure*

	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
Social media has influenced my decision to or not to get the HPV vaccine	n = 16 (57.14%)	n = 0 (0.00%)	n = 11 (39.29%)	n = 0 (0.00%)	n = 1 (3.57%)
	<b>Family/Friend</b>	<b>Doctor</b>	<b>Clergy</b>	<b>Social Media</b>	<b>Other</b>
Which of the following influenced your decision on whether to receive the HPV vaccination?	n = 3 (10.71%)	n = 18 (64.29%)	n = 0 (0.00%)	n = 1 (3.57%)	n = 6 (21.43%)
		<b>Yes</b>	<b>No</b>	<b>Unsure</b>	
I have seen messages about HPV vaccination at my clinic or other local healthcare facilities		n = 23 (82.14%)	n = 3 (10.71%)	n = 2 (7.14%)	
	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
If my primary care provider recommended the HPV vaccine, I would get it.	n = 5 (17.86%)	n = 1 (3.57%)	n = 4 (14.29%)	n = 5 (17.86%)	n = 13 (46.43%)

*Note: Other option in question 10 included a free text box for participants to share their influences. These influences included “A mix of medical professionals and family/friends”, “being a provider” indicating they have received medical training, “I researched the vaccine, side effects and case studies.”*

Questions 12-13 addressed participants’ attitudes and beliefs towards the HPV vaccine. Question 12 addresses participants beliefs if the HPV vaccine is effective in preventing HPV-related cancers. Approximately 39.29% (n=11) of participants strongly agreed that the HPV vaccine was indeed effective in preventing HPV-related cancers. The remaining responses were as follows: 25.00% (n=7) participants agreed, 25.00% (n=7) neither agreed nor disagreed, 3.57%

(n=1) disagreed and 7.14% (n=2) of participants strongly disagreed with this statement. Question 13 addresses participants confidence and attitudes regarding the HPV vaccines efficacy. Similar to Question 12, 39.29% (n = 11) of participants strongly agreed that the HPV vaccine is overall effective. Remaining responses were as follows: 14.29% (n = 4) of participants agreed, 25.00% (n = 7) neither agreed nor disagreed, 7.14% (n = 2), disagreed and finally 14.29% (n = 4) strongly disagreed with this statement. Results are shown in Table 4.

**Table 4**

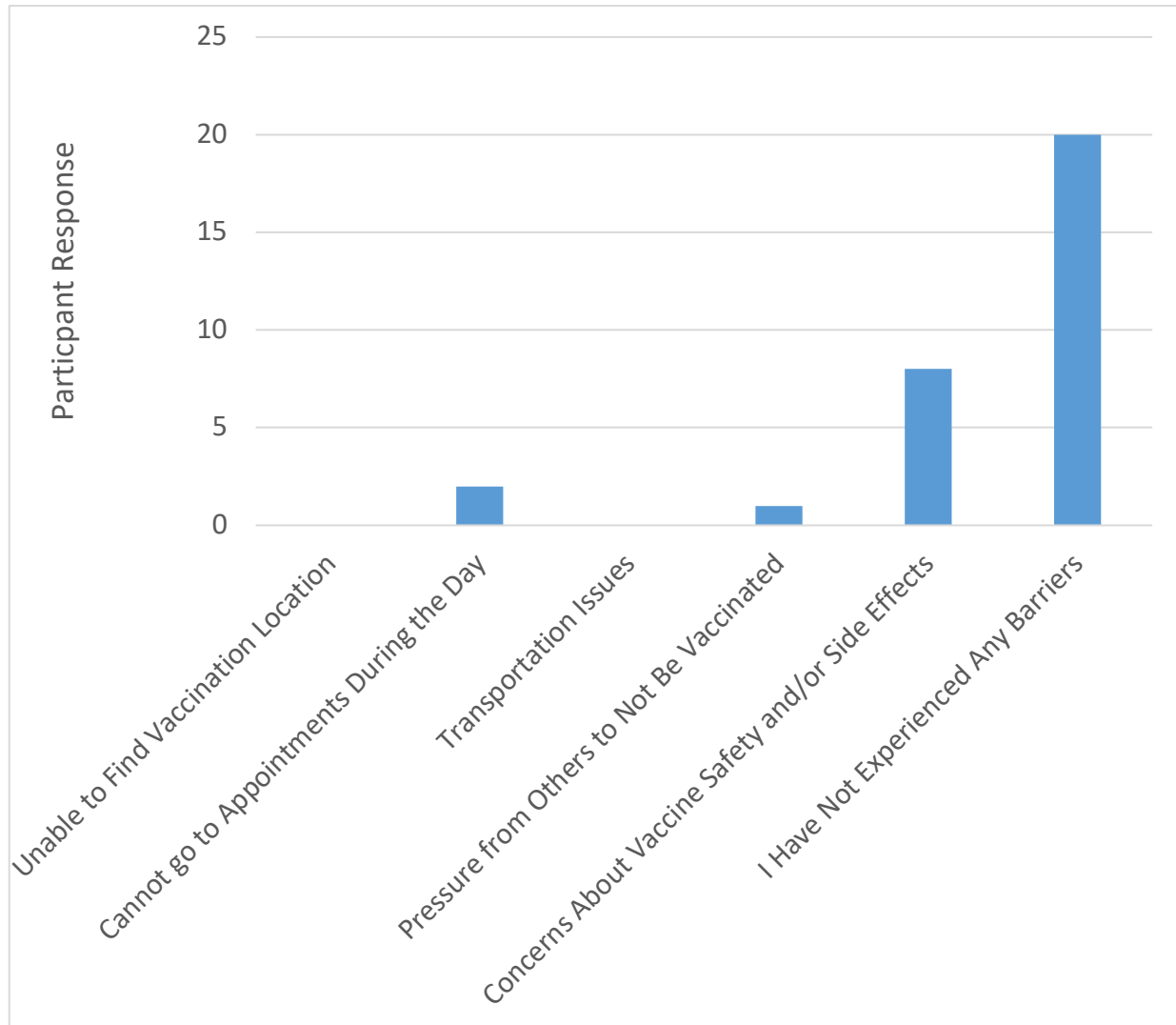
*Attitudes and Beliefs*

	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
The HPV vaccine is effective in preventing HPV-related cancers	n = 2 (7.14%)	n = 1 (3.57%)	n = 7 (25.00%)	n = 7 (25.00%)	n = 11 (39.29%)
I am confident that the HPV vaccine is effective	n = 4 (14.29%)	n = 2 (7.14%)	n = 7 (25.00%)	n = 4 (14.29%)	n = 11 (39.29%)

Question 15 focuses on any barriers that participants may have experienced regarding the HPV vaccine. This question was in a select all that apply format, and participants had the option to select multiple options. 20 participants noted they had not experienced any barriers in receiving the HPV vaccine. While other participants reported multiple barriers, such as inability to go to appointments during the day (n = 2), safety and side effect concerns (n = 8) and pressure from others to not be vaccinated (n = 1). Results are shown in Figure 1.

**Figure 1**

*Barriers to Not Receiving HPV Vaccine*



**Objective Two**

The second objective of this practice improvement project was to identify exposure to social media messages related to HPV vaccinations among rural North Dakota residents. Survey questions 5 and 6 identified how often participants use social media and if participants use social media to obtain health information. Survey questions 7 and 8 asked participants if they have seen positive and/or negative messages related to HPV vaccination on social media sites.



Question 5 asked participants to identify how often they use one or more social media platforms. These social media platforms were identified as Facebook, Twitter, Instagram, TikTok, Pinterest, Reddit, and Snapchat. Most participants (85.71%; n = 24) noted to use these social media platforms and sites “several times per day,” while 10.71% (n=3) of participants noted to use these sites and platforms once daily. Approximately 3.57% (n=1) of participants noted to use the sites and platforms “less than once a week,” and 0.00% (n=0) of participants noted to use these sites “1-2 days per week” or “never.”

Question 6 identifies if participants use social media platforms and sites to obtain health information. Roughly 54% (n=15) of participants noted to obtain health information from social media sites “sometimes”, while 35.71% (n=10) of participants selected that they “never” use social media sites or platforms to obtain health information. Finally, 10.71% (n=3) of participants were noted to use social media platforms and sites “most of the time” to obtain health information.

Questions 7 and 8 identify if participants have seen HPV related message on social media sites. Question 7 focused on if participants have seen positive messages and benefits of the HPV vaccine via social media. 50.00% (n=14) of participants responded, “neither agree or disagree”, 17.86% (n=5), responded “somewhat agree”, 3.57% (n=1) responded “strongly agree”. 10.57% (n=3) of participants response was “somewhat disagree” and 17.86% (n=5) responded “strongly disagree”. While question 8 focused on if participants have seen negative messages and harmful effects of the HPV vaccine via social media. Question 8 obtained similar results to question 7; 42.86% (n=12) responding with “neither agree or disagree”, 14.29% (n=4) responded “somewhat agree”, 14.29% (n=4) responded “strongly agree”. 10.71% (n=3) of participants response was

“somewhat agree” and 17.86% (n=5) responded "strongly disagree". Results from objective two are shown in table 5.

**Table 5**

*Social Media*

	<b>Several times per day</b>	<b>Once daily</b>	<b>3-5 days per week</b>	<b>1-2 days per week</b>	<b>Less than once a week</b>	<b>Never</b>
Please select how often you use one or more of the following sites – Facebook, Twitter, Instagram, TikTok, Pinterest, Reddit, Snapchat	n = 24 (85.71%)	n = 3 (10.71%)	n = 0 (0.00%)	n = 0 (0.00%)	n = 1 (3.57%)	n = 0 (0.00%)

	<b>Always</b>	<b>Most of the time</b>	<b>About half the time</b>	<b>Sometimes</b>	<b>Never</b>
When thinking about social media sites or social media apps you use, how often do you use social media for obtaining health information?	n = 0 (0.00%)	n = 3 (10.71%)	n = 0 (0.00%)	n = 15 (53.57%)	n = 10 (35.71%)

	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
I have seen positive messages and benefits of HPV vaccination on social media sites	n = 5 (17.86%)	n = 3 (10.71%)	n = 14 (50.00%)	n = 5 (17.86%)	n = 1 (3.57%)
I have seen negative messages and harmful effects of HPV vaccination on social media sites	n = 5 (17.86%)	n = 3 (10.71%)	n = 12 (42.86%)	n = 4 (14.29%)	n = 4 (14.29%)

### Objective Three

The third objective of this practice improvement project as to educate local health professionals on the patient distributed survey results. An in-person presentation was held at a family practice clinic in rural North Dakota and included three health professional participants. Following the presentation, three participants completed the post-presentation survey. Of the three participants, all 100% (n=3) found the information presented to be helpful and 100% (n=3) reported that they do intend to modify their future practice based on the results of the patient-distributed survey. One healthcare participant further shared that this change will include utilizing the updated HPV vaccination guidelines. Another healthcare participant recommended repeating the patient survey to obtain a higher number of participants with lower educational levels or economic status to further inform their practice (Appendix K). Results from the post-presentation survey can be found in Table 6.

**Table 6**

*Post Educational Survey Results*

	<b>Yes</b>	<b>No</b>	<b>Unsure</b>		
I found the information presented within the post education survey session to be helpful	n = 3 (100.00%)	n = 0 (0.00%)	n = 0 (0.00%)		
	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neither agree nor disagree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
I plan to modify my future practice based on the results of the patient distributed survey	n = 3 (100.00%)	n = 0 (0.00%)	n = 0 (0.00%)	n = 0 (0.00%)	n = 0 (0.00%)

## Objective Four

Objective four was to distribute evidenced-based HPV information through social media messages and platforms within a rural North Dakota County. A local family practice clinic and District Health unit posted the infograph (Appendix L) via Facebook with the caption “Human Papillomavirus (HPV) is one of the most common sexually transmitted infections (STIs) that can cause cancer. HPV is preventable with vaccination as early as 11-12 years of age and now indicated for up to 45 years of age for both males & females!!” The hashtags #hpv, #hpvvaccine, #hpvawareness, and #gardasil were included to help draw attention to the post and encouraged interactions. The post was “liked” two times and shared four times via the family practice clinic social media site and once via the district county health office social media site. Actual views of the post were unable to be determined due to lack of tracking via Facebook. Links to evidence-based websites such as the CDC, WHO and NDSU CIRE were also presented at the end of the survey for further evidence-based information regarding HPV and its vaccine.

## CHAPTER 5: DISCUSSION AND RECOMMENDATIONS

### Summary

Overall, participants in this practice improvement project have seen both positive and negative social media messages about the HPV and the vaccine. Eleven percent (n=3) of the participants reported using social media to obtain health information most of the time, and 54% (n=15) of the participants reported using social media to obtain health information sometimes. The most common identified sources that influenced the decision to receive the HPV vaccination include doctor, (n = 18; 64.29%) and family or friends (n= 10; 10.71%). While a majority (n = 18; 46.43%) of participants report they would receive the HPV vaccine if recommended by a provider, there were also participants (n= 6, 21.43%) who either disagreed or strongly disagreed that they would receive the HPV vaccination following a recommendation from a healthcare provider, indicating vaccine hesitancy towards the HPV vaccine.

Adverse reactions and long-term effects appeared to be the top barriers among rural North Dakota residents who participated in the patient survey as to why they have not received the HPV vaccine. Minimal, if any, clinically significant reports of adverse effects outside of pain with administration or anaphylaxis; Kamolratanakul and Pitisuttihum (2021) discussed minimal anaphylactic events, approximately 0.3-3 cases per million doses. Three separate vaccine entities, Global Advisory Committee on Vaccine Safety (GACVS), Vaccine Adverse Events Reporting System (VAERS) and the Vaccine Safety Datalink (VSD), determined there are no significant long-term risks associated with the HPV vaccine. Kamolratanakul and Pitisuttihum also discussed diseases such as Guillain-Barre, Complex Regional Pain Syndrome (CRPS), Bell's Palsy, Postural Orthostatic Tachycardia Syndrome (POTS), and ovarian insufficiency and/or failure have not been directly linked to the HPV vaccine.

Healthcare professionals within this rural North Dakota county, including Registered Nurses and Nurse Practitioners, noted that an increase in HPV vaccine uptake was needed within their community and intend to change future practices to help increase HPV vaccination rates. Healthcare professionals noted the patient survey information to be helpful and will utilize the results to help facilitate further discussions with patients. It is important to note that throughout the literature review and research process, similar studies have been conducted, but results of these studies were not shared with local healthcare providers. Manganello (2023) discussed the importance of continuing to attempt to tailor vaccine education to patients to increase HPV vaccine uptake but focused more on how to approach this from a political affiliation standpoint. This did not specifically align with the co-investigators study but should be taken into consideration.

### **Discussion**

Social media continues to have a considerable impact on how teenagers, young adults, and adults obtain, view, and choose how to proceed with their health and wellness journey. An underlying goal of this project was to increase awareness of HPV and its vaccine, but also to provide evidence-based information. Current literature from Weinzierl et al. (2021) shows that more research and literature is currently being published on vaccine hesitancy and social media usage, ultimately requiring even more public trust regarding vaccines. While social media may have a positive impact on vaccine uptake, there are also many antivaccination messages that can negatively impact vaccine confidence and uptake. Objective one of this project was to assess attitudes, beliefs, barriers and influences regarding the HPV vaccine. Participants within the patient distributed survey were noted to obtain their health information directly from social media. One participant had reported that social media directly influenced their decision to

receive or not receive the HPV vaccine. This is particularly concerning as only 167 adults within this specific rural North Dakota county have received the HPV series (Birsch-Steinke, 2023). It should be noted, adults ages 18-45 make up about 26% of this rural North Dakota county's population (U.S. Census Bureau, 2021). While positive social media messages about HPV vaccination may encourage those to become vaccinated, negative social media messages also exist that contain vaccine misinformation, which may further contribute to vaccine hesitancy and reduced uptake.

Present literature published by Kornies et al. (2022) is showing the current antivaccination movement within social media platforms has created a potential epidemic with spreading vaccine misinformation and disinformation that can ultimately lead to widespread vaccine hesitancy and resistance. Kornides also noted that social media users are more likely to remember and retain negative connotations towards the HPV vaccine within social media posts, rather than positive. Social media users are also more likely to “like” and share negative information within social media platforms, ultimately leading to increased vaccine hesitancy. Questions on positive and negative influences were asked within the patient distributed survey. Almost 25.00% (n=8) of participants reported exposure to negative messages and harmful effects of the HPV vaccine via social media, while only 20% (n=6) reported exposure to positive messages and benefits of the HPV vaccine via social media. Ultimately, exposure to negative social media messages related to HPV vaccination may be contributing to reduced vaccine uptake among residents in this rural North Dakota County, as well as the larger society.

### **Recommendations**

Given the results of the patient survey, it is crucial for providers to continue to provide both education and evidence-based resources on HPV and its vaccine. Initiating the vaccination

conversation during well-child, sports physicals, certain acute visits, and annual visits may be essential in reducing missed vaccination opportunities. Through increased awareness of the safety and efficacy of the HPV vaccination and campaigns targeted at discrediting HPV vaccination misinformation, there is a potential to enhance HPV vaccine confidence and uptake. Promoting scientific facts and beneficial outcomes of HPV vaccine by incorporating quickly processed visuals via social media may show more acceptance and ultimately result in increased HPV vaccine uptake (Michigan State University, 2021). Enhanced HPV vaccination uptake has the potential to significantly reduce HPV-related cancers, morbidity, and mortality. While promoting the safety and efficacy of the HPV vaccine is important, it is just as important for providers to discuss potential side effects that may occur with the HPV vaccine. Shen and Dubey (2019) discussed that having an honest conversation about the potential side effects may ultimately lower the perceived risk of the patient.

There are a multitude of ways to discuss vaccines, though it is most important to provide clear, understandable and factual information. Incorporating reputable studies regarding vaccines may help reduce vaccine hesitancy. It is also important for providers to be patient after providing vaccine information. Patients may need additional time to understand the information provided in order to make an educated, autonomous decision. Motivational interviewing (MI) can also be an effective form of communication when discussing vaccines. The overall goal and foundation of MI is to establish a trusted relationship between patient and provider. By utilizing unpatronizing collaboration and creating a partner-like relationship, providers can evoke motivation to change behaviors, such as vaccine uptake (Bischof et al., 2021).

Identifying social media content consisting of misinformation and disinformation and debunking the myths within social media posts may help create a positive view on the HPV



vaccine Al-Uqdah et al. (2022). Current technology, such as Natural Language Processing (NLP), can help identify how social media posts of vaccines are framed (IMB, 2023).

Determining if social media posts are positive or negative can create the potential for decreasing the spread of misinformation and disinformation. NLP has been widely used within political campaigns and has been able to identify what are considered “positive” and “negative” views. This technology utilizes artificial intelligence (AI) to help understand and interpret both spoken word and text. NLP use within social media combines computational-linguistics and statistics to assist in processing human language to understand its meaning. While this technology has not been fully utilized within social media yet, this form of AI can be lucrative in helping to reduce vaccine hesitancy.

Modern technology can also be utilized to help not only spread evidence-based information, but also decrease the spread of misinformation and disinformation. While this technology is currently used, it has not been widely used in the realm of vaccinations. This means that healthcare providers should continue to obtain, provide, and distribute evidence-based information on both HPV and its vaccine. This information should include what HPV is, how HPV is spread, HPV vaccines that are currently available, and HPV vaccine schedules. Approximately 65% (n=18) of participants in this project noted that they would receive the HPV vaccine if their provider recommended it. Between 2019 and 2021, researchers noted a positive trend in HPV vaccine uptake in patients when being recommended by providers (Ejezie et al. 2023). Therefore, a strong recommendation from a healthcare provider can significantly impact HPV vaccination uptake.

Further investigation in the use of neuromarketing may have significant value in increasing HPV vaccine rates, not only in children and teens, but young adults as well. Minimal

scientific data specifically on neuromarketing and the HPV vaccine was found throughout the research portion of this project. Neuromarketing is already occurring within social media, but attempting to determine how social media posts will resonate with users will be required to further investigate the “why” social media users are or are not receiving the HPV vaccine (Thompson, 2022).

### **Dissemination**

The patient survey results were disseminated to nurse practitioners, nurses, and public health officials within the rural North Dakota county via e-mail and PowerPoint presentation. The survey results can be found in Chapter 4, and the PowerPoint presentation can be found in Appendix M.

The project was disseminated at the North Dakota Nurse Practitioner Association’s Fifteenth Annual Pharmacology Conference through a poster presentation in September 2023. (Appendix N). The project will also be published through the North Dakota State University Thesis and Dissertations database. Further opportunities for publication will also be explored.

### **Application to the Family Nurse Practitioner Role**

This project can be applied and implemented within the FNP role by continuing to promote healthcare advocacy, patient autonomy, and evidence-based research into practice. Both leadership and communication skills were key in achieving the completion of this project. Communication and collaboration with key stakeholders were a crucial aspect in the project’s success. By identifying rural county residents’ attitudes and beliefs towards the HPV vaccine may allow rural North Dakota providers to understand any myths or barriers that may be present within their community. By translating this evidence, the co-investigator allowed additional

practitioners to understand how individuals within their area are motivated to seek behavioral changes if given the opportunity.

Healthcare providers, specifically nurse practitioners have a significant influence on public health narratives. Specifically, in dispelling vaccination myths and also promoting the importance of vaccines via social media outlets. Nurse practitioners not only have the ability to create positive, evidence-based messages that discredit vaccine misinformation, but can also provide resources and education about these vaccines. Nurse practitioners now have multiple avenues to share evidence-based information on vaccines. By using social media platforms such as Facebook, Instagram and Twitter, nurse practitioners can share accurate vaccine information, debunk vaccine misinformation and myths and reiterate the safety and efficacy of vaccines. Utilizing social media in healthcare also allows the nurse practitioner to engage with and establish trusted rapport with their patients outside of the clinic setting. This can ultimately lead to an open dialogue between the patient and provider.

### **Strengths and Limitations**

Strengths within this project included excellent communication from nurse practitioners, nurses, and public health officials within the southeastern rural North Dakota county. Without their knowledge of their community, this project would not be successful. While the topic of social media usage has been a main talking point throughout this project, the distribution of the infographic and survey would not have been as effective if it were not for the family practice clinic and district health unit Facebook pages. Communication between the co-investigator and local health professionals played a crucial role in creating, implementing, and disseminating this project.

Limitations of the project have also been identified. One limitation includes that not all participants that began the survey completed the survey in its entirety. Three of the 28 participants did not complete required responses within the survey; therefore, these responses were eliminated. Data analysis could have been strengthened if all participants completed the survey in its entirety.

Another limitation to this project was the lack of communication between the co-investigator and participants. This intervention took place exclusively online, which may have results in participants' questions not being answered. Allowing time for participants to ask questions may have allowed for additional clarity to participants.

A limitation of participant identification was noted. Throughout the patient distributed survey, one to two specific participants selected that social media had influenced their decision not to receive the HPV vaccine, and they would not receive the HPV vaccine if their primary care provider recommended it. By tracking these specific participants utilizing their contact information (if provided within the survey), the coinvestigator could potentially identify specific posts, experiences, etc. that led the participant to selected their answer. The coinvestigator could also provide additional, reputable resources for further information on the HPV vaccine. This could be completed in future replications of this project to help improve HPV vaccine uptake.

A final limitation was the sample size and credibility of answers from the sample. While a total of 28 participants completed the survey, a larger sample size may have allowed for more generalizability of the results. Allowing an increased survey window may have increased the number of participants. Again, the project took place almost exclusively online. While there are no right or wrong answers to the survey questions, it is difficult to determine if a possible Hawthorne effect had occurred to either please or disappoint the co-investigator.

## Conclusion

Improving HPV vaccination rates will ultimately reduce the millions of HPV infections and associated cancers in years to come. We have seen HPV efficacy rates in upwards of 95.4% of patients who have completed the HPV vaccine series and an efficacy rate of nearly 70% with just one single dose, Basu et al. (2021). It is imperative that we as providers continue to promote the HPV vaccine to protect our patients from developing these types of infection. Addressing unique influences and barriers with each patient may prove to increase HPV vaccine uptake. It is essential to tailor vaccination discussions with every patient, as this can ultimately lead to a strengthened patient-provider relationship and can also lead to increased trust. By creating a strong relationship with our patients, healthcare providers are able to continue to provide and promote evidence-based care for patients, increase patient autonomy, and provide increased patient outcomes and satisfaction.

Overall, the project had successfully met the four objectives presented. Identifying rural North Dakota residents' overall view of the HPV vaccine provided insight to healthcare providers as to why there may be HPV vaccine hesitancy or refusal within their community. The PIP results also encouraged healthcare providers to change their future practice to help increase HPV vaccine uptake, which ultimately can reduce HPV-related morbidity and mortality and enhance health outcomes.

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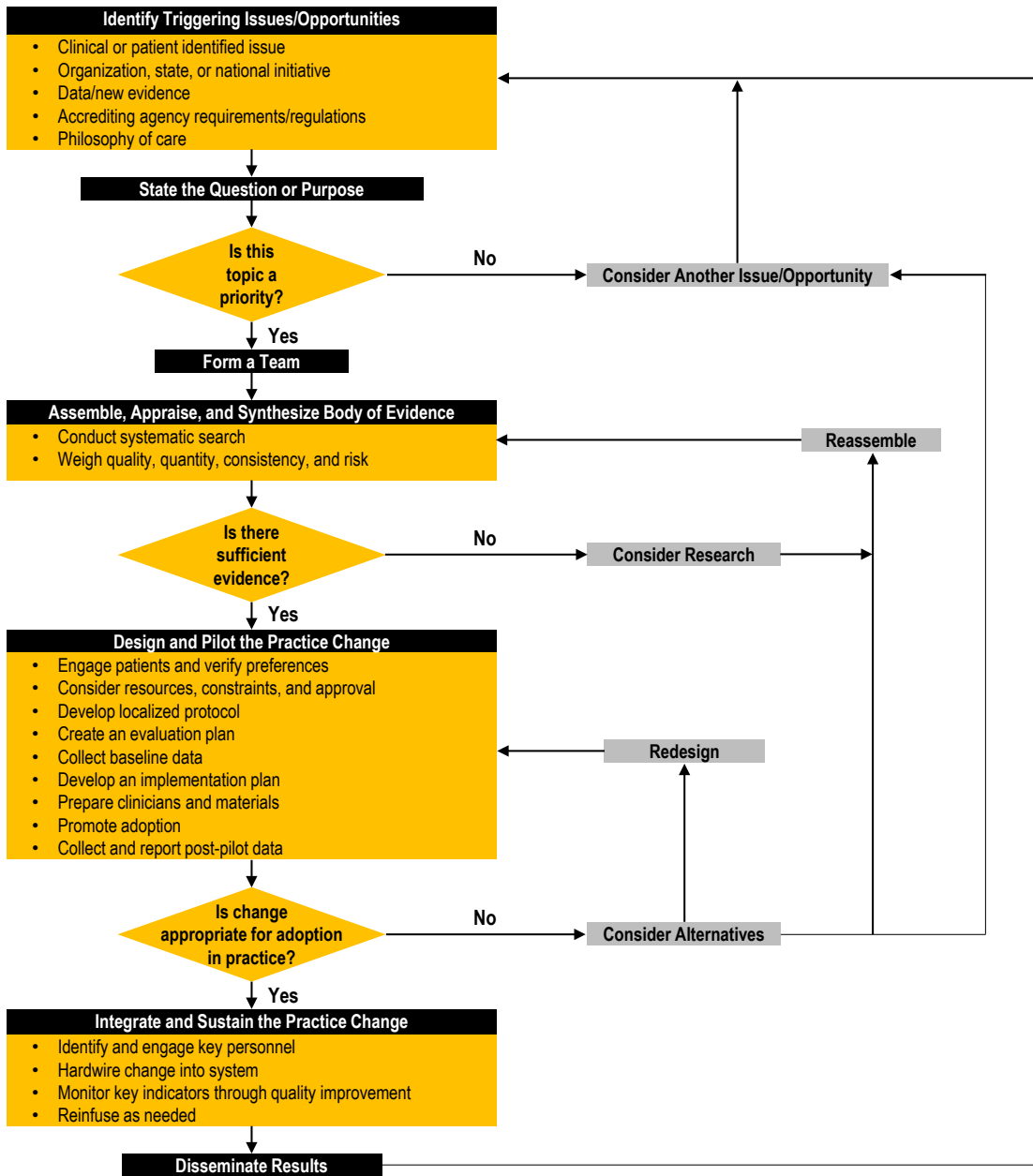
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## APPENDIX A: IOWA MODEL

# The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care



◆ decision point

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## APPENDIX B: APPLICATION OF IOWA MODEL

### **Identifying issues and Opportunities**

The Human Papillomavirus (HPV) vaccine is one of two vaccines that are currently approved for the use to prevent cancer (CDC, 2022a). The HPV vaccine has proven to be efficacious in preventing HPV infections and related cancers since its introduction in 2006 (CDC, 2022b). One factor that may be contributing to increased vaccine hesitancy and refusal is social media. Many posts on social media have been analyzed and identified as containing negative messages towards the HPV vaccination (Ortiz et al. 2019). Dunn et al. (2015) conducted a study focusing on the amount of negative social media posts related to HPV and suggested there may be specific user(s) who may have the ability to influence others to refuse vaccines through misinformation.

### **Question:**

Problem Statement: HPV vaccine misinformation is easily spread through social media and may lead to an increase in vaccine hesitancy and reduced uptake of the HPV vaccine.

Declining HPV vaccination rates may have dire consequences on health outcomes, including more HPV-related infections, cancers and HPV-related cancer mortalities.

Purpose: The purpose of this practice improvement project is to assess attitudes towards HPV vaccination among residents, ages 18-45, in a rural North Dakota County and identify sources of vaccine information. The practice improvement project will also focus on promoting reputable vaccine resources through social media. Health professionals working within the county will be educated on residents' attitudes towards HPV vaccination. Intent to change practice as a result of identified attitudes and vaccine information sources will be assessed, which has the potential to improve HPV vaccine uptake.

**Is this topic a priority? → Yes**

### **Form a Team**

#### **Name**

#### **Role**

Allison Peltier	Chair
Mykell barnacle	Committee Member
Lisa Montplaisir	Committee Member
Kerri Benning	Committee Member

### **Assemble, Appraise, and Synthesize Body of Evidence**

An extensive review of literature was conducted between October 2022 and January 2023 to determine potential associations between increased social media use and reduced HPV vaccine uptake. A large portion of the literature suggests misinformation spread via social media may be a factor in HPV vaccine hesitancy and decreased HPV vaccine uptake.

**Is there sufficient evidence? → Yes**

### **Design and Pilot the Practice Change**

Infographs discussing HPV and the HPV vaccine were created and distributed within a rural North Dakota county. The infographs contain a QR code that leads the participant to a Qualtrics survey that evaluates attitudes, beliefs, barriers and influences regarding HPV and the HPV vaccine. A post survey educational session will be held for providers and district health officials once the patient distributed survey is complete. The results from the patient distributed survey will be available for provider and health official use.

**Is Change Appropriate for  
Adoption in Practice → Yes**

### **Integrate and Sustain the Practice Change**

This project contributes increased knowledge to identify and implement an intervention to increase HPV vaccine uptake. By identifying factors that may initially deter individuals from receiving the HPV vaccine, co-investigators, providers and public health officials can continue to provide education and evidenced based resources. Ultimately increasing HPV vaccine uptake and reducing HPV infections and HPV-related cancers.

## APPENDIX C: PATIENT DISTRIBUTED SURVEY

1. What is your gender?
  - a. Male
  - b. Female
  - c. Prefer not to disclose
2. What is your age?
  - a. 18-24
  - b. 25-34
  - c. 35-46
  - d. Age is other than above selections
3. What is the highest degree or level of education you have completed?
  - a. Some high school
  - b. High school graduate/trade school
  - c. Some college
  - d. Bachelor's degree
  - e. Master's Degree or above
4. The most recent time you looked for general information about your health, what sources did you use?
  - a. Primary Care Provider
  - b. Religious leader such as a pastor or priest
  - c. Friends
  - d. Relatives
  - e. Social media
  - f. Search engines (i.e. Google, DuckDuckGo, etc.)
  - g. Centers for Disease Control
  - h. I have never looked for general health information for myself
  - i. Other – please describe
5. Please select how often you use one or more of the following sites – Facebook, Twitter, Instagram, TikTok, Pinterest, YouTube, Reddit, Snapchat
  - a. Several times per day
  - b. Once daily
  - c. 3-5 days per week
  - d. 1-2 days per week
  - e. Less than once a week
  - f. Never
6. When thinking about social media sites or social media apps you use, how often do you use social media for obtaining health information?
  - a. Always
  - b. Sometimes
  - c. Rarely
  - d. Never



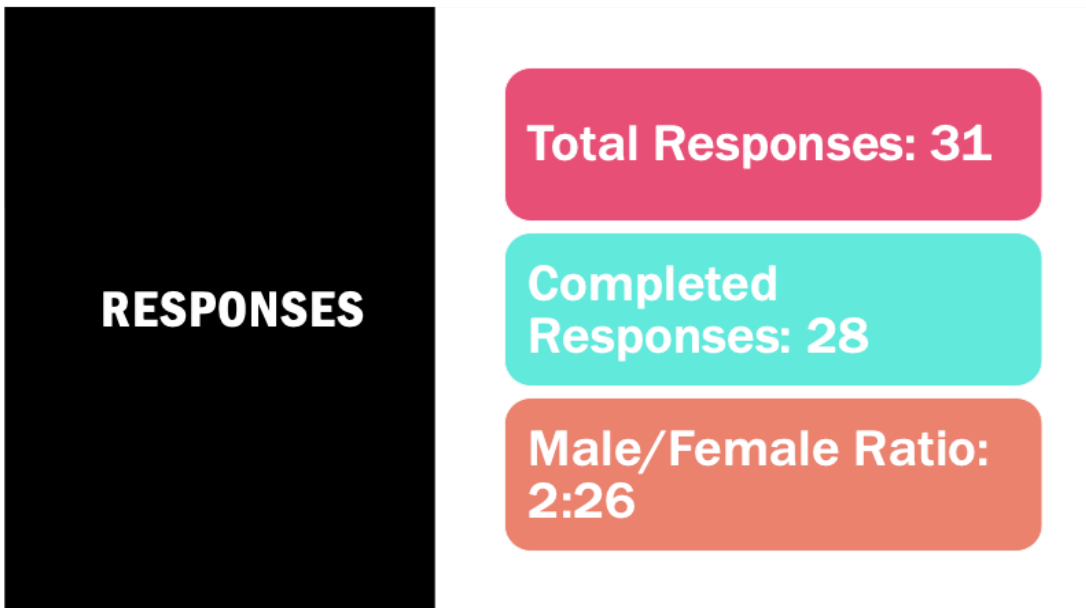
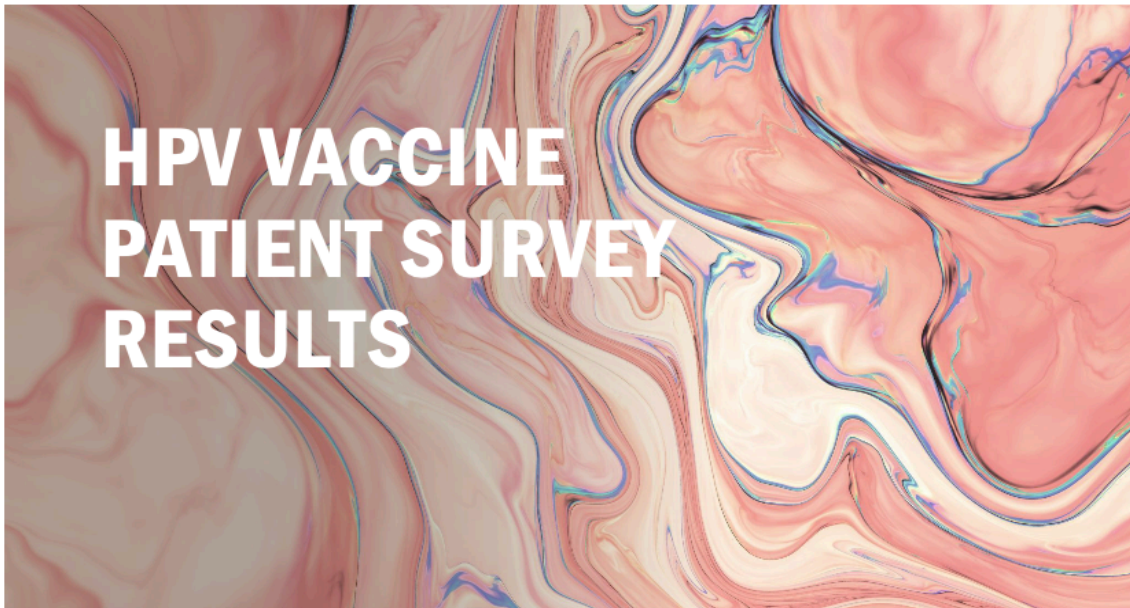
7. I have seen positive messages and benefits of HPV vaccination on social media sites.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Strongly disagree
8. I have seen negative messages and harmful effects of HPV vaccination on social media sites.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Strongly disagree
9. Social Media has influenced my decision to or not to get the HPV vaccine.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Neither agree or disagree
  - d. Somewhat disagree
  - e. Strongly disagree
10. Which of the following influence your decision whether to receive the HPV vaccination?
  - a. Family/friend
  - b. Doctor
  - c. Clergy
  - d. Social Media
  - e. Other, please describe \_\_\_\_\_
11. I have seen messages about HPV vaccination at my clinic or other local healthcare facility.
  - a. Yes
  - b. No
  - c. unsure
12. The HPV vaccine is effective in preventing HPV-related cancers.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Strongly disagree
13. I am confident that the HPV vaccine is safe and effective.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Strongly disagree
14. If my primary care provider recommended an HPV vaccine, I would get it.
  - a. Strongly agree
  - b. Somewhat agree
  - c. Somewhat disagree
  - d. Strongly disagree

15. What barriers to the HPV vaccine, if any, have you experienced? Select all that apply.
- a. Unable to find vaccination location
  - b. Cannot go to appointments during the day
  - c. Transportation issues
  - d. Pressure from others to not be vaccinated
  - e. Concerns about vaccine safety and/or side effects
  - f. I have not experienced any barriers
  - g. Other – Please specify

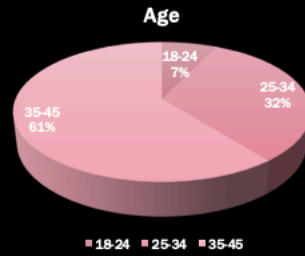
## APPENDIX D: INFOGRAPH



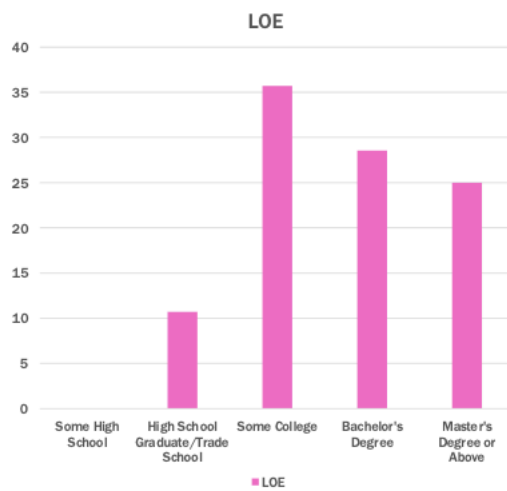
**APPENDIX E: POST EDUCATIONAL SESSION POWERPOINT**

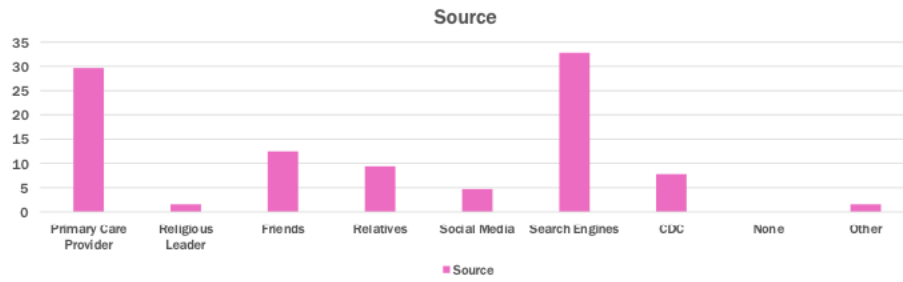


# AGE



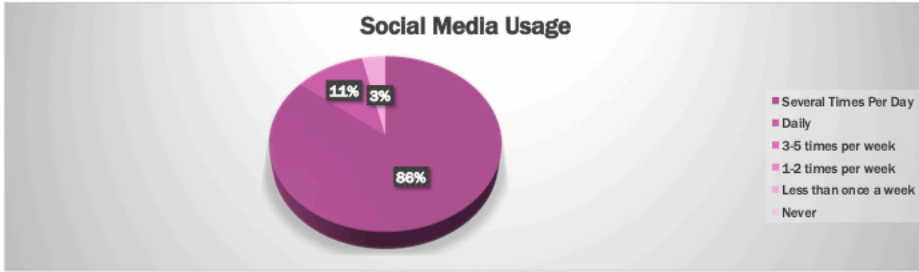
# LEVEL OF EDUCATION



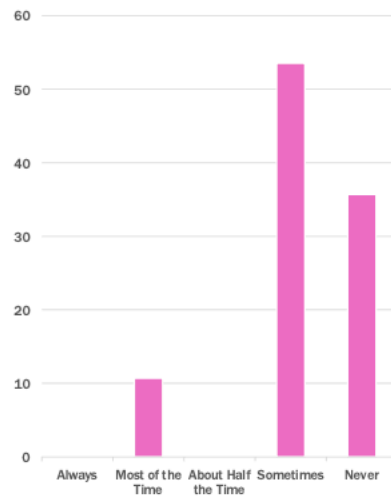


# HEALTH INFORMATION SOURCES

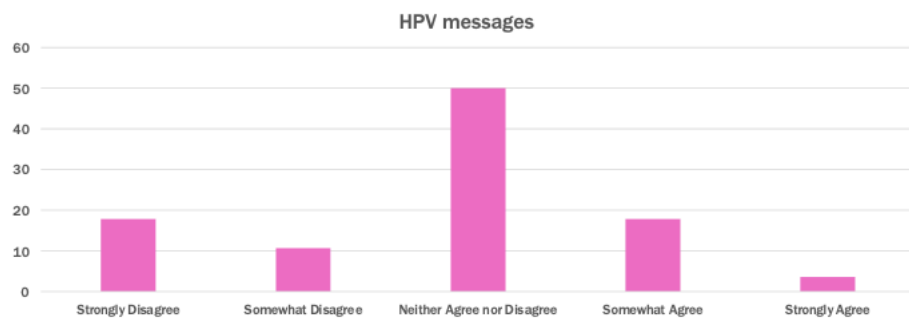
# SOCIAL MEDIA USAGE



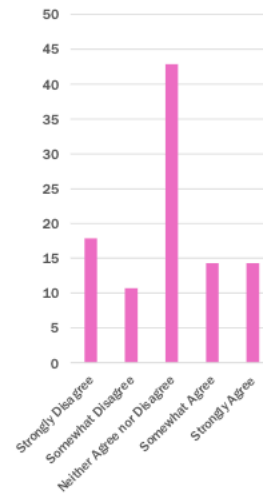
# SOCIAL MEDIA – HEALTH INFO



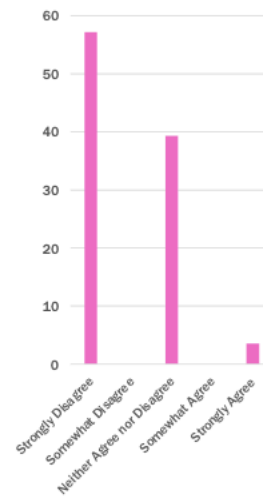
# POSITIVE HPV MESSAGES ON SOCIAL MEDIA



# NEGATIVE HPV MESSAGES ON SOCIAL MEDIA

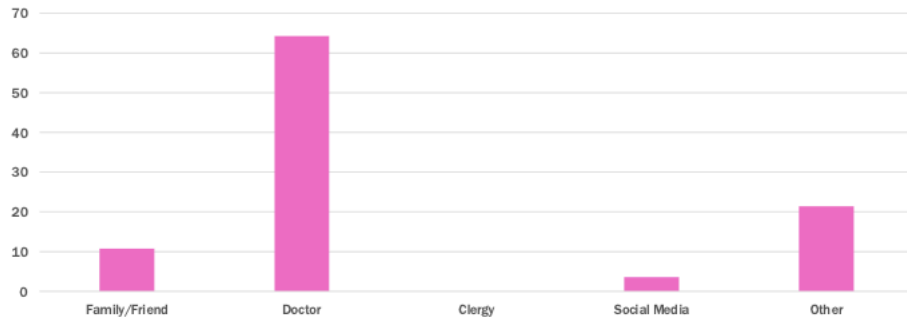


# SOCIAL MEDIA INFLUENCE

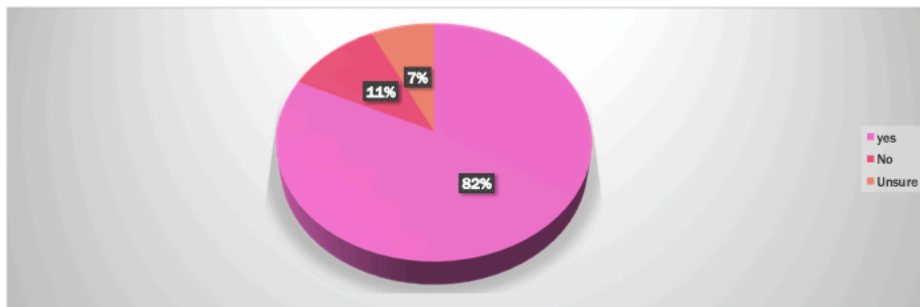




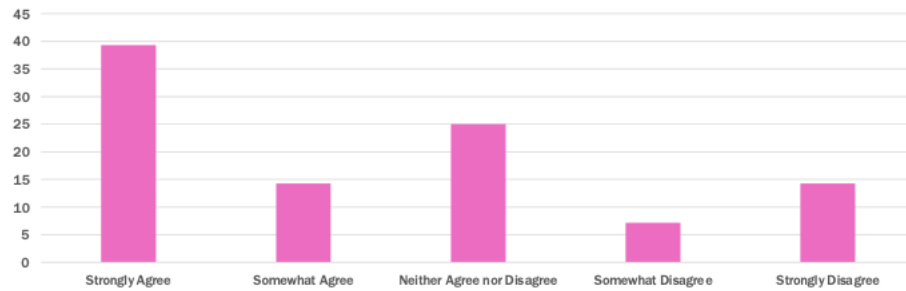
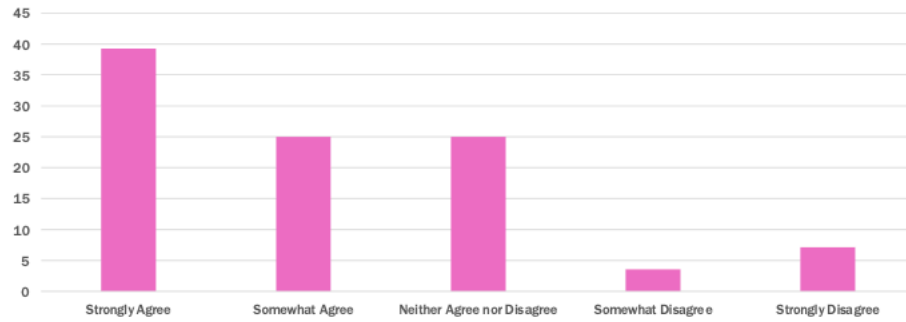
# INFLUENCE ON HPV VACCINE



# HPV MESSAGES IN CLINIC

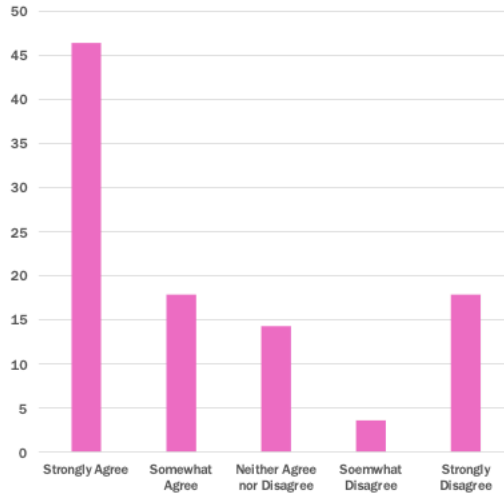


# HPV VACCINE EFFECTIVENESS

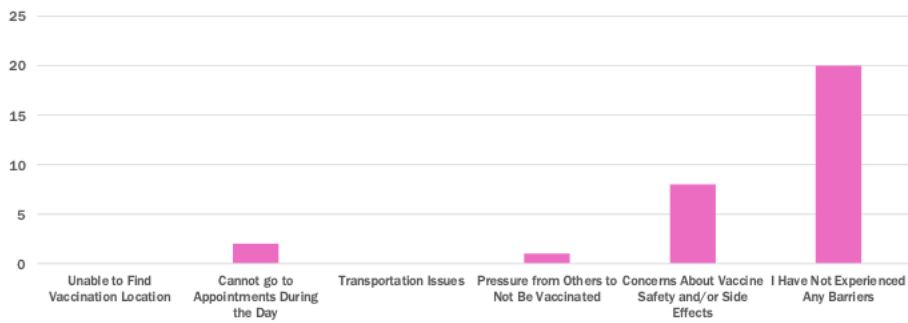


# HPV VACCINE SAFETY AND EFFICACY

## HPV VACCINE RECOMMENDATION



## BARRIERS TO HPV VACCINE



# **SO WHAT DOES THIS MEAN?**

- **Providers and Health Officials within the area are one of the key factors in HPV vaccine uptake**
- **Safety, efficacy and side effects appear to be main concern regarding the HPV vaccine**
- **In some, there is a direct correlation of HPV vaccine refusal due to social media usage**
- **Continue to educate that men can receive this vaccine as well!**

# **THANK YOU!**



## APPENDIX F: POST EDUCATION SURVEY E-MAIL

Post Education Survey

😊 ↩ ⏪ ↶



ⓧ [Redacted]  
To: [Redacted]

Thursday, July 20, 2023 at 9:38 AM

Hello,

Again, I would like to thank you for participating in the post survey education session regarding the dissertation entitled "Associations between Humanpapilloma Virus Vaccine Resistance/Hesitancy and Social Media Usage". It is my hope that you've gained insight as to how members of your community view HPV and its vaccine and any barriers that may be present.

I would appreciate to hear your thoughts and feelings on the presentation, and I invite you to participate in a provider/public health official survey. This survey consists of three questions that help me identify if the information presented to you was helpful, and if there is any intent to change your future practice to help increase HPV vaccine uptake.

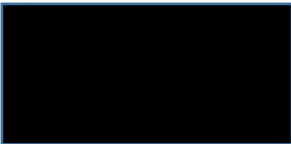
I appreciate your input and I look forward to hearing your thoughts and feelings on this presentation. Thank you for allowing me to conduct this project within your community. Your willingness to help does not go unnoticed.

The link to the survey is below and will be available for 1 week. It is completely voluntary; consent will be obtained prior to the start of the survey with a yes or no question indicating your consent to participate. You will not be allowed to take the survey without consent.

Please feel free to contact me if you have any questions regarding the provider/public health official survey or the project in general.

[https://ndstate.co1.qualtrics.com/jfe/form/SV\\_5uPcSqAmFqhR0AC](https://ndstate.co1.qualtrics.com/jfe/form/SV_5uPcSqAmFqhR0AC)

Kind regards,



## APPENDIX G: PERMISSION TO USE RESEARCH TOOLS

External Re: HPV & COVID-19 vaccine: Social Media Use, Confidence, and intentions artic

MJ

Tuesday, November 22, 2022 at 7:39 PM

RUPA survey FINAL\_...  
322.1 KB

[Download](#) · [Preview](#)

Sorry for the delay...please see attached. Feel free to modify as you like!

Jennifer

**Subject:** Re: HPV & COVID-19 vaccine: Social Media Use, Confidence, and intentions artic

Good morning Jennifer,

I am reaching out to you about the survey utilized in your article. I am wondering if I would still be able to utilize and potentially modify the survey within my dissertation project, and again, all work would be cited throughout the paper and project.

Again, if you have any questions or if I can address anything further, please let me know.

Thanks again!

Katie O'Keefe

--

Katie O'Keefe

External Re: Associations Between Social Media Engagement and Vaccine Hesitancy

Today at 10:54 AM

Hi Katherine,

You have my permission to use the survey from the article entitled "Associations Between Social Media Engagement and Vaccine Hesitancy", provided you cite the article as the source.

Thanks,

Dr. Al-Uqdah



Tuesday, April 11, 2023 at 9:01 PM

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.

[The Iowa Model of Evidence-Based Practice to Promote Quality Care \(Revised 1998\)](#)

Copyright is retained by University of Iowa Hospitals and Clinics. **Permission is not granted for placing on the internet.**

**Reference:** 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:  
*Used/reprinted with permission from the University of Iowa Hospitals and Clinics, copyright 1998. For permission to use or reproduce, please contact the University of Iowa Hospitals and Clinics at 319-384-9098.*

Please contact [UIHCNursingResearchandEBP@uiowa.edu](mailto:UIHCNursingResearchandEBP@uiowa.edu) or 319-384-9098 with questions.

Use of Health Promotion Model > Inbox x



Nola Pender [Redacted]

10:40 AM (1 hour ago) ☆ 😊 ↶

to me ▾

Dear Katie:

You have my permission to use the Health Promotion Model in your project. I wish you success with your work. Please see the attachment for resources we have available.

Sincerely,

Nola Pender

One attachment • Scanned by Gmail ⓘ



## **APPENDIX H: SUPPLEMENTAL HPV RESOURCES**

[https://www.ndsu.edu/centers/immunize/vaccine\\_resources/digital\\_resources/](https://www.ndsu.edu/centers/immunize/vaccine_resources/digital_resources/)

<https://www.cdc.gov/vaccines/vpd/hpv/hcp/recommendations.html>

<https://www.hhs.nd.gov/health/diseases-conditions-and-immunization/hpv>



## **APPENDIX I: POST-PRESENTATION SURVEY**

1. I found the information presented within the post education survey session to be helpful.
  - a. Yes
  - b. No
  - c. Unsure
2. I plan to modify my future practice based on the results of the patient distributed survey.
  - a. Strongly agree
  - b. Agree
  - c. Neither agree or disagree
  - d. Disagree
  - e. Strongly disagree
3. Free text box for discussion of future practice changes

## APPENDIX J: IRB APPROVAL



05/19/2023

Dr. Allison Evelyn Peltier  
Nursing, Sanford Bismarck

Re: IRB Determination of Exempt Human Subjects Research:  
Protocol #IRB0004784, "Associations between Humanpapilloma Virus Vaccine Hesitancy and Resistance and Social Media Engagement"

NDSU Co-investigator(s) and research team:

- Allison Evelyn Peltier
- Katherine Okeefe

Approval Date: 05/19/2023

Expiration Date: 05/18/2026

Study site(s): Steele, Kidder County, North Dakota

Funding Source:

The above referenced human subjects research project has been determined exempt (category 1,2) in accordance with federal regulations (Code of Federal Regulations, Title 45, Part 46, *Protection of Human Subjects*).

Please also note the following:

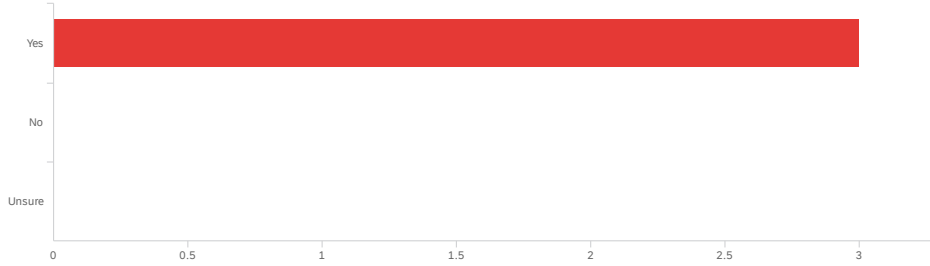
- The study must be conducted as described in the approved protocol.
- Changes to this protocol must be approved prior to initiating, unless the changes are necessary to eliminate an immediate hazard to subjects.
- Promptly report adverse events, unanticipated problems involving risks to subjects or others, or protocol deviations related to this project.

Thank you for your cooperation with NDSU IRB procedures. Best wishes for a successful study.

*NDSU has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.*

## APPENDIX K: POST EDUCATIONAL SURVEY RESULTS

Q1 - I found the information presented within the post education survey sessions to be helpful



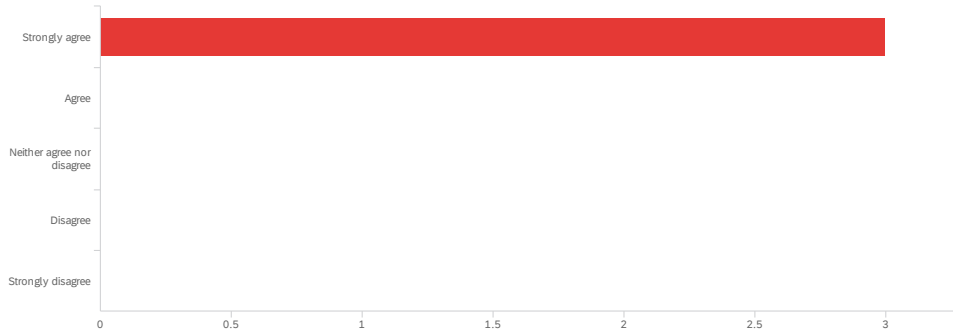
#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I found the information presented within the post education survey sessions to be helpful	1.00	1.00	1.00	0.00	0.00	3

#	Field	Choice Count
1	Yes	100.00% 3
2	No	0.00% 0
3	Unsure	0.00% 0
		3

Showing rows 1 - 4 of 4

Q2 - I plan to modify my future practice based on the results of the patient distributed

survey



#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	I plan to modify my future practice based on the results of the patient distributed survey	1.00	1.00	1.00	0.00	0.00	3

#	Field	Choice Count
1	Strongly agree	100.00% 3
2	Agree	0.00% 0
3	Neither agree nor disagree	0.00% 0
4	Disagree	0.00% 0
5	Strongly disagree	0.00% 0
		3

Showing rows 1 - 6 of 6

### Q3 - Free text box for discussion of future practice

Free text box for discussion of future practice

---

I'm thankful for the updated guidelines on the HPV vaccine. I appreciate your interest in assessing our local community.

Great project! Congrats on finishing your implementation! For additional projects I would work towards a higher "n", always our goal right? Get the survey out to people of lower economic status or with lower education level.

**End of Report**

## APPENDIX L: SOCIAL MEDIA POST

The infographic on the left is titled "HPV VACCINE AWARENESS" and is divided into four sections: "WHAT IS IT?", "WHO SHOULD BE VACCINATED?", and "PREVENTING HPV ASSOCIATED CANCER". The text in the infographic provides key facts about HPV, vaccination recommendations, and lifestyle factors that can help prevent HPV-related cancer.

The social media post on the right features a blacked-out profile picture and a text-based announcement. The text explains that HPV is a common sexually transmitted infection that can cause cancer and is preventable through vaccination. It includes a survey link and several hashtags.

**HPV VACCINE AWARENESS**

HPV or Human PapillomaVirus is one of the most common sexually transmitted infections or STIs.

While most HPV infections resolve on their own, repeat infections can lead to certain types of cancers.

The HPV vaccine is one of only 2 vaccines that can prevent cancer.

**WHAT IS IT?**

**WHO SHOULD BE VACCINATED?**

- Children starting at ages 11-12\*
- Individuals up to age 45 if haven't been previously vaccinated\*\*

**PREVENTING HPV ASSOCIATED CANCER**

- Getting vaccinated against HPV
- Promoting safe sexual practices
- Not using tobacco
- Maintaining a healthy body weight
- Eating a healthy diet

Human PapillomaVirus (HPV) is one of the most commonly sexually transmitted infections (STIs) that can cause cancer. HPV is preventable with vaccination as early as 11-12 years of age and now indicated for up to 45 years of age for both males & females!! Please help by taking the survey below!!

#hvp #hpvvaccine #hpvawareness #gardasil

[https://ndstate.co1.qualtrics.com/.../SV\\_3dPkYiXhCT1rSp8](https://ndstate.co1.qualtrics.com/.../SV_3dPkYiXhCT1rSp8)

4

Like Comment

# APPENDIX M: PHARMACOLOGY CONFERENCE POSTER PRESENTATION



## Human Papillomavirus Vaccine: A Practice Improvement Project to Increase Vaccine Uptake in Rural North Dakota

Katie O'Keefe, BSN, RN, BS, DNP-Student, Allison Peltier, DNP, FNP-C, Mykell Barnacle, DNP, FNP-BC, Kerri Benning, DNP, FNP-C Lisa Montplaisir, PhD, North Dakota State University, Four Seasons Wellness, Kidder County District Health Unit

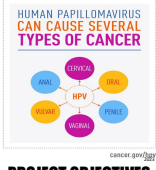
### INTRODUCTION and PROBLEM

**Problem:**

- Human Papillomavirus (HPV) infections are currently increasing with 13 million new diagnoses per year
- HPV vaccination rates have decreased since its introduction in 2006
- Recent guidelines have changed to include individuals up to age 45, yet vaccine rates within the 18-45 age range remain low
- 167 adults ages, 18-45 have received the HPV vaccine within Kidder county North Dakota
- Social media continues to be a gateway for easy access for anti-vaccination information

**Purpose:**

- Assess attitudes, beliefs, barriers and influences towards HPV and its vaccine
- Distribute evidence-based knowledge and resources regarding HPV and its vaccine



cancer.gov/HPV

### PROJECT OBJECTIVES

- Assess attitudes, beliefs, barriers and influences towards the HPV vaccination among residents ages 18-45 living in a rural North Dakota county
- Identify exposure to social media messages related to HPV vaccinations among residents in a rural North Dakota county
- Educate health professionals on attitudes towards HPV vaccination and sources of vaccine information among residents living in their respective rural North Dakota county and assess intent to change practice among health professionals.
- Distribute evidence-based HPV information through social media messages and platforms targeted toward residents in a rural North Dakota county


### PROJECT DESIGN

**Project Type**  
This EBP project is a practice improvement project.

**Sample**  
Males and females ages 18-45 in rural North Dakota

**Method**  
The intervention was self-paced over five weeks.

Infographs with a QR code were distributed within a rural North Dakota family practice clinic and district health unit as well as on their respective social media sites



Participants completed an online survey, via Qualtrics, comprised of 15 questions that were divided into four major categories:

- Attitudes
- Beliefs
- Barriers
- Influences

Participants received evidence-based information regarding HPV and its vaccine after completion of survey including:

- Who can vaccinate
- When to start vaccinating

**Resources**

- Centers for Disease Control
- World Health Organization
- North Dakota Department of Health
- NDSU Center for Immunization Research and Education (CIRE)

Routine vaccination	Age 11-12 years, can be started at age 9 years
Catch-up Vaccination*	Age 13-26 years, if not adequately vaccinated
Shared clinical decision-making*	Some adults age 27-45 years, if not adequately vaccinated

CDC, 2023

### Project Evaluation

- Patient distributed survey made available to residents within rural North Dakota
- Education session held for healthcare providers within Kidder county North Dakota surrounding patient distributed survey results
- Healthcare providers within Kidder county completed a post-education survey discussing if the information provided was useful as well as any intent to change practice

### Results

**Social Media**

- 86% of participants noted they use social media sites such as Facebook, Instagram, TikTok, etc. several times per day
- Over 60% use social media to obtain health information
- 20% of participants noted they have seen **positive** messages and benefits of HPV and its vaccine on social media
- 30% of participants noted they have seen **negative** messages and harmful effects of HPV and its vaccine on social media

**Attitudes/Beliefs**

- 64% of participants noted the HPV vaccine is effective in preventing HPV related cancers
- 54% of participants noted they were confident the HPV vaccine is safe and effective

**Barriers**

- 65% of participants noted they did not experience any barriers receiving the HPV vaccine
- 26% of participants noted safety and side effects as a barrier to receiving the HPV vaccine

**Influences**

- 64% of participants noted their provider has the most significant influence on their decision to receive the HPV vaccine

### Recommendations

- Providers play a crucial role in HPV vaccine uptake, continue to promote HPV vaccination at annual wellness visits
- Discuss the importance of preventing HPV related infections by promoting safe sexual behaviors
- Provide evidence-based resources for additional vaccine information and advise to be weary of what is seen on social media

References available upon request

## **APPENDIX N: EXECUTIVE SUMMARY**

### **Project Summary**

It is estimated that 13 million individuals are diagnosed with HPV each year, leading to HPV associated cancers. The CDC recently changed HPV vaccine guidelines to include individuals ages 27-45. Regardless of guideline changes, HPV vaccination rates are lower than other recommended vaccines, which may be due to antivaccination campaigns. This project focused on identifying attitudes, beliefs, barriers, influences and providing education to rural healthcare providers on the HPV vaccine.

### **Project Background**

Despite being one of the most transmitted sexually transmitted infections, HPV vaccine rates are still considerably low. Currently, 27% of men and 53.6% of women between ages 18-26 have completed the HPV vaccine series, (Boersma and Black, 2020). Rates for men and women ages 27-45 have not been made available given the recent change in HPV vaccine guidelines. This may be due to an increase in antivaccination campaigns and misinformation spread through social media. This project was conducted in conjunction with a family practice clinic and the local District Health Unit in rural North Dakota.

### **Process**

A Qualtrics style survey was created to be distributed to rural residents of a rural North Dakota county via infographs and social media posts. This survey analyzed four separate categories regarding the HPV vaccine; including, attitudes, beliefs, barriers and influences. Participants received evidence-based information regarding HPV and its vaccine after completion of survey including Who can vaccinate and when to start vaccinating. Patient survey results were presented and distributed to local healthcare providers and officials in hopes future practice changes. A second Qualtrics style survey was created and distributed to healthcare providers and officials within Steele, ND to determine if the information presented was beneficial and if an intent to change practice would occur.

### **Findings & Conclusions**

It was found that many participants (67.9%, n = 19) from the patient survey noted they obtain a majority of their health information from their primary care provider. Though it was noted that some participants within the patient survey utilized search engines (n = 8, 29%) and social media (n = 3, 10.71%) to obtain healthcare information. Many participants (n = 18, 64.29 %) would consider getting the HPV vaccine if their primary care provider recommended it.

### **Recommendations for Further Action**

Providers continue to play a crucial role in HPV vaccine uptake. It is imperative that providers continue to provide education as well as promote HPV vaccine uptake at acute care visits, well child exams, sports physicals and annual wellness visits. Initiating honest conversations on the importance of preventing HPV-related infections, patients may be more likely to engage in safe



sexual behaviors. Finally, providers should continue to promote evidence-based resources for additional vaccine information and provide education regarding vaccine myths and misinformation that may be viewed on social media.