# REDUCING SARS-CoV-2 VACCINATION HESITANCY IN A PRIMARY CARE SETTING

by

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As members of the DNP Project Committee, we certify that we have read the DNP project prepared by Blythe Victoria DeMello, titled Reducing SARS-CoV-2 Vaccination Hesitancy in a Primary Care Setting and recommend that it be accepted as fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.

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Final approval and acceptance of this DNP project is contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

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# DEDICATION

This project is dedicated to all healthcare professionals who served during the 2020 SARS-CoV-2 pandemic. Thank you for selflessly braving through uncharted territory to care for your community.

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## ABSTRACT

**Purpose:** The purpose of this quality improvement project was to increase SARS-CoV-2 vaccination confidence and knowledge in adults who display reluctance or hesitancy through a brief educational discussion and a written pamphlet.

**Background:** In recent history, the world was faced with an unprecedented challenge as a pandemic quickly encompassed the globe. In early 2020, this became commonly known and referred to as the COVID-19 pandemic. The severe health implications of this respiratory virus quickly overfilled hospitals and placed the health of communities at risk. To get ahead of further spread of COVID-19, it was pertinent to quickly develop an effective vaccine. Following rigorous clinical trials, two mRNA vaccines were approved by the United States (US) Food and Drug Administration (FDA). What seemed like a solution became a challenge within the US. The population of the US showed reluctance to participate in COVID-19 vaccination programs. Vaccine hesitancy related to COVID-19 mRNA vaccines prolonged communities achieving adequate herd immunity. Understanding why individuals were displaying vaccine hesitancy was pertinent for implementing strategies that would lead to increased mRNA COVID-19 vaccine compliance.

**Methods:** Participants were recruited from Peak Family Practice in Colorado Springs, CO. A pre-survey was administered followed by a short one-on-one educational session reviewing a written pamphlet about mRNA vaccines and common misinformation related to COVID-19 vaccines. A post-survey was administered after the educational intervention. Each survey had the same five questions and assessed participant knowledge and confidence related to mRNA COVID-19 vaccines.

**Results:** A total of 20 participants completed the pre- and post-survey responses, along with participating in the short educational session. No statistically significant differences were found, however, participants who changed their answers on post-survey showed an increase in confidence of mRNA vaccines as well as indicating they would be more likely to receive a COVID-19 vaccine.

**Conclusion:** This educational intervention reviewing a written pamphlet of mRNA vaccine information was effective in increasing the confidence of mRNA COVID-19 vaccines in some participants. Participants who changed their post-survey answers indicated an increase in likeliness to receive COVID-19 vaccination and showed improvement in knowledge related to mRNA vaccines. Although there was evidence of clinical significance a larger sample size would be necessary to indicate true statistical significance.

# INTRODUCTION

It would be reasonable to consider the quick development of a safe, effective, and affordable vaccine to combat the SARS-CoV-2 (COVID-19) virus as a major achievement in the setting of a pandemic. Despite the approval of COVID-19 vaccines, the primary challenge shifted toward the reluctance or unwillingness of the United States population to receive the COVID-19 vaccine; commonly known as vaccination hesitancy (Coustasse, Kimble, & Maxik, 2021). The risks associated with vaccination hesitancy extended beyond the individual's susceptibility for contracting COVID-19 along with the potential health complications. Unvaccinated individuals are more likely to quickly propagate the contagious disease throughout their community (Coustasse, Kimble, & Maxik, 2021). Vaccines are only effective if most of the population gets vaccinated (Ventola, 2016). To eliminate challenges associated with vaccine delay uptake, it was imperative to understand the cause of hesitation to reduce COVID-19 vaccine hesitancy in the United States (US).

## Background Knowledge and Significance

In recent history, the world witnessed the outbreak of two other viruses that were genetically similar to COVID-19. In 2003, the SARS-CoV virus emerged, followed by the outbreak of the MERS-CoV virus in 2012 (Bhattacharjee et al., 2020). The outbreak of these two viruses pointed out the weakness of the limited availability of antivirals and vaccines to combat the virus (Bhattacharjee et al., 2020). Global efforts for containing viral outbursts were limited to monitoring and containment strategies due to the limited availability of therapeutics against the virus (Gudadappanavar & Benni, 2020). Within the US implementation of these measures varied widely and proved insufficient with impeding the spread of COVID-19 (Baden et al., 2020).

Control measures used to reduce transmission included: use of masks, physical distancing, rapid testing for exposed or symptomatic individuals, contact tracing, and isolation for 14 days if sick or exposed to sick persons (Baden et al., 2020).

Vaccinations play a vital role in the history of global health. Smallpox was the first vaccine developed in 1792 by Edward Jenner (Greenwood, 2014). The global eradication of smallpox occurred in 1979 and ultimately shed light on the importance of immunization development and deployment (Greenwood, 2014). The success of the smallpox vaccine proved that there is an on-going need for vaccines. In a pandemic setting, accelerated vaccine design, testing, and mass production were crucial elements for reducing the spread of COVID-19 and decreasing the amount of time it remained prevalent (Gudadappanavar & Benni, 2020).

In response to COVID-19, researchers and clinicians focused their efforts on finding ways to appropriately implement prevention and control strategies (Gudadappanavar & Benni, 2020). With a disease that was as highly communicable as COVID-19, hospitals across the country became filled; development of a vaccine to provide effective means to prevent further disease spread became a priority (Johns Hopkins University & Medicine, 2021; Gudadappanavar & Benni, 2020). In May 2020, the Department of Health and Human Services (HHS) partnered with the Department of Defense (DOD) to complete Operation Warp Speed (OWS) (Slaoui & Hepburn, 2020). The purpose of OWS was to accelerate the development, manufacturing, and distribution of COVID-19 vaccinations, therapeutics, and diagnostics (Slaoui & Hepburn, 2020).

Researchers have studied mRNA vaccines for over a decade. Since SARS-CoV-2 is genetically like the SARS-CoV (2003), researchers were able to quickly synthesize an mRNA vaccine (Baden et al., 2020). In January 2020, researchers discovered the genetic sequence of

SARS-CoV-2 (Baden et al., 2020). Following the identification of the genetic sequence, Moderna and the Vaccine Research Center at the National Institute of Allergy and Infectious Disease (NIAID) developed a lipid-nanoparticle (LNP) encapsulated mRNA vaccine expressing the perfusion-stabilized spike glycoprotein; mRNA-1273 (Baden et al., 2020). By July 2020, the mRNA-1273 vaccine entered a phase 3 trial to assess for safety and efficacy in the prevention of SARS-CoV-2 (Baden et al., 2020). By December 2020, the Federal Drug Administration (FDA) had approved the use of Moderna and Pfizer mRNA vaccines in the US.

The efficacy of vaccinations relies mainly on the immunity of appropriately inoculated individuals against a specific pathogen (Ventola, 2016). Those who are not appropriately immunized or lack immunization are protected from pathogens when most of the community is vaccinated: this is known as herd immunity (Ventola, 2016). Vaccines were necessary to reduce the morbidity and mortality effects associated with COVID-19 (Baden et al., 2020). Members of the public within the US, especially those of a lay audience, displayed vaccination hesitancy, fears, and worry brought on by misconceptions and misinformation (Broockman et al., 2020). The high paced vaccine development and approval for use within the US decreased the public acceptability of immunization against COVID-19 (Feleszko et al., 2021). Public mistrust, especially those of a non-scientific audience, was fueled by the worry of premature implementation of a poorly tested vaccine, questioning the ethicality of accelerated human vaccine trials, and the hesitancy displaced by government officials and regulators (Broockman et al., 2020).

It was imperative to understand the cause of hesitation to reduce COVID-19 vaccine hesitancy in the US. This quality improvement (QI) project aimed to increase COVID-19 vaccine

confidence and knowledge in adults in a primary care setting by providing a brief educational session.

## Local Problem

COVID-19 vaccinations were first made available to healthcare providers in December 2020, after the Food and Drug Administration (FDA) approved vaccines for use (CDPHE, 2021). Each state determined dissemination of the vaccine. Colorado outlined three major phases. The first phase aimed to vaccinate high-risk populations such as health care workers and individuals who have direct contact with COVID-19 positive patients, long-term care facility and staff, firefighters, police officers, first responders, and people aged 70 and older (CDPHE, 2021). Phase 2 opened in Spring 2021 and focused on vaccinating people ages 60 and older and Coloradans with high-risk conditions: those who were receiving treatment for cancer, chronic kidney disease, diabetes mellitus, pregnancy, sickle cell disease, Etc. (CDPHE, 2021). Phase 3 started the Summer 2021 and offered vaccinations to the general public (ages 16 & above) (CDPHE, 2021).

To achieve herd immunity, an estimated 70% of Coloradans needed to receive the entire COVID-19 vaccination course (Flaherty et al., 2020). Vaccination hesitancy was a critical contributor that prevented vaccination rates from reaching 70%. The population of Coloradans who were able to receive the vaccine was limited by the FDA as the organization had only cleared Moderna and Pfizer immunizations for persons aged 12 and older (Flaherty et al., 2020). Although children may be carriers and are susceptible to COVID-19, they were unable to receive the vaccine. With a large majority of the Colorado population exempt from receiving the vaccine, achieving the 70% of vaccinated individuals became even more limiting.

There remained a large amount of rejection and hesitancy within the Colorado population to receive the vaccine. Healthier Colorado performed a survey consisting of 1,008 Coloradans and found that the interest in receiving the vaccine was rejected by 44% of Colorado Hispanics, 48% of African Americans, 50% of those without a college degree, and 58% who identified themselves as republicans (Flaherty et al., 2020). The significance of minority groups displaying uncertainty and rejection was that Hispanics made up 20.9% of the Colorado population, and African Americans made up 4.1% of the population (Statistical Atlas, 2018). In Colorado, the incidents of individuals diagnosed with COVID-19 that required hospitalization, and associated deaths were primarily disproportionate to Hispanics (CDC, 2020). Adult Hispanics alone accounted for 55% of all Colorado COVID-19 cases, 62% of hospitalizations, and 24.9% of deaths (CDC, 2020). Minority groups had more COVID-19 exposure due to living in larger household sizes, working in essential industries, working while ill, and delayed testing after symptom onset (CDC, 2020). Reducing COVID-19 vaccination hesitancy in vulnerable minority groups and all adult Coloradans would have helped achieve herd immunity and decreased COVID-19 cases, hospitalizations, and deaths.

## Intended Improvement

The purpose of this QI project was to increase SARS-CoV-2 vaccination confidence and knowledge in adults who display reluctance or hesitancy through a brief educational discussion and a written pamphlet. The goal was to integrate and deliver a short and informative educational session about SARS-CoV-2 mRNA vaccine information to adults in a primary care setting in Colorado Springs, Colorado.

Aim: Increase vaccination knowledge and confidence by providing a brief five-minute in-person discussion and written pamphlet assessed by pre- and post-survey.

**Project Purpose**

The purpose of this QI project was to increase SARS-CoV-2 vaccination confidence and knowledge in Colorado adults through discussion and educational materials in a primary care setting. Achieving herd immunity within the US required COVID-19 vaccination of up to 55-82% (Gostin & Salmon, 2020). Colorado State required COVID-19 vaccine compliance estimated at 70% to achieve herd immunity (Flaherty et al., 2020). Development of a safe and effective vaccine against COVID-19 while also having the means to mass-produce and distribute it was a testament to how far science and technology have come.

Vaccination hesitancy was a unique challenge that the US faced. Vaccination hesitancy or refusal may have been due to many social, political, and cultural factors (Kestenbaum & Feemster, 2015). There has been a steady culture of vaccination resistance within the US when it comes to parents choosing not to immunize their children from vaccine-preventable diseases such as measles, mumps, tetanus, pertussis, and rubella (Kestenbaum & Feemster, 2015). An anti-vaccination movement reemerged in 1998 when Andrew Wakefield's publication falsely linked the MMR vaccine to autism (Kestenbaum & Feemster, 2015). The consequences associated with rejection of vaccine-preventable disease uptake resulted in an outbreak of 644 cases of measles that affected 27 states in 2014 (Kestenbaum & Feemster, 2015).

The consequences of the reluctance or unwillingness to comply with COVID-19 vaccine uptake affected far more than the individual and their choice. In a pandemic setting where SARS-CoV-2 was highly communicable, individuals who did not get fully vaccinated were at

high-risk of becoming infected and were far more likely to spread the disease to others within the community (Coustasse et al., 2021).

There are a multitude of factors that influenced vaccination decision-making. Despite the amount of information available for consumption, there was equally the amount of misinformation available. The media often propagated and perpetuated misinformation about the COVID-19 vaccine leading to mistrust in the vaccine (Coustasse et al., 2021). Sources to look to for recommendations and advice became unclear and complicated for individuals to decipher which source to look to when treatment for the disease became politicized in the US. Typically, the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) were widely trusted and set a standard platform of practice for health professionals to follow (Kreps et al., 2020). The WHO and CDC endorsed the SARS-CoV-2 vaccine as an effective means to control the pandemic (Kreps et al., 2020). Politicians from the US incited mistrust by withdrawing funding from the WHO, blaming the organization for allegedly covering up the pandemic initially, and criticizing their mismanagement of the pandemic (Kreps et al., 2020).

Despite the vast amount of controversial COVID-19 vaccine information, healthcare providers remained the most influential predictor of vaccine adherence (Kestenbaum & Feemster, 2015). Providers who can articulate a strong recommendation, have a solid patient-provider relationship, and are prepared to discuss concerns are more likely to encourage individuals to vaccinate (Kestenbaum & Feemster, 2015).

This project aimed to provide SARS-CoV-2 vaccine information in a way that was not overwhelming and made sense to individuals. The advantage of having a 1:1 discussion with

adults in a primary care setting was to build a trusting relationship so that the individual felt comfortable discussing their concerns or worries. Providing individuals with knowledge about the vaccine empowered them to make an informed decision about their health and the community's health.

**Project Question**

In adults who display mRNA SARS-CoV-2 vaccination hesitancy in a Colorado primary care setting, what are the effects of a brief in-person educational discussion and written pamphlet on mRNA SARS-CoV-2 vaccination knowledge and confidence?

**Project Objective**

Aim: Increase vaccination knowledge and confidence by providing a brief 5-minute in-person discussion and written pamphlet assessed by pre- and post-survey.

## Theoretical Framework

The Public Health Service (PHS) developed the Health Belief Model (HBM) in the 1950s to prevent the spread of disease on small and large scales (Strecher & Rosenstock, 1997; Rosenstock, Strecher, & Becker, 1988). During this time, the HBM enhanced the adoption of health behaviors specifically within the US (Jones et al., 2016). The goal of the HBM is to learn and predict health behaviors to understand how to implement a plan to solve a problem related to healthcare (Jones et al., 2016; Wong et al., 2020). The HBM framework offers versatility among the healthcare network, leading it to be widely implemented (Wong et al., 2020). The HBM poses six primary constructs that aid with identifying predictors related to healthcare beliefs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and cues to

action (Jones et al., 2016; Wong et al., 2020). The final construct is self-efficacy and became added in the late 1980s (Wong et al., 2020).

More specifically, perceived susceptibility refers to the individual's subjective perception of their risk for contracting a disease or illness (Jones et al., 2016; Wong et al., 2020). Similarly, perceived susceptibility refers to an individual's perceived seriousness of contracting an illness or disease and considers the medical and social consequences that would come from contracting said disease or illness (Jones et al., 2016; Wong et al., 2020). Perceived benefits refer to the individual's perception of the effectiveness of available interventions to prevent or reduce the threat of contracting a disease or illness, for example, a vaccination (Jones et al., 2016; Wong et al., 2020). Perceived barriers include an individual's reluctance to perform recommended healthcare interventions (Jones et al., 2016; Wong et al., 2020). This reluctance leads to barriers or impediments if the individual views the intervention as dangerous, time-consuming, expensive, or inconvenient (Jones et al., 2016; Wong et al., 2020). Cues to action are triggers or actions that lead the individual to decide to accept the health care recommendation (Jones et al., 2016; Wong et al., 2020). These cues can be either internal or external. Internal cues present as physiologic symptoms, such as a cough, shortness of breath, or chest pain (Wong et al., 2020). External cues stem from advice from acquaintances, a news story, or a recent illness of a family member (Wong et al., 2020). Self-efficacy is the final construct that refers to an individual's confidence in their ability to follow through with recommended health care action (Wong et al., 2020).

The purpose of this QI project was to increase COVID-19 vaccination confidence and knowledge in the setting of an adult primary care in Colorado Springs, Colorado. To reduce

COVID-19 vaccine hesitancy in the US, it was imperative to understand the cause of hesitation. In the setting of this QI project, the HBM fits well with the goal of this project because the constructs developed by this model will assess health behavior related to the COVID-19 vaccine. Constructs that are the most helpful include: perceived susceptibility, perceived benefits, perceived barriers, and cue to action.

What made the HBM versatile in this project was that each construct did not need to go in order, and a single perception or behavior could be woven throughout several constructs. Perceived susceptibility is the individual's perception of how likely they are to contract COVID-19 (Jones et al., 2016; Wong et al., 2020). If one is doubtful that their risk for contracting COVID-19 is high, this will show in the perceived barriers construct, as the individual perceptions may become a barrier to following through with the health care recommended action: vaccination as soon as possible (Jones et al., 2016; Wong et al., 2020). Perceived benefits may also affect the perceived barriers because if an individual does not perceive the COVID-19 as practical, this behavioral choice will become relevant in their perceived barrier construct. The cue to action may be the most important construct to understand within this population because ultimately, it shows which trigger, whether internal or external, led the individual to decide to follow through with the recommended health care action.

## Literature Synthesis

The abrupt swiftness of the COVID-19 pandemic presented a time-limiting challenge for scholarly work such as systematic reviews, randomized-controlled trials (RCT), and clinical trials. These types of research often require multiple years to develop, perform, ensure safety, receive funding, and review for publication (Pham et al., 2016). This project focused mainly on

the subjective views of the public; therefore, search criteria expanded to include qualitative and quantitative data.

**Evidence Search**

An extensive literature review was conducted to explore current COVID-19 vaccination perceptions within the US population, the implications of COVID-19 vaccination hesitancy, the development of SARS-CoV-2 vaccines, and SARS-CoV-2 vaccine clinical trials. Two searches were conducted using PubMed and Cumulative Index of Nursing and Allied Health Literature (CINAHL) electronic databases accessed through the Arizona Health Sciences Library.

**Comprehensive Appraisal of Evidence**

In the PubMed database, keywords used in the search forum included: "COVID-19," "vaccine," "safety," "public," and "United States." Initially, this search yielded over 250 articles. Publication dates were limited to five years to refine the search. Article types were restricted to clinical trials, randomized control trials, reviews, and systematic reviews. Exclusions included limiting articles to English language only. The literature search included articles on adults only and excluded articles on children. The refined search yielded 42 results. Searching through these results, a total of 2 RCTs, 1 systemic review, and 3 sample surveys were retained for use.

In the CINAHL electronic database, similar keywords were used in the search forum: "COVID-19 or coronavirus or pandemic," "vaccines and hesitancy," and "United States." This search yielded over 200 results. The search was refined by limiting source types to academic journals and limiting the publication date to five years. Exclusion criteria included limiting articles to the English language only. Literature including children was excluded. This search yielded 68 results. Results were further limited to include articles only from academic journals.

Of the results, a total of two cross-national surveys, one prospective survey, one-panel survey, one randomized survey, and one cross-sectional survey were retained for use. See Appendix F for the delineation of articles.

### *Global Vaccine Hesitancy*

A pandemic means that a virus is infectious at the global level. Extending beyond one's state border, the border of the nation one resides in and is present throughout the world. Herd immunity at the local level was essential to achieve. However, vaccination hesitancy was present among other nations, and it was vital to look to those areas to find solutions at home.

Global vaccination hesitancy was likely already present based on results from surveys dispersed across multiple nations. Results confirmed considerable societal reluctance to the COVID-19 vaccine (Felezsko et al., 2021). An estimated 65-70% of the population needed to receive COVID-19 vaccination to achieve herd immunity (Baden et al., 2021). Interestingly, the level of unwillingness to vaccinate against COVID-19 in most countries was higher than reluctance against regular vaccines (Baden et al., 2021). For example, a survey sample from adult Polish citizens showed that 28% of adults did not intend to get COVID-19 vaccination; 51% of those who did not intend to get vaccinated indicated that information on vaccine safety or efficacy would not change their decision (Baden et al., 2021). Polish respondents indicated a 78% support rate for childhood vaccinations and a 37% rate for COVID-19 vaccinations (Baden et al., 2021).

Broockman et al. (2021) conducted a cross-national survey that assessed public opinion on accelerated COVID-19 vaccine trials in the pandemic setting, and the results contradicted Baden et al. (2021). Broockman et al. (2021) found that the eight nations included in their study

sample endorsed public support for accelerating COVID-19 vaccination trials. Results were consistent among each subgroup surveyed, including vulnerable populations and transparency of ethical considerations (Broockman et al., 2021). This survey was distributed before the availability or approval of any COVID-19 vaccines, but the respondents' answers diminished the worry that public trust would decrease due to the fast pace of vaccine development appearing unethical (Broockman et al., 2021).

### *Vaccine Hesitancy within the United States*

To assess how US citizens felt and perceived the vaccine, surveys were disseminated across the country and analyzed. Multiple surveys reported foremost concerns participants had regarding the SARS-CoV-2 vaccine including safety and side effects; accelerated vaccination development, and not enough testing was conducted (Nguyen et al., 2021; Pogue et al., 2020; Ruiz & Bell, 2020). Other topics leading to vaccine hesitancy included worries about allergic reactions, doubt of vaccine efficacy, concerns regarding the amount and distribution of vaccines (Pogue et al., 2020; Ruiz & Bell, 2020).

In contrast, individuals with low to non-intent for COVID-19 vaccination were higher in individuals who had a high school diploma or less, had an annual household income <$35,000, and individuals who lived in non-metro or rural areas (Nguyen et al., 2021; Ruiz & Bell, 2020). Vaccination hesitancy was higher among African Americans, Hispanics, non-frontline essential workers, individuals with underlying conditions, and those that perceived they would not get the disease (Fisher et al., 2020; Khubchandani et al., 2020; Mercadante & Law, 2020; Nguyen et al., 2021; Ruiz & Bell, 2020). Of the racial/ethnic groups surveyed, African Americans and Hispanics were among the respondents that tended to have a lower education level and a lower

annual household income (Nguyen et al., 2021). Those who rarely or never wore a mask and those who never had or are not likely to get the annual influenza vaccine were likely not to receive or seek out the COVID-19 vaccine (Nguyen et al., 2021).

Individuals associated with stronger vaccine intentions were of the Caucasian race, greater than 60 years of age, had at least a baccalaureate degree and had an annual household income greater than $75,000 (Khubchandani et al., 2020; Mercadante & Law, 2020; Nguyen et al., 2021; Ruiz & Bell, 2020). Participants also displayed accurate general vaccine knowledge, disagreed with vaccine conspiracies, and perceived the threat of COVID-19 as severe (Ruiz & Bell, 2020).

### *Political Influence of Vaccination Hesitancy within the United States*

The year 2020 in the US had more going on than the COVID-19 pandemic. It was also a presidential election year, which occurs once every four years. COVID-19 officially became a pandemic early in 2020 however, the election for the new US president did not take place until November 2020 (Edigin et al., 2020). Surveys disseminated throughout the US showed that the politicization of the vaccine approval process influenced safety beliefs and willingness to get vaccinated based on endorsement by political figures (Bokemper et al., 2020). Most of those identified as democrats and republicans expressed safety concerns about the vaccine, perceiving that vaccine approval centers on politics rather than science (Bokemper et al., 2020). With social isolation mainly implemented to decrease the spread of COVID-19, Americans obtained information from news sources such as FOX News, CNN/MSNBC, and social media sources (Bokemper et al., 2020; Ruiz & Bell, 2020). Results showed that traditional and social media as

sources of information played a role in COVID-19 vaccination hesitancy (Bokemper et al., 2020; Ruiz & Bell, 2020).

Those who watched Fox News had a lower intent to vaccinate than those who watched CNN/MSNBC ($P < 0.001$) (Ruiz & Bell, 2020). A P value of $<0.001$ indicates statistical significance corresponding with lower intent to vaccinate individuals and individuals who watched Fox News (Ruiz & Bell, 2020). Vaccine knowledge did not differ between viewers of Fox News and viewers of CNN/MSNBC (Ruiz & Bell, 2020). However, intent to vaccinate was lower in those who received vaccine information from Fox News viewers than viewers who received vaccine information from CNN/MSNBC ($P < 0.001$) (Ruiz & Bell, 2020). Beyond traditional media sources, information on social media also played a role in vaccine hesitancy due to the politicization of public policy on the origin of COVID-19, how it spread, and best containment measures (Bokemper et al., 2020; Ruiz & Bell, 2020). The timing of approximate vaccine approval was coincidentally around the time of the election in late November 2020. Since before COVID-19 was declared a pandemic, the then US president often expressed skepticism and downplayed the severity of the pandemic (Bokemper et al., 2020). During the pandemic, he would often promise unproven treatments for COVID-19, which directly contradicted guidance from scientific experts on a public forum (Bokemper et al., 2020). With the election coming up in November, the president often boasted about his administration's achievement of the rapid development of a SARS-CoV-2 vaccine (Bokemper et al., 2020). This contradicting information was often confusing to the public and brought the COVID-19 pandemic into the political agenda by creating information mistrust and misguidance (Bokemper et al., 2020).

The National Institute of Allergy and Infectious Disease (NIAID) director was Dr. Anthony Fauci (Bokemper et al., 2020). Dr. Fauci's endorsement of the COVID-19 vaccine increased vaccine confidence among republicans, independents, and had the highest effect among Democrats (Bokemper et al., 2020). The political polarization of the two-party system within the US and political endorsement by either democratic or republican groups suggests that intent to vaccinate decreases (Bokemper et al., 2020). Strategies for encouraging COVID-19 vaccination uptake done through public health experts, like Dr. Fauci, or other vital members of the community who do not have a political presence show improved uptake (Bokemper et al., 2020).

There is conflicting information between the two studies. Ruiz & Bell (2020) found that participants with more excellent general vaccine knowledge were more likely to get vaccinated. Bokemper et al., (2020) found that their participants who displayed a high level of vaccine confidence and knowledge were susceptible to political endorsements and political persuasion by political figures and could potentially decrease vaccination uptake.

**Efficacy of COVID-19 Vaccines**

To find therapies that would help control the spread of SARS-CoV-2, researchers worked to find interventions and ways to prevent and control them (Gudadappanavar & Benni, 2020). Initially, there were various clinical trials approved by the World Health Organization (WHO) evaluating interventions for SARS-CoV-2 (Gudadappanavar & Benni, 2020). It was reported to the Food and Drug Administration (FDA) that there were around 70 drugs, already known and experimental, that may be helpful against SARS-CoV-2 (Gudadappanavar & Benni, 2020). Drugs like hydroxychloroquine, remdesivir, tocilizumab, and chromostat mesylate showed

therapeutic results against the virus (Gudadappanavar & Benni, 2020). However, few broad-spectrum antivirals showed much success in treating or resolving SARS-CoV-2 (Gudadappanavar & Benni, 2020). The limited number of therapies that could be used for COVID-19 brought about the development of the COVID-19 vaccine (Gudadappanavar & Benni, 2020).

The advantage of mRNA vaccines in the setting of a pandemic is the flexibility and ability to synthesize genetic sequences without great effort (Baden et al., 2021; Polack et al., 2020). In January 2020, Moderna and the Vaccine Research Center sequenced mRNA-1273, a spike protein believed to easily be identified by one's immune system to make antibodies against COVID-19 at the National Institute of Allergy and Infectious Disease (NIAID) (Baden et al., 2021). Pfizer/BioNTech developed an mRNA vaccine, synthesizing BNT162b2 as the target spike protein (Polack et al., 2020).

Moderna's clinical trial took place July-October 2020, while Pfizer/BioNTech's clinical trial began in July and finished in November 2020 (Baden et al., 2021; Polack et al., 2020). Both groups found that efficacy was greater with two injections given 21 and 28 days apart, respectively (Baden et al., 2021; Polack et al., 2020).

Pfizer/BioNTech's two-dose inoculation of BNT162b2 was safe and 95% effective against COVID-19 (Polack et al., 2020). Efficacy against COVID-19 after only one dose was 52%, 91% effective seven days after the second dose (Polack et al., 2020). Between the first and second doses, 39 individuals were COVID-19 positive in the group that received BNT162b2, and 89 confirmed positive COVID-19 cases in the placebo group (Polack et al., 2020). There were 10 severe cases of COVID-19 reported in the trial after the first dose, nine were in the placebo

group, and one was in the BNT162b2 group (Polack et al., 2020). Moderna reported 11 cases of COVID-19 in the mRNA-1273 group and 185 cases in the placebo group (Baden et al., 2021). After two doses of BNT162b2, serum labs showed significant antigen-specific antibodies targeting COVID-19, including CD8+ and CD4+ T-cells (Polack et al., 2020). This study shows that mRNA vaccines can prevent COVID-19 given the high vaccine efficacy and low numbers of confirmed COVID-19 (Polack et al., 2020).

These types of studies typically take place over two years to assess for safety and efficacy but given the high vaccine efficacy and emergent need for successful therapeutics, the trial progressed for emergent approval by public health regulators (Polack et al., 2020).

Moderna reported 11 cases of COVID-19 in the mRNA-1273 group and 185 cases in the placebo group (Baden et al., 2021). Moderna had a similar efficacy rate at 94.1% after receiving two doses (Baden et al., 2021). There were 30 severe cases of COVID-19 reported; all 30 were in the placebo group (Baden et al., 2021). Severe cases of COVID-19 are more likely to lead to healthcare utilization, complications, or death (Baden et al., 2021). Because all severe cases were in the placebo group, suggesting that mRNA-1273 effectively prevents severe COVID-19 illness (Baden et al., 2021).

The safety and efficacy of the Moderna trial will be on-going, with follow-up for two years from clinical trial initiation (Baden et al., 2021). Significantly more adverse injection site events occurred in the mRNA-1273 group compared to the Pfizer/BioNTech clinical trial. Delayed injection-site reactions occurred in 244 mRNA-1273 participants after the first dose and 68 participants after the second dose (Baden et al., 2021). Reaction sites had erythema, induration, tenderness, and resolved over 4-5 days (Baden et al., 2021).

**Strengths of Evidence**

The literature identifies the efficacy of mRNA SARS-CoV-2 vaccines providing significant prevention against COVID-19 infections. It is also shown that mRNA SARS-CoV-2 vaccines prevent severe symptoms associated with COVID-19 after second dose of administration (Baden et al., 2021; Polack et al., 2020). Evidence shows that vaccine programs have led to eradication of diseases in the past (Felezsko et al., 2021). Therefore, conducting surveys to understand the driving factors behind SARS-CoV-2 vaccination hesitancy is vital for tailoring education and communication strategies for future success and compliance of vaccine programs (Felezsko et al., 2021).

**Weaknesses, Gaps and Limitations**

COVID-19 continued to cycle the globe two years after being officially declared a pandemic. Researchers were still conducting and producing information due to the prolonged prevalence of COVID-19, so the quantity of quantitative scholarly research was limited on this subject. The Pfizer/BioNTech and Moderna mRNA clinical trials compared established data based on the original SARS-CoV-2 virus. The longevity and prevalence of the COVID-19 pandemic enabled the emergence of multiple variants that eventually became the dominant viral vector (Haque & Pant, 2022). With each new variant, Moderna's mRNA-1273 and Pfizer/BioNTech's mRNA-1273 vaccines lacked thorough clinical data showing efficacy.

Many of the cross-national surveys of attitudes and perceptions based on mRNA SARS-CoV-2 vaccines were conducted before approval of Pfizer/BioNTech or Moderna's mRNA vaccines. There were limited articles that assessed attitudes and perceptions of SARS-CoV-2 vaccines after approval and disbursement of mRNA vaccines. This may have yielded data to aid

in providing an outline for possible solutions to increase compliance and ultimately help achieve herd immunity.

## METHODS

### Project Design

The Health Resources and Services Administration (HRSA) defines quality improvement (QI) as measurable improvement of a healthcare service or healthcare outcomes of a targeted population through the implementation of a systematic or continuous process (Moran, Burson, & Conrad, 2019). The need for QI projects is due to the delay with integrating evidence-based practice due to the gap between published research and the development of evidence-based innovations that account for barriers to health care uptake (Moran, Burson, & Conrad, 2019). This quality improvement project targets adults in a primary care setting and intends to decrease SARS-CoV-2 vaccination hesitancy through a brief 1:1 educational information session and written pamphlet. A descriptive quantitative approach will assess intervention outcomes. Self-reporting data was gathered using a pre-and post-survey questionnaire.

Achievement of the purpose of this QI project will be evaluated using the following four objectives. Upon brief educational session and review of a written pamphlet, adults in a primary care setting will report increase vaccination knowledge after a brief 5-minute in-person discussion and written pamphlet. This will be assessed by a pre- and post-survey.

### Model for Implementation

#### Plan-Do-Study-Act (PDSA)

The Plan-Do-Study-Act (PDSA) is a framework developed in the 1990s by the Associated in Process Improvement (Silver et al., 2016). It has since been primarily used in

various settings to guide improvement in healthcare settings (Silver et al., 2016). Initially, the PDSA was designed to be used to document and assess change after the implementation of a specific intervention.

The advantage of the PDSA cycle is that it can apply within various healthcare settings (Silver et al., 2016). The PDSA allows quick planning and testing implementation and is ideal when applied in a quality improvement project (Silver et al., 2016). The PDSA is a cycle that assesses the effectiveness of change in a standard working environment (IHI, 2021). The effectiveness of change is assessed based on results from extensive planning of change, performing the implemented change, and studying the implemented change results (IHI, 2021) (Figure 1). Information gathered is refined from performing several PDSA cycles until optimal results are achieved (IHI, 2021). This QI project used the PDSA tool to assess the efficacy of a brief in-person educational discussion and written pamphlet on SARS-CoV-2 vaccination hesitancy by using descriptive qualitative data yielded from a pre-/post-survey questionnaire. Using the PDSA cycle allows real-time feedback on the in-person and written educational process. Feedback will be continually evaluated, updated, and reconfigured to ensure that this QI project's objectives are achieved.

***Plan***

Developing a plan is the first step of the PDSA cycle (Christoff, 2018). Plan development should identify specific objectives of the study and the interventions that will help achieve the goal of the QI project (Christoff, 2018). The intervention's how, when, and where are outlined and discussed in detail (Christoff, 2018). The specific goals and the predicted outcomes from the intervention are outlined in detail (Christoff, 2018). For this QI project, the project coordinator

consulted with the owner of Peak Family Practice located in Colorado Springs, Colorado to discuss the implementation of the project at this site. The purpose of the QI project was discussed with the owner of Peak Family Practice to gain buy-in. This QI project aims to decrease vaccination hesitancy in adults by accessing data gained from a short pre- and post-survey after a brief five-minute in-person educational discussion reviewing information about SARS-CoV-2 vaccination information. Adults ages 18 years and older were included in the QI project. The total estimated time needed for this intervention was 15 minutes per participant. The workflow of the clinic was taken into consideration. It was discussed that it would be best for the project coordinator to apply the intervention after an individual's scheduled appointment. The timeframe for implementing the QI project within Peak Family Practice was estimated to occur over a two-week timespan. The pre- and post-survey consisted of five questions. Question types used in the surveys included multiple-choice, dichotomous, and Likert-scale questions.

Each survey was distributed manually by the project coordinator. The patient was given adequate time to complete the pre-survey (Appendix D). The participant was presented with an envelope to place completed pre-and post-survey results. The envelope was labeled with the same unique number. Next, a brief five-minute face-to-face educational session using a written pamphlet was reviewed (Appendix C). The project coordinator offered time to answer questions and provided clarification about the information presented. The project coordinator manually distributed the post-survey immediately following the educational session (Appendix D). The project coordinator ensured the participant had adequate time to complete the post-survey. The participant indicated completion by placing the post-survey in the provided envelope. The project coordinator conducted one educational session per patient. The data collected from the

post-survey results was used to assess the effectiveness of the educational intervention. The participant's matching envelope and the pre- and post-survey were matched using a number identification, and each participant had a unique number.

***Do***

The second part of the PDSA is carrying out the planned intervention and reviewing collected data for success, problems, achieved outcomes, or unexpected outcomes (Christoff, 2018). During this phase, the project coordinator implemented and completed data collection by December 2021. The instruments used for data collection included patient pre- and post-survey of SARS-CoV-2 vaccination knowledge and confidence gained following the educational session. The educational pamphlet was presented to the participant and reviewed by the project coordinator. During this phase, the project coordinator identified any challenges or unintended outcomes and adjusted accordingly.

***Study***

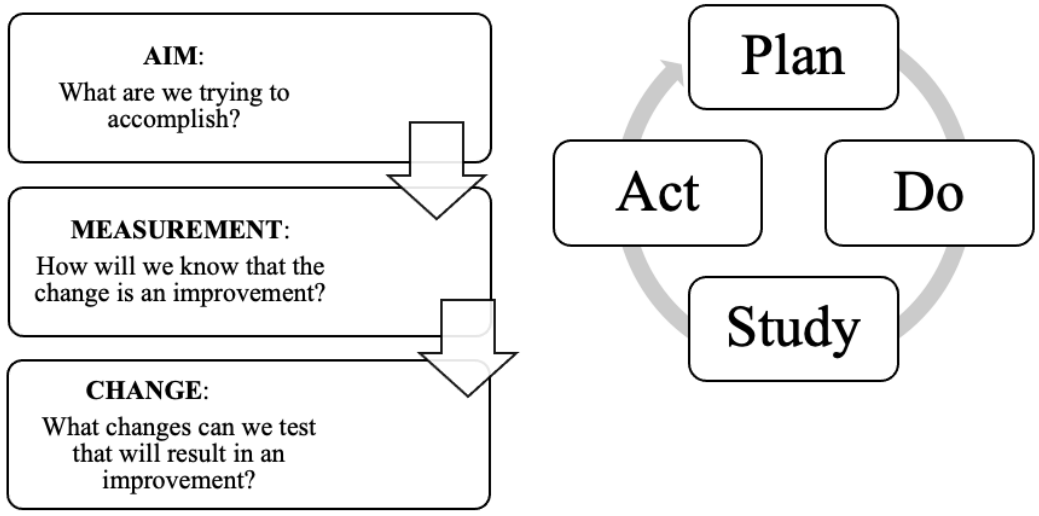
The third part of the PDSA cycle includes analyzing the collected data to help determine if the project's objectives were met (Christoff, 2018). During this phase, the project coordinator critically examined the data that was collected from the pre- and post-survey. Ultimately, the project coordinator assessed if the educational intervention increased participants' knowledge and confidence in the SARS-COV-2 vaccine. The types of pre- and post-survey questions included multiple-choice, dichotomous, and Likert-scale questions. These types of questions yield quantitative data. Therefore, performing statistical analysis assessed if participant vaccine knowledge and confidence increased post intervention.

### *Act*

The final step in the PDSA study is act, meaning the intervention has been adopted, adapted, or abandoned based on the results (Christoff, 2018). The results from the survey and data summary of evidence collected was looked at closely to assess if the overall outcomes of the QI project were met. If the outcomes are not met, the project coordinator will meet with the project team to determine other ways to be more effective. If the project's intended outcomes were met, the project coordinator will work with the stakeholder for Peak Family Practice for utilization within the organization.

**Figure 1**

*The Model for Improvement*




## Setting and Stakeholders

The setting in which this QI project took place was in a family practice clinic located in Colorado Springs, Colorado. This clinic primarily serves individuals across the life span. This clinic has a high Health Professional Shortage Area (HPSA) score, meaning that the patient

population of this clinic primarily receives health insurance through Medicaid and Medicare. Within Colorado Springs, 17.8% rely on Medicaid, and 9.32% rely on Medicare (Data USA, 2021).

Primary care providers in Colorado Springs, CO, see an average of 1,649 patients annually (Data USA, 2021). Peak Family Practice will see about 24 patients per day on average. The population's median age in Colorado Springs, CO, is 35.6 years (Data USA, 2021). The prevalence of costly health diagnoses such as type 2 diabetes mellitus (T2DM) is 6.6% in Colorado Springs, CO (Data USA, 2021). The population of Colorado Springs, CO, is more than 478K (Data USA, 2021). Caucasians (Non-Hispanic) make up the largest ethnic group in Colorado Springs, CO at 67.3%, followed by Caucasian (Hispanic) at 11.3%, and African American (Non-Hispanic) at 5.8% (Data USA, 2021). In the 2016 presidential election, 56.2% of Colorado Springs, CO, voted for the republican party (Data USA, 2021). The annual household income is $70,527 annually, with a homeownership of 59.9% in 2019 (Data USA, 2021). From 2015-2019 those ages 25 and older who had a bachelor's degree or higher was 39.9% (U.S. Census Bureau, 2019).

Peak Family Practice is placed in the center of Colorado Springs, CO, where this QI will take place. Leslie Dawdy, FNP, runs this primary care clinic. She is the sole owner and provider for Peak Family Practice and is one of the key stakeholders for the success and implementation of this QI project. Leslie Dawdy oversees the care of each patient at the practice in addition to heading organizational administration tasks, staffing, and onboarding, QI, and finances. Leslie Dawdy, FNP, has authorized the implementation of this QI project at Peak Family Practice (Appendix A). Other staff that will be instrumental in integrating this project include the nursing

assistant, clerk, and other staff within the office setting. This family practice primarily serves the vulnerable population of the Colorado Springs, CO area. The patient population of this clinic will be key stakeholders as well as they will become the participants of the study and will be receiving the in-person educational session and providing feedback through the pre- and post-surveys.

## Planning the Intervention

The QI project took place in an exam room after the provider had already seen the patient at Peak Family Practice for their scheduled health appointment. The patient was asked if they would like to participate in this DNP project and presented with a printed disclosure form. During the initial encounter, the project coordinator explained the purpose of this DNP project to the participant. The project coordinator also outlined the extent of the encounter, stating that there will be a pre-survey (Appendix D) for the participant to fill out, followed by a short one-on-one educational session reviewing a written pamphlet (Appendix C). Questions regarding pre-survey or any information presented during the educational session were addressed and answered at this time. When all questions were clarified, the post-survey was administered (Appendix D).

The same five questions are on the pre- and post-survey. The project coordinator allotted approximately one minute per question for the participant to answer. The participant was given time alone in the exam room while completing each survey. The project coordinator provided a corresponding envelope at the time the pre-survey was distributed. The participant placed the completed pre- and post-survey into the envelope. The pre- and post-survey was provided for the participant and printed on a single sheet of paper. Each envelope, pre- and post-survey, was uniquely labeled for identification by the project coordinator. The project coordinator provided a

written tool for the participant to indicate their answers on the sheet. The project coordinator was the only person who had access to the acquired data. Once all the data was collected and analyzed, the surveys were destroyed using a shredder at Peak Family Practice per their HIPAA protocol.

## Participants and Recruitment

This QI project included a convenience sample of patients currently receiving care at Peak Family Practice. A convenience sampling method was chosen to be used as recruitment. Convenience sampling is a nonrandom technique in which participants for this project were readily available through specific times at Peak Family Practice (Moran, Burson, & Conrad, 2019). Inclusion criteria include individuals 18-years of age and older and indicated English as a primary language. The information provided in the educational portion of the QI project is non-specific to individuals who have or have not received COVID-19 vaccination. Decreased hesitancy and increased confidence will be the outcomes assessed. Exclusion criteria include any person less than 18-years of age, or those whose primary language is not English. Participants will be given sufficient time to complete the pre-survey on their own. If the participant cannot comprehend the questions provided in each survey along with the written pamphlet, it will be unclear to determine their interpretation of understanding the question.

## Consent and Ethical Considerations

Any study that uses human subjects must implement ethical principles to reduce the risk of potential harm and protect the participants' individual rights (Polit & Beck, 2018). The principles of beneficence include the participants' right to freedom from harm, discomfort, and the participant’s protection from exploitation (Barrow, Brannan, & Khandhar, 2020). Under the

principle of beneficence, researchers must implement barriers aimed to minimize all forms of discomfort and harm and protect participants from any exploitation (Barrow, Brannan, & Khandhar, 2020). Possible participant risks may include loss of privacy, loss of time, emotional distress, social inconveniences, and financial implications (Barrow, Brannan, & Khandhar, 2020). Privacy was maintained by using numerical non-patient identifiers. All responses were kept anonymous, and no participant identifiable information was linked to survey sheets or envelopes. The information gained from the study was handled confidentially and shared only with the project coordinator. A disclosure form was provided for participant review before completing the pre- and post-surveys and receiving the brief educational intervention. Participants were shown the disclosure form and given time for adequate review (Appendix B). As stated in the disclosure form, consent was implied if the participant continued to move forward. An Application of Human Subjects was submitted to the Institutional Review Board (IRB) at the University of Arizona. Permission to proceed from the IRB was obtained before project implementation.

## Timeline

A timeline (Appendix E) was created to ensure adequate documentation of progression for this QI project. The dates on the timeline were preliminarily put in and then updated once official approvals were received from The University of Arizona College of Nursing IRB.

## Data Collection

The participants received a pre- and post-survey. The pre-and post-surveys included the same questions and are formatted identically. The surveys were administered as paper versions and were provided by the project coordinator. Each survey contained a total of five questions.

The breakdown of question types included three Likert-type questions, two true/false, and one multiple-choice question (Appendix D). The pre- and post-survey were assigned a random numerical number that coincided with a sealable envelope.

The participants were provided with the pre-survey and corresponding folder. The participants were allotted approximately five minutes to complete the pre-survey and placed it inside the corresponding envelope. Following the brief educational session, the project coordinator produced the corresponding post-survey and allotted approximately five minutes for completion. The participant was instructed to place the post-survey in the envelope to combine the pre- and post-survey. Once completed, the project coordinator will ensure pre- and post-surveys are combined and seal the envelope until data analysis. Envelopes were kept with the project coordinator and placed in a locked drawer throughout the duration of data collection. Sealing the envelopes ensured that participant responses remained anonymous to ensure answers were not tampered with. The project coordinator opened the envelopes with results after all sealed envelopes were collected to prevent tracing a specific envelope to a particular person.

## Data Analysis

Descriptive statistics were utilized to analyze the pre- and post-survey responses and included graphs and bar charts. The data was input into a secured Microsoft Excel spreadsheet and stored on a password-protected computer. The project coordinator was the only individual who had access to the completed surveys and information transcribed onto the password-protected Microsoft Excel spreadsheet. All paper surveys were shredded upon input into a Microsoft Excel spreadsheet.

The true/false results were analyzed as categorical variables and depicted using frequencies (percentages). The Likert scale and multiple-choice question results were analyzed as ordinal data and scored according to the response. The mean and standard deviation were used to identify any significant differences between the pre- and post-survey responses.

Throughout the development of the proposed implementation of this QI project, scientific rigor, including reliability and validity, were maintained. The reliability and validity of the pre- and post-surveys were peer-reviewed by faculty members at the University of Arizona College of Nursing.

## RESULTS

The QI project was implemented at Peak Family Practice. Each participant was presented with the disclosure statement before proceeding with data collection. The project coordinator then performed data collection through administration of the pre- and post-surveys along with the short in-person educational session discussing mRNA SARS-CoV-2 vaccine information on the written pamphlet. The participant data was collected from the provided printed single sheet pre-and post-survey along with a corresponding envelope. Each envelope was assigned a unique non-identifying numerical number that coincided with each unique pre- and post-survey. Data collection concluded once the participant placed the completed post-survey into the sealable envelope.

### Outcomes

A total of 20 individuals participated in each aspect of the project (n=20). The main objective of this QI project was to increase SARS-COV-2 vaccination knowledge and confidence through a brief 5-minute in-person discussion and written pamphlet. To assess if the project

objective was met, descriptive statistics were utilized to analyze the pre- and post-survey responses.

**Findings of Likeliness**

Each pre- and post-survey included two Likert-style questions. The first question assessed the participant's likeness to receive a SARS-CoV-2 vaccine using a standard Likert scale. Question number 1 on the pre- and post-survey assessed the participant's likeliness to receive a SARS-CoV-2 vaccine with the following statement: "How likely am I to receive the COVID-19 vaccine?" Each participant responded to the pre- and post-survey question (n=20). Of the 20 participants, 35% selected "extremely likely" (n=7/20), and 40% selected "I have already received the vaccine and am partially or fully vaccinated" (n=8/20). These participants also selected the same response on the post-survey apart from one participant who selected "I have already received the vaccine and am partially or fully vaccinated" in the pre-survey (n=7/20) and switched to "extremely likely" in the post-survey (N=8/20). Two participants (10%) selected likely on the pre- and post-survey (n=2/20). One participant (n=1/20) selected "neither likely nor unlikely" on the pre-survey and selected "likely" (n=4/20) on the post-survey. One participant selected (n=1/20) unlikely on the pre-survey and "likely" on the post-survey (n=4/20). One participant (n=1/20) selected "extremely unlikely" on the pre-survey. In the post-survey, this participant changed their answer to "unlikely" (n=1/20). Overall, 15% of the participants increased their likeness of receiving the SARS-CoV-2 vaccine (n=3/20) on the post-survey compared to the pre-survey. None of the participants indicated on the post-survey that they would be less likely to receive the SARS-CoV-2 vaccine after the intervention. The pre-survey mean was 3.55 with a standard deviation (SD) of 2.31. The post-survey mean and SD were 3.1

and 2.29, respectively. The improvement of likeness to receive the SARS-CoV-2 vaccine was not statistically significant (p=0.539).

**Figure 2**

*Pre- and Post-Survey Results: Question #1 – Likeliness*

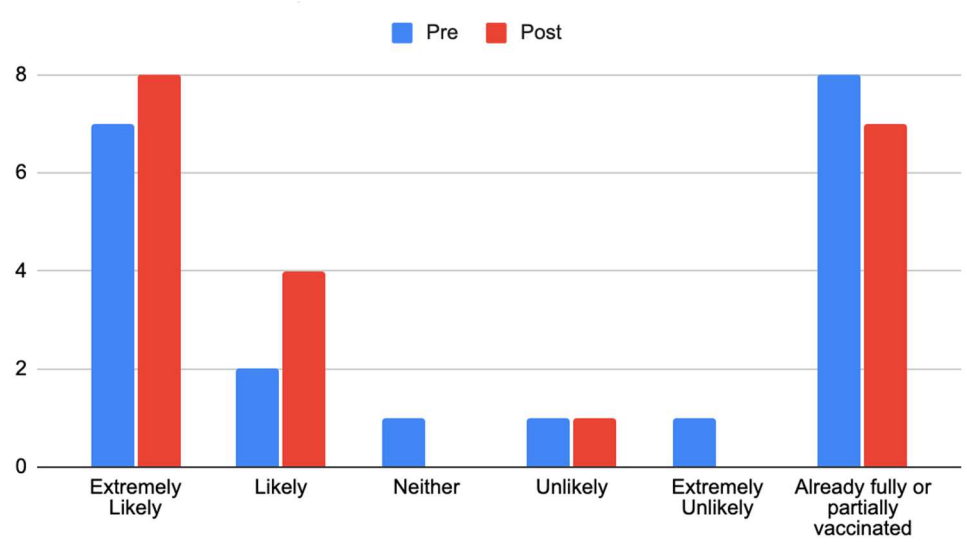



**Table 1**

*Differences of Survey Responses – Likeliness*

| | **Pre-Survey** | **Post-Survey** | **p-value*** |
|---|---|---|---|
| Mean (SD) | 3.55 (2.31) | 3.1 (2.29) | 0.539 |

*Paired t-test

**Findings of Confidence**

Question number 2 on the pre- and post-survey assessed the participant's confidence in a SARS-CoV-2 vaccine using a 5-point Likert scale. Confidence in the SARS-CoV-2 vaccine was assessed with the following statement: "Rate your confidence in the safety of a COVID-19 vaccine, "1" having 'no confidence' and "5" being 'extremely confident'." Each participant

responded to the pre- and post-survey question (n=20). One participant selected a “1” in the pre-survey (n=1/20). Two participants selected “2” in the pre-survey (n=2/20). Four participants rated their confidence in the SARS-Cov-2 vaccine as a “3” in the pre-survey (n=4/20). Of the remaining responses in the pre-survey, 30% of the participants (n=6/20) rated their confidence at a “4” and the final 30% rated theirs at a “5” (n=6/20). The individual who rated their confidence as a “1” in the pre-survey increased their confidence to a “2” in the post-survey (n=1/20). The two individuals who rated their confidence at a “2” in the pre-survey scored their confidence at “4” in the post-survey (n=2/20). Of the participants who scored their confidence as a “3” in the pre-survey (n=4/20), three had unchanged post-survey scores. The participant who originally scored their confidence as a “3” in the pre-survey, scored their confidence as a “4” in the post survey. Two of the participants who scored their confidence at a “4” in the pre-survey (n=6/20) increased their score to a “5” in the post-survey. The remaining four of the participants who originally scored their confidence at a “4” also reported a score of “4” in the post-survey. Each participant who reported a confidence score of “5” in the pre-survey (n=6/20) reported a score of “5” in the post-survey (n=9/20). Of the participants who completed each survey, 30% (n=6/20) had a change in their pre-survey score compared to their post-survey score. Each participant’s score that varied from their pre-survey response indicated an increase in confidence (n=6/20). No participants indicated a decrease in confidence in their post-survey compared to the pre-survey score. The pre-survey mean was a 3.8 with a SD of 1.96. The post-survey mean and SD were 4.2 and 0.89, respectively. The improvement of confidence of a SARS-CoV-2 vaccination was not statistically significant (p=0.239).

**Figure 3**

*Pre- and Post-Survey Results: Question #2 – Confidence*

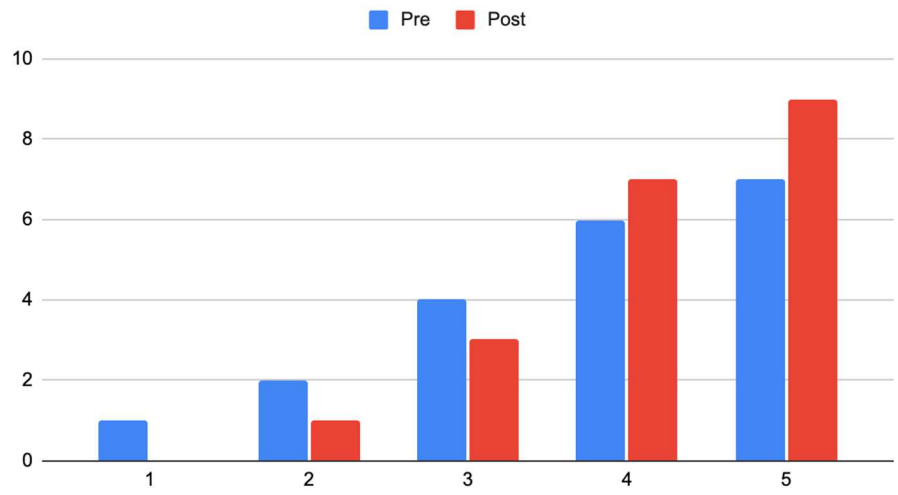



**Table 2**

*Differences of Survey Responses – Confidence*

| | **Pre-Survey** | **Post-Survey** | **p-value*** |
|---|---|---|---|
| Mean (SD) | 3.8 (1.96) | 4.2 (0.89) | 0.239 |

*Paired t-test

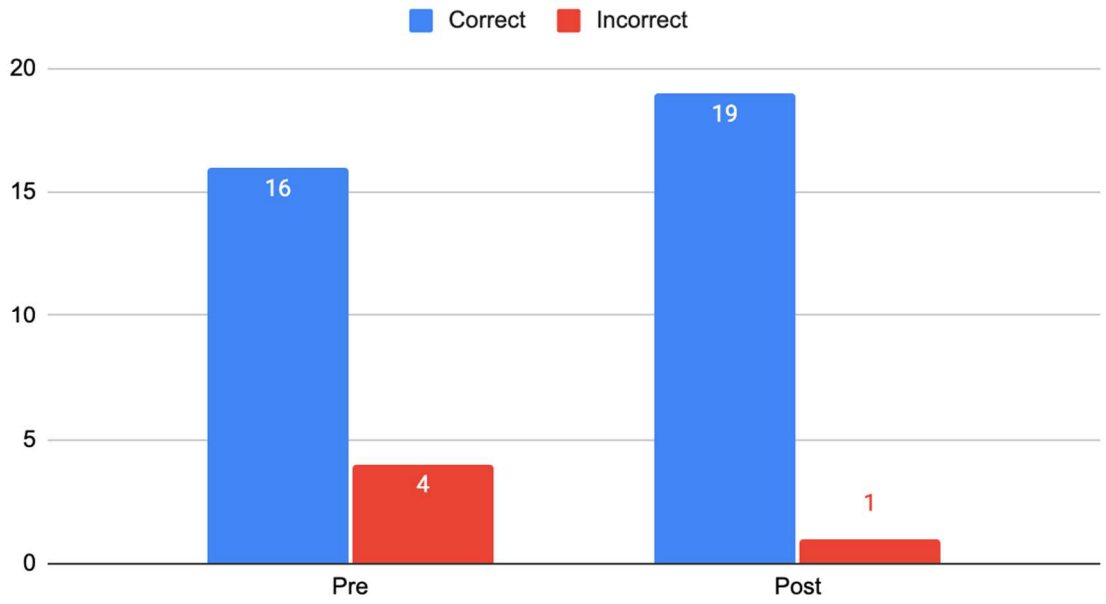
**Findings of True/False Questions**

Each pre- and post-survey included two true/false style questions. The first true/false style assessed participant knowledge related to the SARS-CoV-2 vaccine with the following statement: "True/False: Being fully vaccinated decreases your risk of contracting COVID-19 and decreases your risk of spreading it to other people?" Each participant answered the question on the pre- and post-survey (n=20). The pre-survey response showed that 80% (n=16) of the participants selected the correct answer, "True," in the pre-survey. The remaining 20% (n=4/20) of the participants selected "False" in the pre-survey. After the educational intervention, post-

survey results showed 95% (n=19/20) of the participants selected “True,” and one participant (n=1/20) selected “False” as their response. Three of the four individuals who selected “False” as their pre-survey response changed to the correct answer of “True” in their post-survey response. One participant selected “False” as their pre- and post-survey response.

**Figure 4**

*Pre- and Post-Survey Results: Question #3 – T/F Vaccine Knowledge*

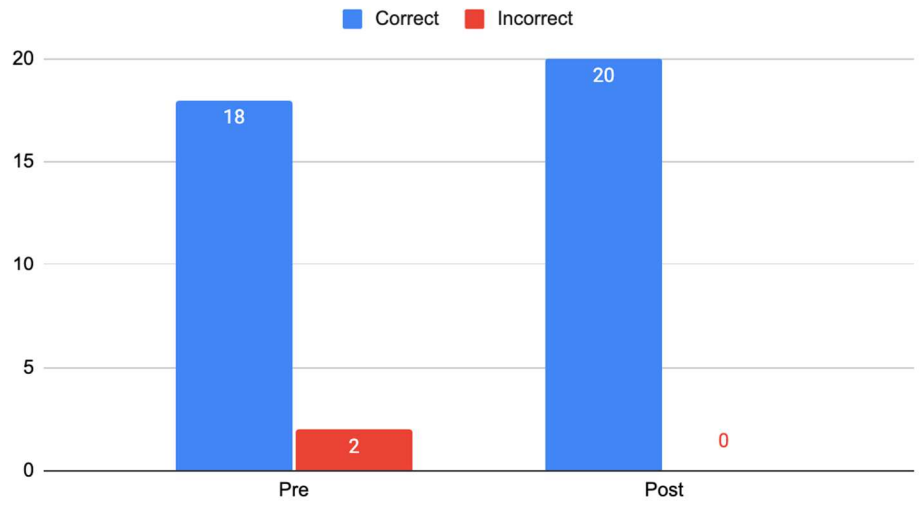



The second true/false style question assessed participant knowledge of mRNA vaccine function. Participant knowledge was assessed with the following statement: “True/False: The COVID-19 vaccine may alter your DNA?” One participant did not indicate an answer for this question in the pre-survey but did answer it in their post-survey. Their pre-survey answer counted as an incorrect answer for result analysis. Pre-survey results showed that 90% (n=18/20) of the participants answered correctly by selecting “False” as their response. Two of the participants (n=2/20) selected either the incorrect answer of “True” or did not indicate an answer

in their pre-survey response. After the educational intervention, the post-survey results showed that 100% of the participants selected the correct answer (n=20/20). The two participants who selected the incorrect answer or did not indicate a response in the pre-survey each selected the correct answer in the post-survey.

**Figure 5**

*Pre- and Post-Survey Results: Question #4 – T/F Vaccine mRNA Knowledge*




**Finding of Multiple-Choice Question**

The fifth and final question present on the pre- and post-survey assessed whether a participant could correctly identify how an mRNA SARS-CoV-2 vaccine develops immunity within the human body. The question was formatted as a multiple-choice question. Each participant provided a pre- and post-survey response to this question (n=20/20). In the pre-survey, 95% of the participants (n=19/20) indicated the correct answer. One individual responded with an incorrect answer (n=1/20). Post-survey responses indicated that 100% of the participants chose the correct answer (n=20/20). The individual who initially responded

incorrectly indicated the correct response in the post-survey. The pre-survey mean was 0.95 with a SD of 0.224. The post-survey mean was 1 with a SD of 0. The difference in scores for this question on the pre- and post-survey was insignificant (p=0.324).

**Figure 6**

*Pre- and Post-Survey Results: Question #5 – Knowledge of Immunity from SARS-CoV-2 Vaccine*

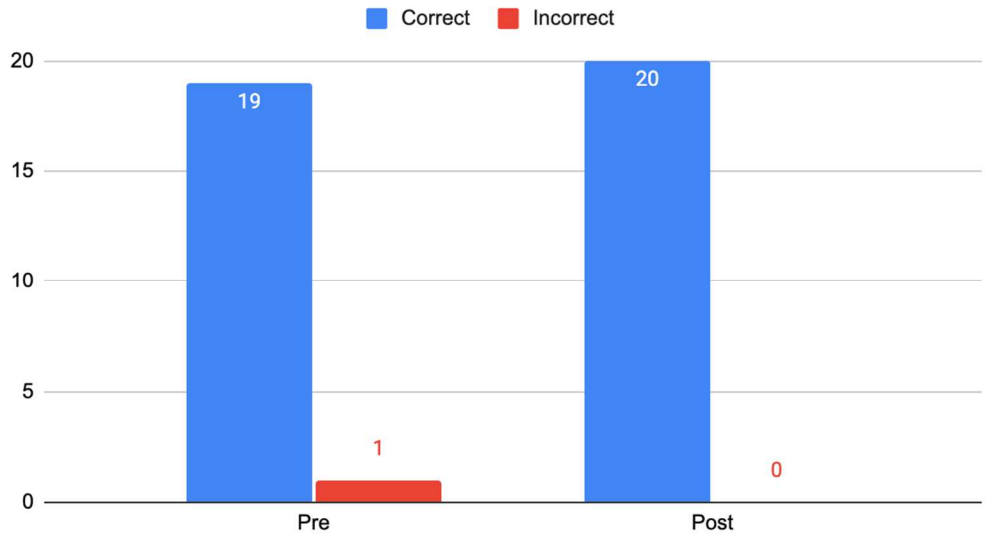



**Table 3**

*Differences of Survey Responses – Knowledge of Immunity from SARS-CoV-2 Vaccine*

| | Pre-Survey | Post-Survey | p-value* |
|---|---|---|---|
| Mean (SD) | 0.95 (0.224) | 1 (0) | 0.324 |

*Paired t-test

## DISCUSSION

### Summary

The COVID-19 pandemic had been raging for nearly two years when this QI project was implemented. The longevity of the COVID-19 pandemic provided an opportunity for the RNA

virus to mutate (Haque & Pant, 2022). Ultimately, this led to the emergence of the more lethal Delta variant, followed by the highly contagious and transmissible Omicron variant (Haque & Pant, 2022). Within the US, the FDA approved the use of the Moderna and Pfizer mRNA vaccines in December 2020 (Baden et al., 2020). In the face of an unprecedented global health emergency, the COVID-19 vaccine was shown to be highly effective at preventing the development of severe symptoms, hospitalization, and death (Haque & Pant, 2022). High vaccination rates within a community offer the best solution to immunity against the COVID-19 virus (Joshi et al., 2021). However, vaccination hesitancy related to the mRNA SARS-CoV-2 vaccines within the US remained a significant hurdle (Haque & Pant, 2022).

Healthcare providers remain among the most influential predictors of vaccine adherence (Kestenbaum & Feemster, 2015). Providers who have a solid patient-provider relationship are more likely to encourage individuals to vaccinate if they can articulate a strong recommendation and are prepared to discuss vaccination hesitancy concerns (Kestenbaum & Feemster, 2015).

This QI project sought to build the confidence and knowledge related to mRNA SARS-CoV-2 vaccines in adults in a primary care setting by implementing a short 1:1 educational session reviewing a written pamphlet of COVID-19 vaccine information, thus reducing SARS-CoV-2 vaccination hesitancy. Using the in-person 1:1 educational session and a written tool presented an opportunity for a patient-provider discussion. Ultimately, increasing an individual's confidence and knowledge level of mRNA SARS-CoV-2 vaccines would help enhance their ability to make a more informed healthcare decision.

Results from this QI project confirms that a brief educational session reviewing a written pamphlet successfully increased participant mRNA SARS-CoV-2 vaccine confidence and

knowledge. Key findings show that personalized educational discussions increased participant confidence and knowledge related to the SARS-CoV-2 vaccine. Results of this QI project indicates the importance of healthcare providers utilizing their role to provide educational tools that enhance the knowledge and confidence of their patient population, ultimately leading to more excellent healthcare decision-making abilities. One encouraging finding showed that individuals who displayed vaccination hesitancy were more likely to vaccinate after the educational intervention. The contributions of this QI project indicate that the implementation of a one-on-one educational discussion strengthens the patient-provider relationship, which provides an environment where the provider can give the patient the educational tools and encourages the patient to make a more informed decision related to their healthcare.

## Interpretation

### Likeliness

The findings of this QI project suggest that a brief one-on-one educational session reviewing mRNA SARS-CoV-2 vaccine information leads to increased likeness to vaccinate. However, this does not indicate intent to vaccinate as this was not addressed or evaluated in this QI project. Question number 1 assessed the participant's likeness to receive a SARS-CoV-2 vaccine. Each of the participants provided a pre- and post-survey answer for this question, with much of the group indicating that they were "extremely likely" or had already been fully or partially vaccinated against COVID-19. Three of the participants who initially indicated a lower level of likeliness in their pre-survey indicated an increase in their likeliness after the educational intervention in their post-survey response. One key finding showed that none of the participants indicated on the post-survey that they would be less likely to receive the SARS-CoV-2 vaccine

after the intervention. Joshi et al. (2021) also found that individuals were more likely to receive a COVID-19 vaccine if the information and recommendation came from a trusted authority such as a healthcare professional. One striking similarity between this QI project and the study performed by Joshi et al. (2021) is that the Health Belief Model (HBM) was selected as a framework that would successfully enhance COVID-19 vaccine acceptance through optimizing educational opportunities.

**Confidence**

The second question assessed the participant's confidence in a SARS-CoV-2 vaccine. This QI project found that the intervention successfully increased participant confidence related to mRNA SARS-CoV-2 vaccines. Each participant answered the pre- and post-survey question. Nearly one-third of the participants had a different post-survey response than their pre-survey response. Each of the six participants who reported a different post-survey response indicated increased confidence. Of significance, no participants indicated a decrease in confidence in their post-survey responses. These results suggest that the educational intervention successfully met the QI project outcome of increasing participant confidence in mRNA SARS-CoV-2 vaccines.

The findings were similar to those in the literature reviewed when analyzing the pre- and post-survey responses. Rutten et al. (2021) found that improvement of vaccine adoption related to COVID-19 stems from the implementation of clinical education efforts that involve evidence-based scientific communication that reaches the individual at the interpersonal, individual, and organizational levels. One could argue that although this QI project took place on a small scale, the evidence-based educational session performed at Peak Family Practice was a communication

tool that helped build an interpersonal connection that led to increased SARS-CoV-2 vaccine confidence.

**Knowledge**

The final three questions consisted of two true/false style questions and one multiple choice question. These questions addressed information built into the educational session and assessed participant knowledge of the SARS-CoV-2 vaccine. The first true/false question assessed participant knowledge related to reducing transmission based on SARS-CoV-2 vaccine status. Most participants answered correctly on the pre-survey. Four participants originally answered the questions incorrectly, but three responded correctly in their post-survey-answer. This information was specifically reviewed in the educational session, and post-survey results showed that the educational session successfully increased participant knowledge.

The second true/false question assessed participant knowledge related to mRNA vaccine function. One participant did not indicate an answer for this question in the pre-survey but did answer it in their post-survey. The omission of a response counted as an incorrect answer. The pre-survey showed that 90% of the participants initially indicated the correct answer in their pre-survey response. All the participants selected the correct answer in the post-survey. This question was formatted as true/false on the survey, which may not have depicted the appropriate level of detail of knowledge gained given that there were only two participants who initially answered incorrectly.

The final question assessed participant knowledge based on appropriate identification of how an mRNA SARS-CoV-2 vaccine develops immunity within the human body. In the pre-survey, 95% of the participants selected the correct answer. The individual who initially chose an

incorrect answer indicated the correct answer in the post-survey. Post-survey results showed that 100% of the participants chose the correct answer. Although this knowledge assessment question was structured differently from the previous true/false question, results suggest it did not depict a relevant detail of knowledge gained.

Given that only one participant had an incorrect pre-survey response, it was anticipated that a more significant number of participants would initially answer incorrectly. The knowledge assessment questions were developed based on common questions and knowledge gaps of the patient population at Peak Family Practice. A more comprehensive discussion with Leslie Dawdy, FNP, the sole provider at Peak Family Practice, about typical mRNA SARS-CoV-2 vaccine knowledge gaps within the patient population may have yielded a question that better-assessed participant knowledge.

## Implications

### Practice

A written pamphlet is an appropriate tool that a clinician can use as a starting point for an educational discussion. The written pamphlet was used as an aid for providing a discussion leading to increased knowledge, confidence, and health competency. In this case, there was a profound lack of knowledge and belief of common misinformation within the patient population Peak Family Practice related to mRNA SARS-CoV-2 vaccines. The educational written pamphlet was tailored toward the overall most common gaps of knowledge of this specific patient population. The written pamphlet is a great tool to have accessible in an exam room to discuss this type of information.

The written pamphlet used in this QI project could be a supplemental resource distributed to the patient population of Peak Family Practice or kept in exam rooms for provider intervention. This QI project could also be implemented in other healthcare clinics that provide care for primary health issues in adults. However, barriers to the sustainability of this intervention include the continuously evolving nature of information and public opinion surrounding this topic. As the dynamic environment of the COVID-19 pandemic evolves, so does the information and public concerns surrounding mRNA SARS-CoV-2 vaccines. The educational information provided on the written pamphlet used for this QI project may quickly become outdated and need frequent updating.

**Education**

This project included pertinent education topics related to mRNA SARS-CoV-2 vaccines. This QI project demonstrates the value of a brief one-on-one educational session, increasing participant knowledge and confidence related to mRNA SARS-CoV-2 vaccines. The findings of this project support the current literature regarding the importance of including education as part of building a solid patient-provider relationship, further leading to an increased predictor of vaccine adherence (Joshi et al., 2021; Kestenbaum & Feemster, 2015; Rutten et al., 2021). The effectiveness of this QI project in a small setting validates their necessity within the healthcare field. Furthermore, this project should prompt healthcare providers to conduct further research in the clinical setting.

**Research**

A challenge for future research includes finding a way to provide educational material to a large audience in a form that addresses common complex topics in an easy-to-understand

manner. In addition, the COVID-19 pandemic is continually evolving, with information being rapidly produced. As a result of this, common concerns and misconceptions are also evolving. Providing updated educational material at this pace provides a considerable challenge.

**Policy**

Future policy changes may include incorporating SARS-CoV-2 vaccine discussions with every patient encountered at a primary care clinic based on the positivity rates of local, state, or national levels. An addition to the local county healthcare website where providers may easily access a printable updated COVID-19 patient information sheet would impact the knowledge and confidence levels of the population.

## Limitations

This QI project was implemented at a single primary care clinic. Therefore, the results cannot be disseminated to other healthcare facilities. This QI project had a small sample size of twenty participants; therefore, the results do not apply to other healthcare facilities, and the findings are not generalizable. This QI project had 20 participants; however, this number does not provide enough data for proper statistical analysis, only descriptive statistics.

Another limitation of this QI project is that demographic data such as age, gender, or ethnicity was not collected. Within the Colorado population, it was found that 44% of Hispanics and 48% of African Americans displayed SARS-CoV-2 vaccine rejection (Flaherty et al., 2020). However, these minority groups make up a large portion of the Colorado population, with Hispanics accounting for 20.9% (Statistical Atlas, 2018). Statistically, those of minority ethnicity have higher rates of severe COVID-19 symptoms, hospitalizations, and deaths (CDC, 2020). It

would have been helpful to compare the confidence and knowledge data using the demographics of the sample size from the QI project compared to the local Colorado population.

Implementation took place at a single site, Peak Family Practice. This site had approval from the state of Colorado to administer Moderna and Pfizer mRNA SARS-CoV-2 vaccines according to current guidelines. To not waste doses of either vaccine, Peak Family Practice administered Moderna and Pfizer vaccines once weekly. The QI project was implemented on a day when the clinic was administering Moderna and Pfizer vaccines. This may have influenced the survey results as eight of the 20 participants indicated that they were already fully or partially vaccinated. This is significant because individuals who have already received full or partial COVID-19 vaccination do not display true SARS-CoV-2 vaccination hesitancy.

Other limitations to this study include the effects of the COVID-19 pandemic. As the education portion of this QI project was developed, a non-mRNA SARS-CoV-2 vaccine was approved. The Delta COVID-19 variant became the dominant variant over the original SARS-CoV-2 virus, presenting additional questions related to the vaccine's efficacy. Another limitation of the study is the design of the pre- and post-survey questionnaires. These surveys were constructed by the project coordinator, who has limited experience in survey construction. The survey tools were not tested prior to this project implementation. Therefore, possibly limiting internal validity due to design.

## DNP Essentials Addressed

The Doctor of Nursing Practice (DNP) degree is based on the foundational Essentials developed to enhance knowledge, improve practice and patient outcomes, and advance competencies for the advanced practicing nurse role (American Association of Colleges of

Nursing [AACN], 2006). Three Essentials were woven throughout this QI project. DNP Essential III (Clinical Scholarship and Analytical Methods for Evidence-Based Practice) was reflected in this QI project using current literature and scientific findings to develop and implement the best population-based educational intervention (AACN, 2006). DNP Essential V (Health Care Policy for Advocacy in Health Care) was persistent throughout the development of this QI project. With the approval and national rollout of mRNA SARS-CoV-2 vaccinations, this project facilitated the delivery of healthcare services, including provider engagement of practice addressing the health care needs associated with the current COVID-19 pandemic (AACN, 2006). DNP Essential VI (Interprofessional Collaboration for Improving Patient and Population Health Outcomes) was utilized through the development and implementation of an effective mRNA SARS-CoV-2 scholarly communication tool based on current practice guidelines, health policy, and standards of care (AACN, 2006).

## Conclusion

The outcomes of this project reinforce the importance of the provider's utilization of informative, educational tools to engage and enhance the knowledge and confidence of their patient population. This project was developed because of the complex web of individual, social, cultural, economic, and political factors that influenced the information surrounding the COVID-19 pandemic. The misinformation surrounding the seemingly quick approval of mRNA SARS-CoV-2 vaccines presented a large amount of the population exhibiting vaccination hesitancy. Those who exhibit vaccination hesitancy ultimately undermine the efficacy of and purpose of the mRNA SARS-CoV-2 vaccines. A lack of consistent control measures such as masks, physical distancing, rapid testing for exposed or symptomatic individuals, and isolation expanded beyond

the healthcare system and was persistent throughout the US. Although this QI project was implemented at a single clinical site, findings showed that a one-on-one patient-provider educational session reviewing mRNA SARS-CoV-2 vaccines enhanced participant knowledge and confidence in vaccines. The educational tool included information on common misconceptions about mRNA SARS-CoV-2 vaccines and discussed how an mRNA produces immune protection, ultimately enhancing the participant's knowledge. The goal of enhancing an individual's knowledge is to feel more confident and make an informed healthcare decision confidently. One key finding of this QI project showed that a small portion of the participants was more likely to receive an mRNA SARS-CoV-2 vaccine after the short educational intervention. Even on a smaller scale, implementing a straightforward educational healthcare intervention may lead to a more informed healthcare decision that leaves a mark on a larger scale.

**Plan for Sustainability**

To sustain this QI project, the content provided in the written educational pamphlet must be reviewed and updated frequently. The PDSA cycle may become cyclical in the presence of this QI project as new information related to the COVID-19 pandemic is actively being produced. The community health department or CDC website may be necessary for accessing printable patient pamphlets regarding common informational topics related to mRNA SARS-CoV-2 vaccines. Implementation of the intervention on multiple days would yield a larger sample size so that the results may be significant or more generalizable.

## Plan for Dissemination

A summary of the project implementation process, results, and key findings was provided to the owner of Peak Family Practice via email for review. This QI project and findings were presented for final defense with project committee members. Future dissemination may include a review of results with the staff at Peak Family Practice.

## Funding

This QI project received no funding. The project coordinator provided the printed pre- and post-survey paper, printed written pamphlet, and envelopes.

# APPENDIX A:

# SITE APPROVAL AUTHORIZATION LETTER

Peak Family Practice
1304 Academy Boulevard, Suite 201
Colorado Springs, Colorado USA 80909-3318

September 30, 2021

Human Subjects Protection Program
The University of Arizona
845 N Park Ave., Suite 537A
Tucson, AZ 85719

Please note that Ms. Blythe DeMello, UA Graduate Student, has permission of the Peak Family Practice Company to conduct research at our Anytown facility for her study, "Reducing SARS-CoV-2 Vaccination Hesitancy in a Primary Care Setting."

Ms. DeMello will contact patients to *recruit* them by approaching them at the end of their scheduled visit at Peak Family Practice while maintaining the workflow of the clinic. Her plan is to administer a pre-survey, conduct a brief 1:1 educational session reviewing a written pamphlet, and administering a post-survey. Our human resources office will provide de-identified information regarding patient survey results for use in her research. Ms. DeMello's on-site research activities will be completed by November 30, 2021.

Ms. DeMello has agreed not to enter any of our buildings or interfere with the flow of pedestrians or vehicles. Employees will not be allowed time from their work duties to help administer the surveys. Ms. DeMello also has agreed to provide to my office a copy of the University of Arizona IRB approval document before she recruits participants on campus and will also provide a copy of any aggregate results.

If there are any questions, please contact my office.

Signed,

Leslie M. Dawdy, FNP-BC
Board Certified Family Nurse Practitioner
Owner of Peak Family Practice
1304 Academy Boulevard, Suite 201
Colorado Springs, CO 80909-3318
(719) 465-2388

# APPENDIX B:

# CONSENT DOCUMENT (DISCLOSURE AND CONSENT FORM)

**Reducing SARS-CoV-2 Vaccination Hesitancy in a Primary Care Setting**

**Blythe DeMello, BSN, CCRN**

The purpose of this quality improvement project is to increase vaccine compliance for SARS-CoV-2 in adults at Peak Family Practice who initially said no or were undecided about vaccines, decrease vaccination hesitancy through a brief 5-minute in person discussion and written pamphlet assessed by pre-and post-survey, and increase vaccination knowledge and confidence by providing a brief 5-minute in person discussion and written pamphlet assessed by pre and post survey.

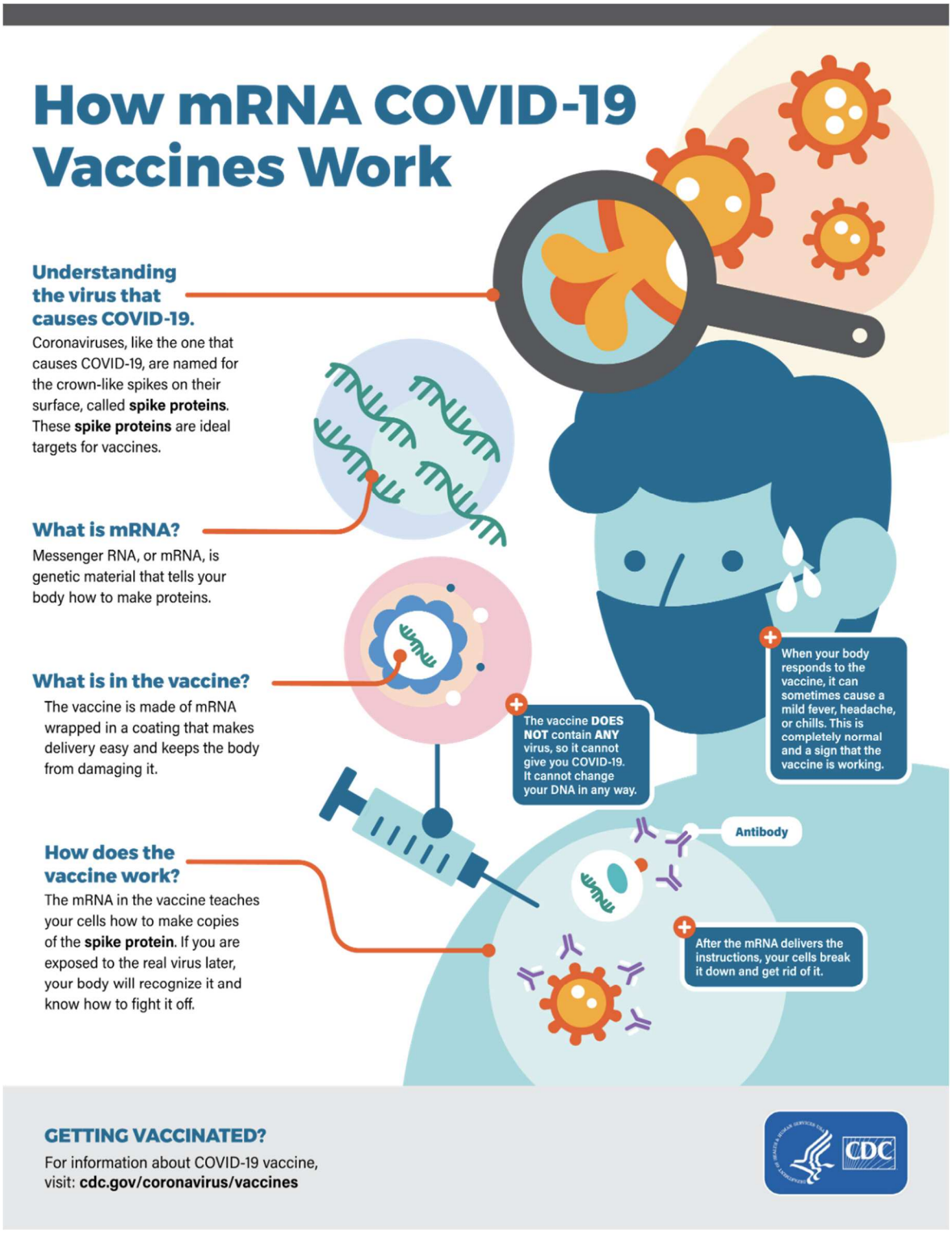
If you choose to take part in this project, you will be asked to take a pre-survey assessing SARS-CoV-2 vaccination hesitancy followed by a brief 1:1 educational session reviewing a written pamphlet discussing SARS-CoV-2 vaccination safety. After the in-person discussion is complete and all questions are answered you will be asked to take a short post-survey. It will take approximately 20 minutes to complete all these steps. There are no foreseeable risks associated with participating in this project. You will receive no immediate benefit from your participation. Your responses are anonymous. Your name will not be collected or linked to your answers. You will not benefit directly from participating in this study. You will not be paid for participating in this study. The only cost to you is your time.

If you choose to participate in the project, participation is voluntary; refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may withdraw at any time from the project. In addition, you may skip any question that you choose not to answer. By participating, you do not give up any personal legal rights you may have as a participant in this project.

For questions, concerns, or complaints about the project, you may contact Blythe DeMello, BSN, CCRN at bdemello@email.arizona.edu

# APPENDIX C:

# RECRUITMENT MATERIAL (SARS-COV-2 WRITTEN PAMPHLET)


How mRNA COVID-19 Vaccines Work
Understanding the virus that causes COVID-19.
Coronaviruses, like the one that causes COVID-19, are named for the crown-like spikes on their surface, called spike proteins. These spike proteins are ideal targets for vaccines.
What is mRNA?
Messenger RNA, or mRNA, is genetic material that tells your body how to make proteins.
What is in the vaccine?
The vaccine is made of mRNA wrapped in a coating that makes delivery easy and keeps the body from damaging it.
How does the vaccine work?
The mRNA in the vaccine teaches your cells how to make copies of the spike protein. If you are exposed to the real virus later, your body will recognize it and know how to fight it off.
The vaccine DOES NOT contain ANY virus, so it cannot give you COVID-19. It cannot change your DNA in any way.
When your body responds to the vaccine, it can sometimes cause a mild fever, headache, or chills. This is completely normal and a sign that the vaccine is working.
Antibody
After the mRNA delivers the instructions, your cells break it down and get rid of it.
GETTING VACCINATED?
For information about COVID-19 vaccine, visit: cdc.gov/coronavirus/vaccines
CDC

## Do COVID-19 vaccines contain microchips?

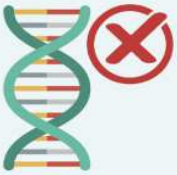
**No.** COVID-19 vaccines do not contain microchips. Vaccines are developed to fight against disease and are not administered to track your movement. Vaccines work by stimulating your immune system to produce antibodies, exactly like it would if you were exposed to the disease. After getting vaccinated, you develop immunity to that disease, without having to get the disease first.

## Can receiving a COVID-19 vaccine cause you to be magnetic?

**No.** Receiving a COVID-19 vaccine will not make you magnetic, including at the site of vaccination which is usually your arm. COVID-19 vaccines do not contain ingredients that can produce an electromagnetic field at the site of your injection. All COVID-19 vaccines are free from metals.

## Will a COVID-19 vaccine alter my DNA?

**No.** COVID-19 vaccines do not change or interact with your DNA in any way. Both mRNA and viral vector COVID-19 vaccines deliver instructions (genetic material) to our cells to start building protection against the virus that causes COVID-19. However, the material never enters the nucleus of the cell, which is where our DNA is kept.



## Will getting a COVID-19 vaccine cause me to test positive for COVID-19 on a viral test?

**No.** None of the authorized and recommended COVID-19 vaccines cause you to test positive on viral tests, which are used to see if you have a **current infection**.


If your body develops an immune response to vaccination, which is the goal, you may test positive on some antibody tests. Antibody tests indicate you had a **previous infection** and that you may have some level of protection against the virus.

## Is it safe for me to get a COVID-19 vaccine if I would like to have a baby one day?

**Yes.** If you are trying to become pregnant now or want to get pregnant in the future, you may get a COVID-19 vaccine when one is available to you.

There is currently no evidence that COVID-19 vaccination causes any problems with pregnancy, including the development of the placenta. In addition, there is no evidence that female or male fertility problems are a side effect of any vaccine, including COVID-19 vaccines.

# APPENDIX D:

# EVALUATION INSTRUMENTS (PRE-EDUCATIONAL SESSION SURVEY / POST-EDUCATIONAL SESSION SURVEY)

ID #_____

COVID-19 EDUCATIONAL PRE-SURVEY

1. How likely am I to receive the COVID-19 vaccine?

    - Extremely likely
    - Likely
    - Neither likely nor unlikely
    - Unlikely
    - Extremely unlikely
    - I have already received the vaccine and am partially or fully vaccinated

2. Rate your confidence in the safety of a COVID-19 vaccine. “1” having no confidence and “5” being extremely confident.

1 2 3 4 5

3. True/False: Being fully vaccinated decreases your risk of contracting COVID-19 and decreases your risk of spreading it to other people?

    True False

4. True/False: The COVID-19 vaccine may alter your DNA?

    True False

5. Which of the following is TRUE?
    a. COVID-19 vaccines contain microchips.
    b. You can contract COVID-19 from the vaccine.
    c. Your immune system makes antibodies against the COVID-19 virus from mRNA in the vaccine.
    d. The vaccines contain medals and may cause you to become magnetic.

ID #_____

COVID-19 EDUCATIONAL POST-SURVEY

1. How likely am I to receive the COVID-19 vaccine?

    - Extremely likely
    - Likely
    - Neither likely nor unlikely
    - Unlikely
    - Extremely unlikely
    - I have already received the vaccine and am partially or fully vaccinated

2. Rate your confidence in the safety of a COVID-19 vaccine. “1” having no confidence and “5” being extremely confident.

1 2 3 4 5

3. True/False: Being fully vaccinated decreases your risk of contracting COVID-19 and decreases your risk of spreading it to other people?

    True False

4. True/False: The COVID-19 vaccine may alter your DNA?

    True False

5. Which of the following is TRUE?
    a. COVID-19 vaccines contain microchips.
    b. You can contract COVID-19 from the vaccine.
    c. Your immune system makes antibodies against the COVID-19 virus from mRNA in the vaccine.
    d. The vaccines contain medals and may cause you to become magnetic.

# APPENDIX E:

# PROJECT TIMELINE

| Completion Date | Planning | Pre-Implementation | Implementation | Evaluation |
|---|---|---|---|---|
| **08/15/2021** | Meet with advisor Dr. Allison to discuss timeline for DNP Project | | | |
| **08/24/2021** | Meet with key stakeholder, Leslie Dawdy, NP and obtain support for QI project implementation at Peak Family Practice | | | |
| **11/15/2021** | Met with DNP project committee for proposal defense and received approval. | | | |
| **11/19/2021** | | Received eIRB form approval from Dr. Pasvogel and approval for eIRB project submission. | | |
| **11/19/2021** | | Submit DNP proposal to eIRB for review and approval | | |
| **11/22/2021** | | Received eIRB approval. | | |
| **11/28/2021 - 12/4/2021** | | | Implemented QI project at Peak Family Practice. | |
| **1/1/2022 - 1/20/2022** | | | | Analyze Data |
| **1/31/2022** | | | | Submit final draft to Dr. Allison for review. |

# APPENDIX F:

# LITERATURE REVIEW GRID

Project Question: *In adults who display SARS-CoV-2 vaccination hesitancy in a Colorado primary care setting, what are the effects of a brief in-person educational discussion and written pamphlet on SARS-CoV-2 vaccination hesitancy*

| Pub. Year; Author's Last Name | Title of Publication | Type of Study | Main Outcomes of Findings | Support for and or Link to Project |
|---|---|---|---|---|
| Baden, L. et al. (2020). | Efficacy and safety of the mRNA-1273 SARS-CoV-2 vaccine | Double-blinded randomized control trial (RCT) | ● N=30,420; N=15,210 placebo; N=15,210 vaccine<br>● 96% of participants received both injections; 2.2% had serologic or virologic evidence of SARS-CoV-2 infection at baseline<br>● Confirmed symptomatic COVID-19 infection in 185 of participants in placebo group (56.5 per1000 person years; 95% confidence interval [CI]<br>● Confirmed symptomatic COVID-19 infection in 11 participants in mRNA-1273 vaccine group (3.3 per 1000 person-years; 95% CI<br>● mRNA-1273 vaccine efficacy 94.1% (95% CI; P<0.0001)<br>● All severe COVID-19 cases occurred in 30 participants in placebo group; 1 fatality occurred | ● COVE trial provides evidence of short-term efficacy of the mRNA-1273 vaccine in preventing symptomatic SARS-CoV-2 infection in a diverse adult trial population.<br>● Severe COVID-19 cases were included in the placebo group, suggesting that mRNA1273 was likely to have an effect on preventing severe illness, which is the major cause of health care utilization, complications, and death. |
| Gudadappanavar, A., & Benni, J. (2020). | An evidence based systematic review on emerging therapeutic and preventative strategies to treat novel coronavirus (SARS-CoV-2) during an outbreak scenario. | Systematic review | ● Few broad-spectrum antivirals have been studied against COVID-19 in clinical trials with clinical recovery.<br>● Hydroxychloroquine, chloroquine, remdesivir, azithromycin, tocilizumab, and cromostat mesylate have shown therapeutic results<br>● Limited therapeutic aid was seen with lopinavir-ritonavir in hospitalized individuals with severe COVID-19<br>● Subunit vaccines, peptides, nucleic acids, plant-derived, and recumbent vaccines are being developed | ● The biologics for treatment of COVID-19 have potential impacts as they have shown promising results, including bioengineered and vectored antibodies, cytokines and nucleic acid-based therapies targeting virus gene expression, as well as various types of vaccines |

| Pub. Year; Author's Last Name | Title of Publication | Type of Study | Main Outcomes of Findings | Support for and or Link to Project |
|---|---|---|---|---|
| Felezsko, W. et al. (2021). | Flattening the curve of COVID-19 vaccine rejection - An international overview | Sample survey | ● Sample size: N=1,066 Polish citizens<br>● 20 national surveys assessing averseness of anticipated COVID-19 vaccine<br>● China: 2-6%; Czech Republic 43%; Turkey 44%; Egypt 3%; Russia 55%<br>● Herd immunity of 67% globally may be achieved only if mandatory vaccination programs are implemented early on | ● Elevated levels of COVID-19 vaccination hesitancy may severely limit the success of rolling out vaccination programs' effectiveness, particularly when fueled by misinformation and platforms such as social media or popular news informants.<br>● Herd immunity benefits are achievable if 65%–70% of the population is vaccinated.<br>● Research on vaccine hesitancy assumes that it is vital to understand the reasons behind individual attitudes to tailor the communication and immunization programs accordingly. |
| Brookman, D. et al. (2020). | Broad cross-national public support for accelerated COVID-19 vaccine trial designs. | Cross national survey | ● N=5920<br>● Survey conducted in Australia, Canada, Hong King, New Zealand, South Africa, Singapore, United Kingdom and the United States<br>● Study 1: 84% (95% CI; 82-85%) of respondents correctly stated that challenge trial involves intentionally infecting study participants with SARS-CoV-2<br>● Study 2: 75% (95% CI: 73-76%) correctly stated that the standard trial involves additional safety testing not present in the integrated design<br>● Study 1 participants saw challenge trial as slightly more likely to be ethical ($p<0.001$). | ● Broad cross-national support was found for both the challenge trial and the integrated trial designs and view them as ethical.<br>● Respondents said they would be more likely to take a vaccine that had been tested using a challenge instead of a conventional trial |
| Khubchandani, J. et al., (2020). | COVID-19 vaccination hesitancy in the | Cross-sectional survey | ● N= 1,878; 52% female; 74% Caucasians, 81% non-Hispanics; 56% married; 68% employed | ● A large national study of adult Americans was included in this study and found more than one fifth |

| Pub. Year; Author's Last Name | Title of Publication | Type of Study | Main Outcomes of Findings | Support for and or Link to Project |
|---|---|---|---|---|
| | United States: A rapid national assessment | | full time; 77% obtain a bachelor's degree or higher<br>● -52% very likely to receive COVID-19 vaccination<br>● -27% somewhat likely to receive COVID-19 vaccine<br>● -15% not likely to get vaccine<br>● -7% not likely to get vaccine<br>● Individuals likely/definitely not going to get vaccine tended to have lower education, income, or perceived threat of getting infected<br>● Vaccine hesitancy higher among African-Americans (34%), Hispanics (29%), those who had children at home (25%), rural individuals (29%) | of the participants (22%) reported COVID-19 vaccine hesitancy.<br>● American adults found that 57.6% of participants intended to be vaccinated, 31.6% were not sure, and 10.8% did not intend to be vaccinated.<br>● High vaccine hesitancy could be a result of sociopolitical factors and pressures may lead to a rushed approval for the COVID-19 vaccine without the assurances of safety and efficacy.<br>● Individuals with lower income and education and those who lived in rural America were less likely to pursue COVID-19 vaccination |
| Fisher, K. et al. (2020) | Attitudes toward a potential SARS-CoV-2 vaccine: A survey of US adults | Sample survey | ● The AmeriSpeak Omnibus survey was used:<br>● N=1,003<br>● Of participants, 63.3% were Caucasians; 30% were at least 60 years old; 51.1% were female; 37.8% had a high school diploma or less; 64.1% perceived they would not get COVID-19.<br>● 57.6% (N=571) intended to be vaccinated; 31.6% (N=313) were unsure; and 10.8% (N=107) did not intend to get vaccine. | ● Of the participants in this study, 56.6% indicated vaccination hesitancy by reporting that they did not like, want, or believe in vaccines. Whereas others made explicit reference to scientifically inaccurate information, such as the association between vaccines and autism and that it is not possible to vaccinate against a virus.<br>● Second most common reason for no intent to vaccinate was lack of trust.<br>● Trust has been shown to be a determinant of vaccine uptake.<br>● This indicates a need for strategies aimed at increasing trust among individuals with greater degrees of vaccine skepticism. |

| Pub. Year; Author's Last Name | Title of Publication | Type of Study | Main Outcomes of Findings | Support for and or Link to Project |
|---|---|---|---|---|
| Pogue, K. et al. (2020). | Influences on attitudes regarding potential COVID-19 vaccination in the United States | Sample survey | ● 66.05% of participants said they would be vaccinated if a vaccine was available within 30 days<br>● 73.14% of respondents agree with "I worry that the rushed pace of testing for a new COVID-19 vaccine will fail to detect potential side effects or dangers"<br>● Fears written in free -response section included: 10.65 concerned about effectiveness, 10.18% concerned there is not enough testing, 2.13% worried there would not be enough vaccines/problems with distribution | ● The effects of timing, efficacy and location on willingness to be vaccinated were predictors of likeness of receiving COVID-19 vaccine.<br>● Efforts that address the design of potential vaccines, testing, along with directed public outreach efforts, will likely improve vaccine uptake contributing to control of the COVID-19 pandemic. |
| Polack, F. et al. (2020). | Safety and efficacy of the BNT162b2 mRNA COVID-19 vaccine | Double-blinded randomized control trial (RCT) | ● N=43,548; N=21,720 injected with BNT162b2; N=21,728 injected with placebo<br>● 8 cases of COVID-19 onset within 7 days after second dose in those who received BNT162b2 (95% confidence interval [CI], 90.3 to 97.6)<br>● 162 cases of COVID-19 onset within 7 days after second dose in those who received placebo (95% CI, 89.9 to 97.3)<br>● BNT162b2 was 95% effective in preventing COVID-19 (95% credible interval, 90.3 to 97.6)<br>● 10 cases of severe COVID-19 occurred with onset after the first dose; 9 occurred in placebo recipients and 1 in a BNT162b2 recipient<br>● A two-dose regimen of BNT162b2 (30 ug per dose, given 21 days apart) was found to be safe and 95% effective against COVID-19. | ● This study indicates that COVID-19 can be prevented by immunization.<br>● mRNA vaccines require only viral genetic sequence information, therefore are relatively simple to replicate and produce.<br>● mRNA vaccines are a major tool to combat pandemics and other infectious disease outbreaks. |

| Pub. Year; Author's Last Name | Title of Publication | Type of Study | Main Outcomes of Findings | Support for and or Link to Project |
|---|---|---|---|---|
| Bokemper, S. et al. (2020) | Timing of COVID-19 vaccine approval and endorsement by public figures | Randomized survey experiments | ● Respondents were less confident that the vaccine would be safe and effective if approved before the election (difference = 0.049 for scale outcome ranging from 0 to 1, 95% C.I. = 0.030 to -0.069, $p < .001$)<br>● A vaccine approved in December compared to the week after the election increased willingness to vaccinate by 1.7 percentage points (95% C.I. = 1.5 to 5.0, $p = .30$) and confidence by 0.41 units (95% C.I. = 0.18 to 0.63, $p < .001$)<br>● Effects for Republicans and Independents smaller and not statistically significant.<br>● For vaccine uptake and confidence, respectively, the effects of a positive rather than negative endorsement by Dr. Fauci were very large, approximately 21.6 percentage points (95% C.I. = 17.6 to 25.5, $p < .001$) and 0.234 units (95% C.I. = 0.204 to 0.264, $p < .001$).<br>● All groups indicated more willingness to receive a vaccine if Dr. Fauci supported it rather than opposed it, but the effect was 4 times larger for Democrats than Republicans, with the effect for Independents in between<br>● Dr. Fauci's support increased reported uptake intentions and confidence in safety and efficacy compared to Dr. Fauci opposing a vaccine (vaccine uptake difference = 15.4 percentage points, 95% C.I. = 9.2 to 21.6, $p < .001$; confidence difference = 0.201 units, 95% C.I. = 0.152 to 0.251, $p < .001$). | ● Endorsement by political figures does not appear to move vaccine uptake or confidence in safety and efficacy in the pre-election window. |
| Mercadante, A., & Law, A. (2020) | Will they or won't they? Examining | Prospective survey | ● One way ANOVA showed significant differences in both 5C and CoBO scores within age groups, household income | ● Participants were less likely to accept COVID-19 vaccinations if they are in the 18-49 age group. |

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| | patients' vaccine intention for flu and COVID-19 using the health belief model. | | groups, and respondent knowledge of impact of COVID-19 on someone close to them ($p<0.005$)<br>● There was a significant difference in vaccination acceptance between groups with different racial identities and education. The Native American Indian, Alaska Native, Asian, and South Asian groups scored the highest in vaccine acceptance (2.87-2.89) while Black or African American groups scored the lowest (2.55). Those with a bachelor's degree had the highest acceptance (2.87) and apart from those who did not want to disclose their education, those with some high school had the lowest score (2.61).<br>● The inner DMD regression model was significant at an R2 of 0.127; where 13% of variance in DMD was significantly explained by perceived benefits (30.7% $p<0.001$) and perceived barriers (-11.4%, $p<0.001$), with a very low multicollinearity (VIF ~ 1.1)<br>● A one-unit increase in item 28 (Table 3) was significantly associated with a 13% increase in the odds of COVID-19 vaccine intention. | ● Participants were less likely to accept COVID-19 vaccinations if they had a household income of less than $20,000 per year.<br>● Participants were less likely to accept COVID-19 if they did not know anyone directly impacted by the COVID-19 pandemic.<br>● Pharmacists and public health groups were shown to potentially improve flu vaccine uptake and contributed to high COVID-19 vaccine acceptance.<br>● Education and outreach focused interventions on individuals increased the perceived benefits and decreased barriers to the COVID-19 vaccine. |
| Nguyen, K. et al. (2021) | COVID-19 vaccination intent, perceptions and reasons for not vaccinating among groups prioritized for early | Panel survey | ● Of 3,541 adults, 39.4% responded that they were very likely, 22.5% somewhat likely, and 38.1% not likely to get vaccinated against COVID-19<br>● Among priority subgroups, non-intent to get vaccinated was highest among non-frontline essential workers (41.5%), followed by persons with underlying medical conditions (40.1%) and frontline essential workers | ● Among priority subgroups, concern that the vaccine is being developed too fast was highest among adults ≥75 years (28.4%).<br>● The sources with the lowest level of trust among all adults were news sources (17.3%), religious leaders (15.9%), and social media (4.1%). |

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| | vaccination, United States, September 2020 | | (38.5%), and lowest among adults ≥75 years (26.3%)<br>● Among priority subgroups, adults ≥75 years had the highest percentage of respondents reporting they would be very likely to get vaccinated (51.8%)<br>● Among adults who said they were very likely to get the vaccine, more than one-half of adults would get it within a week if available to them (59.3%)<br>● Among different racial/ethnic groups, non-intent ranged from 32.1% among adults of non-Hispanic other races to 56.1% among non-Hispanic Black adults<br>● Non-intent was also 47.0% among adults with a high school diploma or less compared to 23.8% among adults with more than a college degree<br>● Concern about the side effects and safety of the COVID-19 vaccine was highest among adults in Tier 1a (32.6%), Hispanic adults (31.5%), and adults who are non-Hispanic other race category (29.0%)<br>● Approximately one quarter of adults (23.4%) did not trust the COVID-19 vaccine manufacturing process; about one third (34.6%) did not trust the approval process | |
| Ruiz, J., & Bell, R. (2020) | Predictors of intent to vaccinate against COVID-19: Results of a nationwide survey. | Survey | ● Distribution of responses on the intent to vaccinate question was as follows: extremely or somewhat unlikely to get vaccinated (14.8%), unsure (23.0%), and extremely or somewhat likely (62.2%).<br>● Democrats were most likely to express an intent to vaccinate while only one-fourth of the politically indifferent expected to do so. | ● Older age (65), Caucasian race, high household income, and being college educated were all associated with stronger vaccination intentions.<br>● It is noteworthy that a majority of the least educated respondents did |

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| | | | ● Having a spouse or partner was associated with higher anticipated likelihood of vaccination.<br>● The model was statistically significant (F (30, 773) = 21.06, p < .001, Adj. R2 = 0.43). Greater likelihood of COVID-19 vaccine acceptance was associated with more knowledge about vaccines, less acceptance of vaccine conspiracies, elevated COVID-19 threat appraisals, and being current with influenza immunization.<br>● Intent to vaccinate was lower for respondents relying upon Fox News (57.3%) than CNN and MSNBC (76.4%) (v2 (1) = 12.68, p < .001). Fox News viewers also perceived COVID-19 to be a lesser personal threat (M = 3.04, SD = 1.20) than CNN and MSNBC viewers (M = 3.34, SD = 0.94 (t (303) = 2.38, p = .018). However, these two audiences did not differ in their vaccine knowledge (Fox News: M = 5.02, SD = 2.72; CNN/MSNBC: M = 5.06, SD = 2.54; t (303) = 0.16, p = .87). | not expect to get vaccinated against COVID-19.<br>● The top four reasons given for vaccine hesitancy were as follows: concerns about vaccine side effects, worries about allergic responses to the vaccine, doubts about vaccine effectiveness, and a preference for developing immunity through infection. |

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