11-28-2022

Increasing Knowledge of Sexually Transmitted Infections in Sexually Active Females Reporting Symptoms of UTIs at Walk-in Clinics: A Quality Improvement Project

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A Scholarly Project Presented to the Faculty of the

Nicole Wertheim College of Nursing and Health Sciences

Florida International University

In partial fulfillment of the requirements

for the Degree of Doctor of Nursing Practice

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Approval Acknowledged: DocuSigned by: Dr. Charles Buscemi 5D65DFEB12C74F7..., DNP Program Director

Date: 11/09/2022

Acknowledgments

I would like to recognize and express my gratitude to all the people who, in some way, contributed, supported, and helped me to complete this important milestone in my life.

Thanks to my family, my dear husband and children, Flavio and Fabiana. I appreciate all the technical support and cheering me up during the difficult times.

Thanks to my director, supervisor, scheduler, executive director, and the entire team: Sarah Flory, Dayana Mason, Elston Ponciano, Cristina Rubio-Delgado, and the #dream team for all your help, support, accommodations, and participation in making this project possible. Thanks to Dr. Myrlande Dubuisson, my clinical mentor, for her enthusiasm, patience, and support.

Thanks to my faculty, Dr. Fenkl, for your guidance and advice. To all my professors at FIU who help me build and guide my way to the DNP.

Special thanks to my FIU DNP project class 2022 group: Annery, Steven, Rebelee, and Alexander, for our virtual meetings and constant support. It was a great experience cheering us up and taking care of each other even without meeting in person!

Thank you!

Abstract

Background: Urinary tract infections (UTIs) are among the most reported health issues in ambulatory care. However, in half of all sexually active women of childbearing age, the presence of urinary symptoms is associated with a sexually transmitted infection (STI). Providers often lack knowledge on this topic, limiting opportunities for STI screening among those at increased risk for these infections.

Objective: The purpose of this quality improvement project was to increase provider knowledge of sexual health history taking and STI screening among providers working at a walk-in clinic.

Methods: Using a quasi-experimental pre-/post-intervention design, providers working at a walk-in (retail) clinic were recruited to participate in the project. Baseline knowledge of sexual health history taking and STI/UTI screening was assessed. This was followed by an educational module on the topic and post-intervention assessment of topic knowledge.

Results: A total of 24 providers were recruited for the project including 22 females (92%). Mean pretest knowledge scores calculated at baseline were 9.875 and increased to 19.5 post-implementation. The results were compared using a paired *t*-test and were found to be statistically significant, $p < 0.000$.

Conclusions: The results of this quality improvement project suggest that provider education can increase knowledge of sexual health history and STI screening in sexually active women seen in a walk-in clinic. The results are evidence-based and indicate that action should be taken to extend and expand the program at the practice site to improve patient care.

Keywords: UTI, STI, walk-in clinic, nursing, sexual health, screening

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Chapter I

Introduction

Urinary tract infections (UTIs) are common bacterial infections that are reported to affect more than 150 million people globally each year (McLellan & Hunstad, 2016). Women are much more likely to develop these infections compared to men, and current data indicate that between 50% and 60% of all women will develop a UTI at some point in their lives (Medina & Castillo-Pino, 2019). Most UTIs are classified as uncomplicated, indicating that the patient is not pregnant or immunocompromised, has no functional or anatomical abnormalities impacting the urogenital tract, and is not experiencing a systemic infection impacting the tissue of the urinary system (Pinkerton et al., 2020). Urinary tract infections occur when bacteria enter the urinary tract, with evidence indicating that *Escherichia coli* (E. coli) is implicated in more than 80% of these infections (McLellan & Hunstad, 2016). While women are at greater risk for a UTI because of their anatomy—the proximity of the urethral opening to the anus—scholars consistently report that there are other risk factors for UTI, including recent sexual activity (Chu & Lowder, 2018; Hoffmann et al., 2021). Despite the relationship between UTIs and sexual activity, providers treating uncomplicated UTIs often fail to address this issue in practice (Behzadi et al., 2019). Consequently, there appears to be a missed opportunity for providers to screen sexually active women who present with symptoms of a UTI for sexually transmitted infections (STIs).

Problem Statement/Significance

As noted in the introduction to this work, UTIs represent a common health issue for women, including those who are sexually active (Chu & Lowder, 2018; Hoffmann et al., 2021). Despite this, when providers deliver care for patients with UTIs, screening for sexually transmitted infections is often overlooked (Behzadi et al., 2019). In fact, research indicates that

dipstick urinalysis is typically used in the clinical setting when patients present with a UTI (Chu & Lowder, 2018). However, while urine culture is the gold standard for evaluating the presence of a UTI and the underlying culprit, STI screening is often overlooked, with providers focusing specifically on the treatment of the patient's urinary tract symptoms (Behzadi et al., 2019; Chu & Lowder, 2018). This situation can be quite problematic as scholars assert that STI symptoms can mimic those of a UTI, including the presence of urinary urgency, frequency, and dysuria (Behzadi et al., 2019; Gupta et al., 2017). Further, evidence indicates that in many instances, when women present for UTI treatment, they may be asymptomatic for STIs but may still be infected (Gupta et al., 2017).

Sexually active patients who present with symptoms of UTI but are not screened for STIs risk developing serious complications because of delayed treatment (Patel et al., 2021). In addition to a prolonged course of infection, women with untreated STIs are more likely to increase the spread of STIs within the community while also risking the potential for a negative health sequela that can result in significant health complications such as pelvic inflammatory disease (PID), infertility, and increased morbidity and mortality (Patel et al., 2021). Current evidence suggests that STIs may be present in as many as 50% of current urinary tract infections (Behzadi et al., 2019). Consequently, the failure of providers to screen for STIs when patients present with symptoms of a UTI represents a missed opportunity for improving both patient and community health, with the potential to have systemic health implications for both.

The frequency of UTIs in the U.S. population is currently 0.5 episodes per person per year (Medina & Castillo-Pino, 2019). The peak rate of UTIs typically occurs when women are most sexually active: i.e., between the ages of 18 and 39 (Medina & Castillo-Pino, 2019). Uncomplicated UTIs are common in this population and have been shown to have an adverse

effect on overall function and quality of life (McLellan & Hunstad, 2016). In most instances, treatment for UTIs involves the use of broad-spectrum antibiotics that are noted to be highly effective for symptom relief (McLellan & Hunstad, 2016). Despite the fact that UTIs can be easily managed in practice, current evidence suggests that as many as half of all UTIs may also involve a sexually transmitted infection (Behzadi et al., 2019). Because screening for STIs is often not provided when UTI assessment and diagnosis is made, this may systemically impact patient and population health.

Statistics regarding STIs in the United States, including chlamydia, syphilis, gonorrhea, trichomoniasis, hepatitis B, herpes, HPV, and HIV, provided by the Centers for Disease Control and Prevention (CDC, 2021a) indicate that approximately one in five people have one of these conditions on any given day. Further, the organization notes that 26 million new STIs occur each year, and half of all new infections are found in youth, including those between the ages of 15 and 24. Therefore, failure to screen, detect, and treat STIs in the U.S. is a growing threat to public health (Tien et al., 2019). In addition, failure to adequately screen for STIs can result in an increase in the spread of these diseases with increased transmission associated with increasing antimicrobial resistance, rendering some current treatments ineffective for intervention (Tien et al., 2019).

Failure to adequately screen for STIs and the eventual spread of these infections in the population is a significant concern for public health. Data provided by the CDC (2021) indicates that in 2018, there were 68 million STIs reported in the U.S. Further, data provided by Bamberger (2020) clearly indicates that before the COVID-19 pandemic, the rates of STIs in the U.S. were increasing at a dramatic pace. One example is with regard to gonorrhea cases. According to Bamberger, in 2009, the number of cases of gonorrhea had reached an all-time low

of 98 cases per 100,000 population. By 2018, this rate had increased by 82.6% to 179 cases per 100,000 population (Bamberger, 2020). Bamberger reports similar trends for both chlamydia and syphilis.

When looking at the number of STIs that occur each year and recognizing that as many as 50% of these infections may be associated with UTIs (Behzadi et al., 2019), it is also helpful to review the scope of UTIs diagnosed in the U.S. Current data indicate that UTIs are the second most common type of infection seen in healthcare practices and account for more than 10 million visits annually in the United States (Pinkerton et al., 2020; Rastogi et al., 2020). These statistics provide more context regarding the need to screen for STIs, especially in young women that are sexually active. When combined, the data indicate that as many as five million UTIs may potentially be associated with STIs (Behzadi et al., 2019). Given this potential, healthcare providers have there is a real opportunity to deliver better patient care through STI screening to help reduce the prevalence of these diseases in the community while also improving the patient's long-term health (Patel et al., 2021).

The consequences of the problem—i.e., failing to screen young women with UTIs for STIs—can be seen when looking at the implications of STIs within the community, the impact of STIs on health, and the growing concern of antimicrobial resistance for treating STIs. Considering first the implications of STIs within the community, data provided by the CDC (2021) does indicate that new STIs cost more than $16 billion in direct medical costs each year. This is distressing in light of what Bamberger (2020) noted regarding the increasing rates of STI transmission within the United States. Information regarding the impact of STIs on health does indicate that failure to treat these infections can result in a host of health complications ranging from PID and infertility to increased morbidity and mortality (Patel et al., 2021). Finally, early

intervention to treat STIs is associated with better outcomes for patients, indicating that screening is needed to detect these events before they adversely impact patient health (Hull et al., 2017).

While costs and patient health are certainly crucial factors to consider when reviewing the consequences of not addressing the problem, when it comes to public health, scholars note that there is a need to address the increasing antimicrobial resistance associated with STIs (Tien et al., 2019). For example, Unemo et al. (2017) noted that four of the most common STIs, including trichomoniasis, chlamydia, gonorrhea, and syphilis, are curable with the use of current antimicrobial agents. However, despite the ability to cure these diseases, increased rates of infection coupled with a lack of screening for early detection have resulted in increased antimicrobial resistance for treating many STIs (Unemo et al., 2017). As the number of cases of STIs increases, the potential threat of these infections to global health will increase as well, creating a situation in which curable STIs could become life-threatening infections (Unemo et al., 2017). Consequently, efforts to prevent the spread of STIs within the community are imperative (Unemo et al., 2017).

As noted, when reviewing the problem, most healthcare providers do not screen sexually active women for STIs when patients present with symptoms of a UTI (Behzadi et al., 2019). Current evidence indicates that most healthcare providers face challenges when it comes to discussing sexual and reproductive health with patients (Rubin et al., 2018). Providers typically report a lack of knowledge regarding the topic, along with a lack of comfort in completing a sexual history for the patient (Rubin et al., 2018). Additionally, evidence demonstrates that when patients present with symptoms of a UTI, a complete physical examination for the patient is rarely performed (Hoffmann et al., 2021). Further, providers may not be aware of the link

between urinary tract symptoms and sexually transmitted diseases (Behzadi et al., 2019). This lack of knowledge may prevent providers from completing a full sexual health history on the patient and recognizing the importance of STI screening, especially in sexually active young adults between 18 and 36 years of age. Increasing healthcare provider knowledge of these issues should lead to increased screening rates for STIs, resulting in a decline in the number of these infections and the costs to treat these infections, and a decline in antimicrobial resistance associated with the treatment of STIs.

Proposal Solution/Summary

The proposed solution to the problem involves provider education to increase awareness of the problem and the need to provide screening for STIs. A review of the literature regarding interventions aimed at improving STI screening in clinic-based settings does indicate that this solution is highly effective not only for increasing provider knowledge of the topic but also for changing attitudes regarding the need for sexual health screening and history taking (Seidman et al., 2016; Taylor et al., 2016). For example, Taylor et al. (2016) reported on the results of a systematic review of 38 articles involving provider education to increase STI screening in clinic-based care. The results of this analysis indicated that educational interventions for clinic staff were highly effective in increasing STI screening rates among all patients at risk for these conditions. Further, Seidman et al. (2016) reported that the use of provider education increased provider knowledge of HIV screening while also enhancing attitudes toward approaching patients about the use of preexposure prophylaxis for preventing HIV. These results suggest that with proper training, providers should be able to acquire the knowledge needed to make practice changes that include screening for STIs when young, sexually active patients present with symptoms of a UTI.

Chapter II

Summary of the Literature

Urinary tract infections (UTIs) represent one of the most common ailments seen in primary care practice (McLellan & Hunstad, 2016). Although UTIs have numerous root causes, these infections occur more often in women who have frequent intercourse and have intercourse with multiple partners (Storme et al., 2019). Storme et al. (2019) reported that frequent sexual activity is one of the leading causes of recurrent, uncomplicated urinary tract infections. Because of the close relationship between UTIs and sexual intercourse, Behzadi et al. (2019) argued that it is not uncommon for UTIs and sexually transmitted infections (STIs) to occur simultaneously. Unfortunately, most healthcare providers fail to make this connection in practice, choosing to treat the patient's urinary tract symptoms rather than consider screening for sexually transmitted infections (Behzadi et al., 2019). This trend in practice persists even though evidence-based practice guidelines do recommend STI screening in sexually active women reporting symptoms of a UTI (Hlatshwayo et al., 2019, Tomas et al., 2015).

Improving the diagnosis and management of STIs and UTIs will require providers to recognize the overlap between these two conditions. In some instances, evidence indicates that symptoms of UTIs and certain STIs can overlap (Behzadi et al., 2019). Even when different symptoms for these two conditions are present, research consistently supports the use of STI screening to reduce the community spread of these infections (Barrow et al., 2020). Consequently, this would suggest that more providers need to screen for STI infections in sexually active women that seek treatment for UTIs. Based on this assessment of the current problem, the proposed quality improvement project seeks to deliver provider education regarding the relationship between UTIs and STIs, emphasizing the importance of screening to enhance

STI screening while also improving public health by reducing STI rates. Because this proposed practice change must be evidence-based, a review of the literature to support provider education for enhancing knowledge and awareness of the problem is provided here. More specifically, this review of the literature includes a consideration of the problem (urinary tract infections and STIs in young adult women), the relationship between UTIs and STIs, barriers to STI screening, and the implications of STIs for public health, along with an overview of the search strategy used and a summary of the evidence located to support the use of provider education in STI screening.

Background on Urinary Tract Infections

Before reviewing the evidence to support the proposed practice change—i.e., provider education to increase knowledge of STI screening in young adult women presenting with urinary symptoms—it is first helpful to provide some background on the topic, including a consideration of the epidemiology of UTIs, their pathophysiology, and risk factors for their development in women as well as their implications for the health of the patient. A general review of epidemiological data regarding UTIs indicates that these infections are among the most commonly reported in the United States (Chu & Lowder, 2018). Each year UTIs account for more than 8.6 million healthcare visits and approximately $1.6 billion in costs (Chu & Lowder, 2018). Current estimates indicate that 11% of all women will experience one UTI in a given year (Chu & Lowder, 2018). Of these, between 20% and 30% are recurrent (Chu & Lowder, 2018). Further, population estimates indicate that 50% of all people will develop a UTI at some point in their lives (Davenport et al., 2017). Women are much more likely than men to develop this condition. For comparison, current data indicate that in men under the age of 65, UTIs develop at a rate of 10 cases per 10,000 population, or about 3% annually (Smith et al., 2018).

Although UTIs are more common in women than in men, there are specific subgroups of this population that are more likely to develop this condition. Evidence indicates that urinary tract infections are most common in sexually active females, with current estimates indicating that sexually active women typically experience 0.5 to 0.7 UTIs per person annually (Long & Koyfman, 2018). Factors that increase the risk of UTI in this population include engagement in sexual intercourse, spermicide, condom use, and having new sexual partners (Storme et al., 2019). However, it is essential to note that research does indicate that menopausal and post-menopausal women are likely to develop UTIs as well (Medina & Castillo-Pino, 2019). Following menopause, women are more likely to experience these infections due to changes in the function and structure of the urinary tract (Medina & Castillo-Pino, 2019). Issues including genitourinary organ prolapse, urinary retention, urinary incontinence, and decreased physical mobility can all increase UTI rates in menopausal and post-menopausal women (Medina & Castillo-Pino, 2019; Storme et al., 2019).

When compared with men, women are more likely to develop UTIs due to the anatomical structure of the female urinary tract (Medina & Castillo-Pino, 2019). The close proximity of the urethral opening to the anus increases the risk that the urinary tract will become contaminated with fecal matter containing *Escherichia coli* (Nascimento et al., 2021). In fact, current evidence indicates that between 80% and 90% of all urinary tract infections are caused by this organism (McLellan & Hunstad, 2016). *Staphylococcus saprophyticus*, which is the second most common organism resulting in UTI, is abundantly found in the female genital tract and perineum (Choe et al., 2018). Other pathogens that can cause UTIs include *Enterococcus faecalis, Klebsiella pneumoniae,* and *Proteus mirabilis* (Choe et al., 2018). All three of these organisms are commonly found in the intestines, where they do not cause any significant harm to the

individual. When these bacteria are transmitted to fecal matter and in the presence of poor hygiene, they can spread to the urinary tract (Choe et al., 2018). This data demonstrates the role of physiology in the development of UTIs for women.

Although the unique anatomical structure of the genitourinary tract in women increases the risk for the development of UTI, there are normal defense mechanisms to prevent these events from occurring, including complete voiding, which helps to remove bacteria from the urinary tract; urine pH, which helps to reduce acidity and prevent bacteria from entering and colonizing in the urinary tract; vesicoureteral valves, which prevent urine reflux into the urethra and bladder; and the presence of phagocytic leukocytes that help fight infection when bacteria enter the urinary tract (Chu & Lowder, 2018). However, given the proximity of various bacteria from fecal matter to the urethra, problems with any of these defense mechanisms can increase a woman's risk of developing a UTI (Chu & Lowder, 2018). Consequently, changes in vaginal flora, as well as changes to homeostasis within the body to help regulate the pH of urine or the strength of the immune system will all have implications for the development of a UTI.

Diagnosis of urinary tract infections can prove challenging in some instances since symptom presentation in some subgroups of women can be different (Chu & Lowder, 2018). Older patients may not report any symptoms of UTI and may instead present with symptoms related to incontinence or difficulty voiding (Chu & Lowder, 2018). Despite these differences, some clinical manifestations of UTIs have been shown to be consistent. Evidence indicates that the most common symptoms of UTI include urinary frequency and urgency as well as dysuria (Long & Koyfman, 2018). Vaginal and urethral tenderness, as well as hematuria, may also be present (Long & Koyfman, 2018). Systemic symptoms such as nausea, vomiting, fever/chills, and flank pain are often not associated with UTI, and the presence of these symptoms may be

indicative of other infections beyond the urethra or bladder: i.e., kidney infections (Long & Koyfman, 2018). The positive predictive value of UTI diagnosis based solely on the clinical symptoms reported by the patient has been shown to be 84%, indicating that in most cases, women who report the above symptoms are more than likely to have a urinary tract infection (Chu & Lowder, 2018). For this reason, the literature does support a diagnosis of UTI in otherwise healthy premenopausal women reporting the above symptoms (Chu & Lowder, 2018).

Diagnosis of UTI in the clinical setting is typically made based on rapid dipstick urinalysis, which can be quickly completed while the patient waits (Baral & Maharjan, 2017). Most urine dipstick tests provide information regarding the presence of leukocyte esterase (LE), nitrites, and red blood cells (Baral & Maharjan, 2017). Increased levels of LE are commonly seen when an infection is present, and nitrates in the urine are indicative of the presence of bacteria (Baral & Maharjan, 2017). Dipstick tests also assess the presence of blood in the urine which can be caused by other factors, including menstruation (Baral & Maharjan, 2017). However, evidence has shown that in the presence of clinical manifestations of UTI or the presence of positive nitrate or LE results, blood is typically indicative of a urinary tract infection (Baral & Maharjan, 2017). Although urine dipstick analysis typically confirms the presence (or absence) of a UTI, the type of bacteria present may impact test results (Chu & Lowder, 2018). If the UTI is caused by *Staphylococcus saprophyticus*, this may result in a negative nitrate test and suggest that the patient's symptoms are not caused by a urinary tract infection (Chu & Lowder, 2018).

To circumvent false positives in the clinical setting, microscopic urinalysis and urine culture can also be used to confirm the patient's diagnosis (Carlson et al., 2017). Microscopic urinalysis is performed in a laboratory setting using light microscopy to detect the presence of

leukocytes or bacteria (Carlson et al., 2017). A further urine culture can be used and is often considered to be the gold standard for UTI testing in pregnant women (Carlson et al., 2017). Clean catch urine or urine acquired through catheterization will be needed, and this test will be able to determine the specific organism that is causing the underlying infection (Carlson et al., 2017). While broad spectrum-antibiotics are commonly used for the treatment of UTIs before the urine culture is complete, data provided via urine culture may indicate the need to change the antimicrobial agent to help ensure appropriate and effective treatment of the infection (Chu & Lowder, 2018).

While various tests can facilitate the ability of healthcare providers to accurately confirm the diagnosis of UTI outside of the clinical symptoms reported by the patient, the evidence does indicate that diagnosis can be challenging if a complicated UTI is present (Wagenlehner et al., 2020). In general, urinary tract infections are classified as being either complicated or uncomplicated (Wagenlehner et al., 2020). Uncomplicated urinary tract infections refer to those that are commonly seen in clinical practice and include UTIs that develop in non-pregnant, premenopausal women that are otherwise healthy and have no known abnormalities in their urinary tract (Pinkerton et al., 2020). Complicated UTIs, on the other hand, are associated with factors that may increase the colonization or clearance rate of bacteria in the urinary tract (Wagenlehner et al., 2020). In some cases, distinguishing complicated and uncomplicated UTIs may be challenging as the symptoms reported are similar (Wagenlehner et al., 2020). However, the evidence does indicate that in women with complicated UTIs, infections may be more common (recurrent) and may be associated with other symptoms such as incontinence or fever and tachycardia, which are not the result of any other underlying health conditions (Wagenlehner et al., 2020). In young, sexually active females, most UTIs are uncomplicated.

Once a diagnosis of UTI has been made, treatment for the condition will be needed. As previously noted, providers often prescribe broad-spectrum antibiotics for the treatment of UTIs, including nitrofuran, Fosfomycin, or sulfamethoxazole-trimethoprim (Gupta et al., 2017). Scholars reviewing these medications note that they are highly efficacious and further have an excellent safety profile with few side effects (Gupta et al., 2017). Duration and dosage of the medication selected will depend on the severity of symptoms reported by the patient as well as the duration of the infection before seeking treatment (Gupta et al., 2017). Antimicrobial agents are often prescribed for 3 to 7 days, depending on the medication used and the specific needs of the patient (Gupta et al., 2017). Although standard care for patients with uncomplicated UTI typically involves antimicrobial agents, the utility of this recommendation has been challenged in recent years due to concerns over increasing antimicrobial resistance in general (Bader et al., 2017). While the debate over this practice persists, specific guidelines for a wait-and-see approach have not been formally established within the literature, making it difficult for many providers to recognize when to wait and when to prescribe antibiotics for the patient (Bader et al., 2017).

Even though urinary tract infections are often not considered to be life-threatening events, it is important to note that early identification and treatment of UTIs are essential for improving patient health and well-being. If left untreated, the bacteria causing the UTI can further colonize, leading to infections of other parts of the urinary tract, including the kidneys (Dimitrijevic et al., 2021). Further, if bacterial infections result in UTIs spread to the bloodstream, this can result in urosepsis which can be deadly (Dimitrijevic et al., 2021). Therefore, early identification and treatment of UTIs, especially in women who experience this event on a recurrent basis, can also improve quality of life (Ennis et al., 2018). Current evidence

suggests that recurrent urinary tract infections can reduce the quality of life of women, making early identification and treatment of these infections critical for improving the holistic health of the patient (Ennis et al., 2018).

Background on STIs and Their Relationship with UTIs

With a thorough review of UTIs provided, it is now possible to consider the issue of sexually transmitted infections (STIs) and their relationship to urinary tract infections. A cursory overview of STIs demonstrates that human papillomaviruses (HPVs), herpes simplex virus-2, *Chlamydia trachomatis*, *Neisseria gonorrhea*, *Trichomonas vaginalis*, and *Mycoplasma genitalium* are the most common STIs reported globally (CDC, 2021a; Yagur et al., 2021). In the United States, data from the Centers for Disease Control and Prevention ([CDC], 2021a) indicate that in 2018, there were 42.5 million active HPV infections in the U.S., and an additional 13 million diagnosed. Table 1 below provides a review of STI prevalence and incidence based on the most recent data from the CDC.

Table 1

Prevalence and Incidence of STIs in the United States, 2018

STI	Prevalence	Incidence
HPV	42.5 million	13 million
HSV-2	18.6 million	572,000
Trichomoniasis	2.6 million	6.9 million
Chlamydia	2.4 million	4 million
Gonorrhea	209,000	1.6 million
HIV	984,000	32,600

HBV	103,000	8,300
Syphilis	156,000	146,000

Additional data regarding STI infection rates provided by the CDC (2021a) further indicated that in 2018, there were 68 million active STIs in the U.S. and 26 million more were acquired in this timeframe. These numbers indicate that roughly one in every five Americans currently has an STI (CDC, 2021a). Additional data provided by Kreisel et al. (2021) further estimate that chlamydia, trichomoniasis, genital herpes, and HPV accounted for 97.6% of all existing STIs, and 93.1% of all new STIs reported in previous years. Interestingly, all prevalent or current infections were noted to be in adults over the age of 25, with new infections occurring more frequently in younger populations: i.e., young adults between the ages of 15 and 24 years (Kreisel et al., 2021). Data from the CDC indicate that of all new STI infections that occurred in 2018, 45.5% were in this age group.

Unfortunately, evidence continues to indicate that STI infection rates only continue to increase. While the specific rates of increase for each STI are noted to be different, overall, the data indicate that among the three most commonly reported STIs—including chlamydia, gonorrhea, and syphilis—rates have increased by nearly 30% between 2015 and 2019 (CDC, 2021b). This situation is one that is clearly lamentable, as the evidence does indicate that just three decades earlier, gonorrhea rates were at historic lows and syphilis was on the verge of being eradicated completely in the United States (CDC, 2021b; Scott-Sheldon & Chan, 2019). Increased rates of STIs in the population have also led to increased costs to provide care for these infections. Data from the CDC (2021a) demonstrate that direct treatment for chlamydia, gonorrhea, and syphilis combined total more than $1.1 billion annually. Further, the CDC reports that new HIV infections cost $13.7 billion in direct lifetime costs, while HPV infections have an

associated lifetime cost of $755 million. Perhaps most distressing about the increased rates of STI infection and costs is that these outcomes are preventable.

For women of childbearing age, including those between the ages of 18 and 36 years, contracting an STI can have significant implications for both physical and mental health. Yagur et al. (2021) considered this issue in the context of pelvic inflammatory disease or PID. According to these authors, PID is typically classified as an infection of the upper genital organs, including the uterus, fallopian tubes, and ovaries (Yagur et al., 2021). Pelvic inflammatory disease is directly caused by sexually transmitted infections; however, Yagur noted that the rates at which specific STIs result in PID has not been fully evaluated in the current literature. In small-scale studies, chlamydia was found to result in 35% of all cases of PID, while gonorrhea infection was associated with PID in 13% of women (Yagur et al., 2021). The development of PID can be serious and can result in a medical sequela that results in chronic pelvic pain, ectopic pregnancy, and tubal factor infertility (Tsevat et al., 2017; Yagur et al., 2021).

Infertility has been shown in the literature to impact 9% of the world's total population and 1.5 million women in the United States (Tsevat et al., 2017). While fertility can be impacted by myriad factors that are not associated with STIs, scholars do note that as many as 30% of all infertility cases are related to tubal factors associated with sexually transmitted infections (Tsevat et al., 2017). In women who develop PID, tubal factor infertility typically occurs in 15% of all cases (Tsevat et al., 2017). The onset of tubal factor infertility will be impacted by both the severity of the infection and the number of STIs that a woman contracts across her lifespan (Tsevat et al., 2017). Chlamydia and gonorrhea have been the most diagnosed agents in women with tubal factor infertility caused by pelvic inflammatory disease (Tsevat et al., 2017). For

couples seeking to have children, these outcomes can be emotionally devastating and can carry with them a host of psychological and psychosocial implications (Tsevat et al., 2017).

For many women who contract STIs, the problem is also one that can have mental health implications as well. Scholars argue that gender stereotypes about women and women's sexuality often make it difficult for women to seek healthcare services even after they believe that they have been exposed to an STI or have symptoms of one (Lee & Cody, 2020, Liu et al., 2021). Although efforts have been made to reduce the stigma regarding STIs among healthcare providers, women still experience considerable shame when seeking treatment for STIs, due in large part to gender stereotypes and roles (Lee & Cody, 2020, Liu et al., 2021). These concerns can delay the diagnosis of an STI and can lead to complications such as pelvic inflammatory disease (Lee & Cody, 2020). These challenges can be more prevalent in rural healthcare settings where access to providers and education regarding STIs may be limited (Valentine et al., 2021). What this indicates is that STIs carry with them the potential to have significant physical and mental health implications for the patient.

Challenges are also noted regarding the potential for increased risk of STI infection following initial treatment for one of these conditions. Scholars do note that having a past history of STI infection has long been associated with the potential to acquire additional STIs across the lifespan (Suarez et al., 2021). While the specific underlying mechanisms for this to occur were once noted to be unknown, emerging evidence suggests that vaginal flora may contribute to increased susceptibility to STIs following infection (Van de Wijgert et al., 2017). More specifically, current research regarding this topic has demonstrated that following the contraction of an STI, changes in the vaginal flora may result in enhancing a woman's risk for contracting other STIs (Van de Wijgert et al., 2017). While prevention is key, early screening and treatment

will also be critical for limiting the changes that occur in the vaginal flora to help protect the patient over the long-term (Van de Wijgert et al., 2017).

STIs and UTIs

Although STIs and UTIs initially appear to have little in common, research indicates that these two conditions' co-occurrence occurs quite frequently (Behzadi et al., 2019). In fact, data from one study indicated that in a small sample of women seeking primary care services for urinary tract symptoms, STI testing increased by 45%, tripling the number of women who had a sexually transmitted infection (Chadwick et al., 2018). In another study of 264 women presenting to an emergency room with urinary symptoms, 175 (66%) were diagnosis with UTI despite the fact that only 84 women had a positive urine culture, and 60 were later found to have one or more STIs (Tomas et al., 2015). This data suggests that STIs and UTIs may co-occur more frequently than providers recognize. Unfortunately, evidence consistently demonstrates that STI screening rates in sexually active women who present with urinary symptoms are rather low (Behzadi et al., 2019). Many believe that this is becoming a missed opportunity to increase STI screening rates, reduce STI transmission in the community, and improve public health (Behzadi et al., 2019).

The current state of practice regarding STI screening in women who present with urinary symptoms demonstrates a dearth of guidance regarding managing the patient's care. The systemic implications of this can be seen when reviewing a study conducted by the American Society for Microbiology (Tomas et al., 2015). In this study, it was found that in 64% of patients with STIs, providers mistakenly diagnosed the patient with a UTI (Tomas et al., 2015). This has the potential to lead to the overtreatment of UTIs and the potential for antimicrobial resistance (Wagenlehner et al., 2016). In particular, women with STIs diagnosed with UTIs are being

provided with ineffective treatment for curing their STI, leading to the potential for a sexually transmitted infection to cause more harm to the patient (Tomas et al., 2015). In addition, while many STIs are highly treatable when they are first contracted, they become more complicated as they progress (Seiler et al., 2022). This not only leads to increased health risks and complications for the patient but it has also been shown to increase the costs to provide patient care (Seiler et al., 2022). Further, the mismatch of antimicrobial agents may result in increased antibiotic resistance in the patient (Tomas et al., 2015). Over time, this can make it more difficult for providers to effectively treat UTIs if the patient experiences this event in the future.

When looking at the relationship between UTIs and STIs, scholars note that the unique microbiome associated with the urinary tract can actually contribute to contracting certain sexually transmitted infections (Aragon et al., 2018). Even though the urinary tract has traditionally been viewed as a sterile environment in which bacteria and other pathogens were not present, emerging research suggests that certain pathogens are present in the urinary tract, often at levels that are difficult to detect (Aragon et al., 2018). If bacterial species become more dominant in the urinary tract, this has been shown to directly impact the rate at which certain STIs, including HIV, HPV, and herpes, can be transmitted (Torcia, 2019). This may help to explain why STIs and UTIs occur more frequently in sexually active females (Torcia, 2019). This can be an issue of concern in clinical practice, as some STIs have no overt symptoms, and others may have symptoms that mimic those that occur when a UTI is present (Behzadi et al., 2019).

Although the unique microbiome of the urinary tract in women can increase susceptibility for simultaneously contracting UTIs and STIs, scholars do argue that there are sexual risk factors that can also increase the risk of these two events co-occurring (Behzadi et al., 2019). In

particular, sexually active women are more likely to develop co-occurring UTI and STI when having sexual intercourse with more than one partner (separately or concurrently), having sex with a new partner within 2 months, having a previous history of STIs and/or UTIs, the presence of immune system deficiencies, having sex with high-risk populations including injection drug users, failing to use condoms, use of spermicidal agents, and in the case of sexual assault/rape (Behzadi et al., 2019). In addition, because STI screening is not routinely provided in sexually active women presenting with symptoms of a UTI, sexual health history taking in the case of sexually active women should be considered to determine if there is a need to perform STI screening (Behzadi et al., 2019).

While evidence provided by Behzadi et al. (2019) does indicate that completing a sexual health history of the patient can be helpful in identifying women with urinary symptoms that may be at greater risk for having an STI, there are some caveats regarding the use of this intervention to determine if STI screening is needed. Scholars argue that even with a thorough sexual health history and physical exam of the patient, it may be challenging to determine if patients have an STI, UTI, or both (Sheele et al., 2022). Further, evidence indicates that when sexual health histories are completed in the clinical setting, these assessments are often inadequate as most healthcare providers lack both the education and experience to complete these histories efficiently (Sheele et al., 2022). Additionally, some patients may not be forthcoming about their sexual history when asked by a medical practitioner to provide this information (Sheele et al., 2022). Consequently, STI screening through laboratory testing has been noted in the literature to be the most reliable method for assessing this aspect of patient health (Sheele et al., 2022).

The role of the provider in the diagnosis and management of urinary symptoms in women has been noted in the literature to be a crucial factor that influences the current state of practice when it comes to simultaneously screen for UTIs and STIs in practice (Sheele et al., 2019; Tomas et al., 2015). Evidence indicates that providers often make assumptions about the presence of STIs in patients from different social, racial, and economic backgrounds (Sheele et al., 2019; Sheele et al., 2022). This can create bias on the part of the healthcare provider, leading to the decision not to provide STI testing, even though it may be warranted (Sheele et al., 2019; Sheele et al., 2022). Sheele et al. (2022) specifically stated that "physicians have low diagnostic accuracy for predicting bacterial UTIs when combining urinalysis results and clinical impression" (p. 314). Based on this assessment, Sheele et al. (2022) argued that all patients presenting with urinary symptoms should be tested for urinary tract and sexually transmitted infections.

The Current State of STI Screening

Because STIs and UTIs can frequently co-occur, especially in sexually active females, it is helpful to consider the current guidance regarding STI screening along with data regarding the use of STI screening in practice. Scholars reviewing this topic assert that the CDC, affirmed by other public health agencies, has supported the regular use of STI screening in sexually active women under the age of 25 (Hull et al., 2017). This guidance notes the need for regular STI screening in high-risk populations, including men who have sex with men (MSM) (Cantor et al., 2016; Hull et al., 2017). What is evident from this guidance is that the required screening for STIs only includes a very small subset of the general population seen in clinical practice. Further, evidence indicates that even though only a small number of patients would require STI screening, many do not receive it (Hull et al., 2017). More precisely, evidence from health

insurance claims data indicates that among those who should be screened for STIs covered by eligible health insurance plans, only 15% are screened (Hull et al., 2017).

Understanding STI screening rates poses some unique challenges. Although the Kaiser Family Foundation (KFF, 2020) reports that STI screening is covered under the Affordable Care Act with no cost sharing, an evaluation of the use of STI screening amount providers conducted by Yoo and Vangrafeiland (2018) indicated that most providers do not implement STI screening even when recommended for certain populations. Further, while the CDC (2021a) indicates that STI rates are nationally reported, there is no evidence that STI screening rates are reported to any public health organization. These screening tests are often not directly reported to public health officials. Information provided by the CDC (2021a) indicates that currently, there is no national reporting system for STI screening within various communities, making it difficult to state with certainty the total number of tests performed annually. The scholars who review this issue note that this data would be helpful to demonstrate the efficaciousness of testing in terms of how many of the tests result in positive outcomes (Cantor et al., 2016). This data may also help identify epidemiological trends in STIs that could be better utilized to build STI screening guidelines utilized in practice (Cantor et al., 2016). Given the marked increases in STIs that have occurred over the last several years, there is a need to increase testing to help ensure that those with these infections can be treated in a timely manner.

Tracking and increasing screening rates for STIs within the community have other implications that must be considered, including the community spread of these diseases. When patients with STIs continue to engage in sexual activity with different or multiple partners, this can increase the community spread of these conditions, leading to a host of deleterious implications for individual and public health (Hull et al., 2017). In addition to the impact of STIs

on individual health—including the potential for PID, infertility, and mental health concerns—STIs spread within the community can increase the costs associated with treating these infections (Hull et al., 2017). Further, while treatment has been shown to be quite effective for curing many STIs, the spread of these infections within the community and globally gives rise to antimicrobial resistance (Tien et al., 2020). This issue is one of the emerging concerns, as antimicrobial resistance can limit the ability of providers to cure these infections (Tien et al., 2020).

Barriers to STI Screening

The literature reviewed to this point demonstrates some essential points regarding the presence of urinary symptoms in sexually active females. In particular, the literature demonstrates that the presence of urinary symptoms can be associated with the presence of an STI and that further, screening for STIs is often overlooked by most healthcare providers. With these issues in mind, a closer look at STI screening and barriers to this practice was viewed as being imperative for understanding when this type of screening is provided and to whom. Through a review of the literature on this subject, it should be possible to not only identify populations for whom screening may be necessary but also to gain a better understanding of the patient, provider, and institutional factors that may affect clinical practitioners' ability and willingness to provide STI screening to certain patients.

Interestingly, a review of STI screening in the general population indicates myriad barriers to this process, including patient views and attitudes toward screening (Hull et al., 2017). More precisely, evidence indicates that most individuals believe that they are at low risk for contracting STIs (Pollack et al., 2013), and many will not report their sexual health history to a healthcare provider, (Lee & Cody, 2020; Ollivier et al., 2018). Patients' unwillingness to speak

with their providers regarding their sexual health history can have myriad root causes, including social taboos regarding the subject of sex or fear of embarrassment or judgment from medical providers (Patel et al., 2018). Further, evidence suggests that many patients report concerns over privacy and confidentiality (Lee & Cody, 2020, Ollivier et al., 2018). Sexually transmitted infections must be reported to public health officials and are tracked at community, state, and national levels. Patient fears over mandatory reporting may prevent some patients from disclosing certain sexual behaviors or reporting when they may have been exposed to an STI.

While risk perception, negative attitudes, and concerns over privacy are critical issues of concern that may impact the ability and willingness of some patients to discuss sexual health issues with their providers, the evidence does indicate that underlying cultural values regarding sex and sexuality may also influence patient decision making when it comes to STI screening (Hutchinson & Dhairyawan, 2017). For example, in some communities and cultures, women may be ashamed of discussing sexual health issues with their healthcare providers (Brown et al., 2019). This can translate into difficulty in seeking sexual health services even when needed. In addition, some patients may be concerned that medical providers will judge them, especially if they test positive for a sexually transmitted infection (Hutchinson & Dhairyawan, 2017; Patel et al., 2018). Additionally, research indicates that following STI screening, negative results may influence STI screening decision-making in the future (Patel et al., 2018). In short, patients who test negative for STIs may believe that their risk for contracting these infections is lower, leading to the decision to forgo STI screening in the future (Patel et al., 2018).

Scholars evaluating the topic of sexual health and patient disclosure of sexual health information to healthcare providers have also noted that some women may believe that these conversations with providers are generally unproductive (Jahn et al., 2019). In particular, Jahn et

al. (2019) noted that when providers engage in sexual health discussions with women, the focus of the information provided during these encounters is typically rooted in discussions of contraception and pregnancy. Healthcare providers are one of the primary sources of reliable information for patients regarding sexually transmitted infections and other issues related to sexual health outside of pregnancy prevention (Jahn et al., 2019). When this information is excluded from conversations about sexual health, this leaves gaps in care and women who would like more information regarding sexual health; this creates a barrier for initiating conversations about other aspects of sexual health and well-being (Jahn et al., 2019). While this information facilitates greater insight into the specific barriers to sexual health knowledge and education for patients, this discussion also provides a valuable foundation for exploring practitioner barriers to providing support for patients regarding their sexual health.

The challenges facing healthcare providers when it comes to delivering education and support for the sexual health of patients have long been noted in the literature (Besera et al., 2016; Flynn et al., 2016; Haesler et al., 2016; St. Vil et al., 2019). Barriers to providing patient education and sexual health care can stem from the cultural and personal values of the provider regarding sex and sexuality (Lindsay et al., 2019; St. Vil et al., 2019). Some providers may be biased against certain population groups, including those at the highest risk for contracting STIs (St. Vil et al., 2019). Views on women's sexuality and sexual behavior may also bias providers, making it more difficult to initiate conversations regarding the topic (Lindsay et al., 2019). Biases and negative attitudes that are perceived by patients often translate into challenges for the patient to connect with the provider (Altman et al., 2019). This, in turn, can erode the relationship and trust with the provider, leading to the inability or unwillingness of patients to seek information or care even when it may be helpful or needed (Altman et al., 2019).

Disengagement of the patient plays a significant role in shaping the quality and scope of care that patients receive. Regarding sexual health, the cultural taboos surrounding this issue coupled with negative attitudes from providers can create systemic problems for patients to acquire needed information to foster healthy sexual development, including awareness of the importance of seeking STI testing.

While providers may have a strong bias regarding sexuality and patient sexual behavior, research also suggests that providers lack a general awareness of the topic and its importance to patient health. Scholars assert that providers often fail to address sexual health issues, assuming that these concerns are not important to the patient (Flynn et al., 2016). Additionally, many providers may believe that if a sexual health issue is essential to the patient, it is the responsibility of the patient to address this topic during the clinical encounter (Flynn et al., 2016; Haesler et al., 2016). When this information is juxtaposed against the negative attitudes that some providers may have toward sexuality and sexual behavior, it becomes evident that notable gaps can arise regarding the provider's ability to address sexual health effectively with patients during their healthcare visits. Interestingly, these same issues do not seem to be present when discussing more common health issues, including urinary tract symptoms. This would suggest that some effort to integrate sexual health as a standard part of patient care may need to be considered (Lanier et al., 2014; Serefoglu et al., 2021).

While the attitudes of providers toward sexual health and sexuality of the patient will, in many instances, limit discussions regarding STI screening and other essential sexual health services for patients, scholars reviewing for provider barriers to STI screening also note skill and knowledge deficits reported by those responsible for undertaking these assessments (Criniti et al., 2016; Shindel et al., 2016). Research indicates that formal education for sexual health history

taking is often limited in medical education programs (Shindel et al., 2016). Often, providers lack formal training regarding how to take sexual health histories. Because taking these histories may be an overlooked component of practice, providers may never develop the hands-on skills and competencies needed to feel comfortable undertaking these conversations with patients (Criniti et al., 2016). Without efforts to expand the education and experience of providers regarding this topic, providers will more than likely continue to overlook this issue in practice.

Provider initiation of conversations with patients over sexual health and STI screening may also be impacted because there are few standardized tools available to provide this type of screening in practice (Kingsberg et al., 2019; Lanier et al., 2014). Evidence indicates that when providers initiate conversations with patients regarding their sexual health, a lack of standardized tools to guide these conversations and collect needed data can be challenging (Kingsberg et al., 2019; Lanier et al., 2014). The lack of standardized tools for sexual health history taking has also been noted to contribute to a lack of educational programs for healthcare providers to learn how to effectively master this aspect of clinical practice (Kingsberg et al., 2019). Without this valuable support, clinicians may lack the knowledge needed to complete sexual health history with the patient thoroughly. As noted earlier in this literature review, research has consistently shown that even when providers complete sexual health histories, these assessments are often incomplete and do not accurately provide insight into the sexual health needs of the patient (Lanier et al., 2014).

Notably, a review of interventions to help address providers' knowledge, skills, and attitudes regarding sexual health and sexual health history taking with patients does support the use of educational programs to augment outcomes in this area of practice (Savoy et al., 2020). More specifically, a systematic review regarding the use of provider education to increase

knowledge of sexual health issues, including HPV, demonstrated that education increased provider awareness and knowledge of these topics (Leung et al., 2019). These results suggested that when education is provided, it can positively impact changing provider attitudes and behaviors and in some cases increasing awareness of the need for STI screening, especially in patients that may be at increased risk for contracting these infections (Yoo & Vangrafeiland, 2018).

Scholars reviewing provider barriers to providing sexual and reproductive health services to patients also note the lack of available resources and time associated with the process (Lanier et al., 2014; Kingsberg et al., 2019; Manninen et al., 2021). In general practice and primary care settings, scholars note that healthcare providers may not be given the time or opportunity to speak with patients regarding sexual health issues (Fennell & Grant, 2019). A lack of organizational support to promote the sexual health of patients further contributes to this problem (Fennell & Grant, 2019). Klaeson et al. (2017) argued that when healthcare organizations do not provide needed support to foster practitioners' ability to engage in conversations with patients about sexual health, it can be difficult for providers to prioritize the issue to deliver basic needs health services. While a lack of organizational support for providers to discuss sexual health issues with patients demonstrates a provider-centered barrier to patient education and STI screening, this issue also highlights some of the structural challenges within the healthcare system when it comes to addressing this topic in practice.

Structural and organizational barriers to patient sexual health promotion and STI screening are also concerns that have been reported in the literature. Footman et al. (2021) completed a systematic review of STI screening rates to identify the macro-, meso-, and micro-level factors contributing to a low rate of STI screening and sexual health history taking among

providers. Evidence collected in this research demonstrated that costs associated with screening and a lack of standardized protocols for STI screening in otherwise healthy adults often serve as significant institutional barriers for providers to deliver this type of care for patients. Taylor et al. (2016) further considered the costs of STI screening in clinic-based settings, arguing that providers and patients may have a financial disincentive to seek STI screening or sexual and reproductive health services.

Antimicrobial Resistance and STIs

Although gaps in assessing STI screening rates in comparison with STI incidence within the community make it difficult to state with certainty the degree to which increased STI screening is needed, it is evident that efforts are needed to reduce the number of STIs that are occurring. Increased health care costs along with the potential for adverse outcomes for undetected or misdiagnosed STIs carry with them a host of implications for public health. However, a more pressing issue of concern has been noted about the increased community spread of STIs: antimicrobial resistance (Tien et al., 2019). While this topic has been briefly noted throughout this literature review, the significance and impact of this topic appear to be germane to the current project, as STIs have been frequently diagnosed in patients with urinary tract infections (Chadwick et al., 2018; Olaru et al., 2021). This suggests that efforts to expand STI screening to sexually active women with urinary symptoms may represent an essential foundation for early intervention to treat STIs while also reducing the rising antimicrobial resistance associated with these infections.

Scholars reviewing the topic of antimicrobial resistance have asserted that this issue represents a global public health emergency (Tien et al., 2019). Despite this, evidence indicates that when it comes to provider awareness of this issue, especially in sexually transmitted

infections, antimicrobial resistance and its implications are often underappreciated by healthcare providers as evidence suggests that providers often fail to adhere to recommendations for STI prescribing (Weston et al., 2018). While antimicrobial resistance, including *Clostridium difficile* (*C. diff.*) infections, has received considerable attention in the literature, *Neisseria gonorrhoeae* has been consistently noted as one of the top five organisms that have become resistant to all antibiotics in recent years (Tien et al, 2019). As a result of this situation, the World Health Organization has identified the prevention of gonococcal infections as a priority issue of concern for improving public health (Tien et al., 2019). It is also important to note that antimicrobial resistance has been reported in drugs used to treat other STIs (Tien et al., 2019). What this indicates is that as the spread of these infections continues, it is likely that higher rates of drug resistance will occur, leaving medical providers with few tools to combat these diseases.

Because current data indicates that gonorrhea or *Neisseria gonorrhoeae* has consistently been shown to have the highest rate of drug resistance, a closer look at this organism and the factors contributing to its growing resistance are considered here. Scholars reviewing gonorrhea infections note that, across the globe, infections caused by this organism are resistant to all known treatments for the condition (Unemo et al., 2017). This includes penicillin, tetracyclines, sulfonamides, quinolones, and macrolides (Tien et al., 2019). Laboratory testing of drug-resistant strains of *Neisseria gonorrhoeae* has consistently shown that the bacteria have acquired resistance through point mutations that render antimicrobial agents ineffective (Tien et al., 2019; Unemo et al., 2017). Additionally, evidence suggests that *Neisseria gonorrhoeae* has undergone gene transfer from other Neisseria species circulating within the community, rendering available pharmacotherapies useless in treating gonorrheal infections (Tien et al., 2019, Unemo et al., 2017). These changes in the bacteria have resulted in increased antimicrobial resistance.

Furthermore, these mutations have made it much more difficult for patients to utilize natural immune defenses to combat this pathogen (Quillin & Seifert, 2018).

Current prescribing guidelines for antimicrobial-resistant organisms indicate that public health agencies stop recommending the use of antimicrobial agents when drug resistance reaches 5% or greater within a community (Tien et al., 2019). At present, this threshold has been met for penicillin, doxycycline, and fluoroquinolone in most countries globally (Tien et al., 2019). In 10 countries, epidemiological data indicate that fluoroquinolone can no longer be used to treat gonorrhea because this medication has reached > 90% resistance (Tien et al., 2019). Increased globalization and the rapid spread of STIs across the globe have raised additional concerns regarding what could potentially occur if efforts are not made to stop the spread of gonorrhea in all communities (Tien et al., 2019). Increased STI screening may help with the early identification of those with these diseases allowing for early intervention and treatment as well as increased education to prevent the spread of the disease, including partner notification (Mathews et al., 2021; Pearce et al., 2019).

The most challenging regarding antimicrobial resistance in treating STIs is that these medications are vital to ensuring the patient's recovery (Pearce et al., 2019). The most appropriate method for reducing drug resistance in STIs is to prevent these diseases from spreading in the community (U.S. Department of Health and Human Services, [DHHS]. 2020). When reviewed in this context, the importance of preventing the spread of STIs within the community becomes much more evident. If women of child-bearing age report urinary symptoms and no STI screening is performed, providers and public health authorities appear to be losing a significant chance to limit the transmission of these infections significantly while also lowering antibiotic resistance.

Evidence to Support the Quality Improvement Project

It is essential to plan a robust search strategy to get evidence-based information that will support the study while looking for the limitations and implications of the quality improvement project.

Search Strategy

The intervention selected for review in this quality improvement project in involves the use of provider education to help increase knowledge of STI screening in healthcare providers treating urinary symptoms in sexually active women between the ages of 18 and 36 years. To locate evidence to support this intervention as a means to address the clinical problem a search strategy to locate relevant evidence on the topic was established. This search strategy began with the identification of five nursing- and healthcare-related electronic journal databases that could be used for locating articles on the topic under investigation. More precisely, the databases identified included Academic Search Complete, CINAHL, Medline, Ovid, and ProQuest. Each of the databases was searched using the problem— "urinary tract infections" and "sexually transmitted infections"—along with the intervention proposed, i.e., "provider education." Initial searches were conducted using these keywords combined with the Boolean operator AND. Additional search terms were utilized, including synonyms that were combined with the Boolean operator OR. For the initial search terms identified, the following synonyms were searched to locate articles in each database:

- "Sexually transmitted infection" OR "sexually transmitted disease" OR "genital tract infections" OR "STI" OR "STD"
- "Urinary tract infection" OR "UTI" OR "cystitis"
- "Provider education" OR "education" OR "training" OR "clinical education"

Limiters were utilized to help ensure that the results provided the most timely and rigorous evidence to support the practice change. Expressly, database searches were limited to articles published within the last 10 years (2012 through 2022) in peer-reviewed journals. Additional limiters included articles published in English and available in full text. All searches were set to organize results based on relevance to the search terms provided. For each search, the article abstract was evaluated to determine if the article included a primary study and was relevant to the PICO question proposed. When searches resulted in more than 200 articles, only the first 200 were reviewed. All relevant abstracts were placed in a folder for full-text review. After completing all searches, duplicates from the abstract review were deleted. Full-text articles were then reviewed to determine article relevance. Using Polit and Beck's (2017) taxonomy for evaluating article level and quality, the 10 articles with the highest level of evidence and relevance were selected for this literature review. A summary of these articles can be found in the appendix F to this work.

Evidence Base to Support Practice Change

To substantiate the choice of interventions used in evidence-based practice considering what has been noted in the literature regarding the topic is needed. The summary of the literature provided here and further explored in the appendix F to this work includes a consideration of the overall strength and quality of the information collected as well as a consideration of what each actual study demonstrated, the limitations of the literature, and the implications of the literature for the current quality improvement project. Examining these facets of the literature will provide the needed foundation to justify and build this quality improvement project.

Strength and Quality of the Information

Evaluation of the strength and quality of the evidence was made utilizing Polit and Beck's (2017) taxonomy for grading evidence. Assessment of the literature reviewed for this project demonstrates that when it comes to providing education for STI screening, one level I, systematic review/meta-analysis (Taylor et al., 2016) was identified along with two Level II randomized controlled trials (RCTs) (McKee et al., 2018; McNulty et al., 2014), and seven Level III quasi-experimental studies utilizing a pre-/post-intervention design (Alam et al., 2015; Buffomante et al., 2019; Lanier et al., 2014; Myers et al., 2017; Pillay et al., 2018; Samuel et al., 2021; Yoo & Vangrafeiland, 2018). Regardless of the methodologies utilized in each of the studies, collectively, the evidence acquired for this project indicates that provider education has a significant impact on increasing STI screening in various settings, including primary care practice (Alam et al., 2015; Lanier et al., 2014; McKee et al., 2018; McNulty et al., 2014; Myers et al., 2017; Pillay et al., 2018; Taylor et al., 2016), retail clinics (Samuel et al., 2021), and the emergency room (Buffomante et al., 2019; Yoo & Vangrafeiland, 2018). This indicates that primary, quantitative studies were utilized as the foundation for building this quality improvement project, suggesting a solid foundation upon which to build and implement the project.

Even though there is ample evidence to suggest that providers' education is effective for improving STI screening in women and young adults, it is essential to note that there are some gaps between the current literature and the proposed quality improvement project. As noted in the introduction to this work, the focus of this quality improvement project is to increase provider knowledge regarding STI screening when sexually active adults present with urinary symptoms. Although there is ample evidence to support the use of providers' education to

increase STI screening, only one study located for this literature review specifically considered the topic of STIs screening when patients present with urinary symptoms (Yoo & Vangrafeiland, 2018). The remaining studies primarily focused on general provider education and training to increase STI screening rates at various practice sites.

Additionally, when analyzing the data, it is necessary to emphasize that the present quality improvement project intends to raise provider knowledge about STI screening. Unfortunately, an overview of the literature indicates that this outcome measure—provider knowledge—was only evaluated in one study (Alam et al., 2015). However, it is worth noting that the current quality improvement project is constrained by time limitations, making it impossible to evaluate change in provider practice. For this reason, the project is focused on improving provider knowledge with the idea that this will lead to improvements in practice in terms of increasing STI screening rates when patients present with urinary symptoms. Consequently, it seems reasonable to argue that if STI screening rates among providers increase because of provider education, this is a formidable indication that knowledge and awareness of STI screening have indeed increased.

Overview of Individual Studies

With a general consideration of the evidence level and quality provided, it is now possible to review each study and evaluate its contribution to building the quality improvement project. For the purposes of this review, the decision was made to review each individual study based on the level of evidence beginning with Level I. As previously noted, there was one level I study conducted by Taylor et al. (2016). In this study, the authors conducted a search of MEDLINE to locate articles between January 1, 2000, and January 31, 2014, on the topic of clinic-based screening interventions to improve STI screening rates among medical providers.

This systematic review and meta-analysis included 38 articles that reviewed 42 different interventions. According to the authors, 33% of the studies reviewed included provider education as the basis for increasing STI screening rates. When comparing the programs and their outcomes, Taylor et al. reported that overall provider education resulted in a 20% increase in STI screening rates for patients.

Reviewing the Level II studies or randomized controlled trials located for this review also indicates positive outcomes for using provider education. More specifically, McKee et al. (2018) employed a provider training program to increase STI screening rates at 11 different general practice sites. The results were compared with ten similar sites where provider training was not offered. The results indicated that STI screening rates increased from 13% to 88% compared with controls at the sites where education was offered. This increase was noted to be statistically significant: $p = 0.0000$. McNulty et al. (2014) further utilized an RCT framework in which providers at 76 primary care sites were given STI screening education, and providers at 81 primary care sites were not offered this intervention. The results indicated a 1.76-fold increase in screening rates compared with control sites, which was statistically significant: 95% confidence interval (CI), 1.24 to 2.48. What is also important to note from this project is that these rates were 1.57 times higher nine months following the intervention: 95% CI 1.27 to 2.30.

Seven Level III studies involving the use of a quasi-experimental pre-/post-intervention design were also identified for inclusion in this literature review. Alam et al. (2015) utilized a sample of 225 primary care providers working in rural clinics to provide a 2-day educational program to increase providers' knowledge of STI screening rates. The study results indicate that before the educational intervention, only 3% of providers included in the study were able to pass the knowledge test provided by the authors. Following the completion of the educational

program, 94.9% of providers were able to pass the test, indicating that knowledge had increased substantially. Buffomante et al. (2019) utilized a similar design to evaluate the use of an educational program delivered to providers to increase STI screening rates in an emergency department. Utilizing the electronic health record, Buffomante and coauthors found that STI screening rates for gonorrhea and syphilis (the most common STIs) increased from 1% and 2%, respectively, to 31% and 37%, respectively, following the educational intervention.

Additional data provided by Lanier et al. (2014) and Myers et al. (2017) demonstrated similar results using a quasi-experimental design. Lanier et al. provided education to twenty-six healthcare providers working in a single healthcare system. Lanier et al., using data from the electronic health record system, were able to demonstrate that documented STI screening and sexual health history taking increased by 90% following the educational intervention. This was noted to be statistically significant: $p < 0.001$. Myers et al. further provided education to medical practitioners working at a single site: a college health center. Again, patient electronic medical records were used to assess STI screening rates before and after the intervention. More specifically, screening rates for gonorrhea and chlamydia were found to increase from 2% to 65.58% following education. Again, this represented a statistically significant improvement: $p = 0.000$.

The final three quasi-experimental studies reviewed for this project also demonstrated notable improvements in STI screening rates among providers following the use of education. For instance, Pillay et al. (2018) provided education at 52 primary care sites between 2009 and 2016 to increase STI screening rates. Across all practice sites, this resulted in a 16% increase in STI screening as evaluated through patient medical records: testing rate ratio (TRR) 1.16, 95%, CI 1.05 to 1.28, $p = 0.004$. Samuel et al. (2021) also provided education to eight medical

practitioners working at a single retail clinic and found that after one month following the intervention, STI screening increased by 67%. Data were collected from patient medical records, and the results were statistically significant: 95% CI -0.83 to -0.09; $p < 0.005$. Finally, Yoo and Vangrafeiland (2018) delivered educational intervention to all medical providers working in an emergency department. With the use of patient medical records, the authors found that STI screening rates for young adults presenting to the emergency room with urinary symptoms were more likely to be screened for STIs. The results were found to be statistically significant: $p < 0.001$.

Limitations of the Research

Although the evidence base included in this literature review does provide ample support for building and implementing the proposed quality improvement project, the reality is that there are some limitations to the research that needs to be considered when undertaking practice change. For example, as noted earlier in this review, most of the studies reviewed focused primarily on STI screening without considering urinary symptoms. Additionally, only one study was noted as focusing on increases in provider knowledge of STI screening. While these limitations are significant, the studies themselves carry with them further methodological limitations that need to be considered before implementing change.

Although Level I studies are considered to be the highest level of evidence to support practice change (Polit & Beck, 2017), the study conducted by Taylor et al. (2016) only included a search of one electronic article database (MEDLINE). The authors further imposed limitations on the timeframe for article publication. While this was more than likely done to make the search more manageable, the reality is that by expanding the timeframe and number of article databases used, it is possible that additional articles demonstrating contradictory results may have been

located. The Level II and Level III studies reviewed, also high levels of evidence for supporting practice change, had methodological weaknesses as well. Remarkably, these studies utilized small sample sizes and often included one site or multiple sites located in a similar geographical region. This limits the generalizability of the findings to all medical providers working in diverse healthcare settings. In short, it is not possible to state with certainty that education will be effective for increasing STI screening rates among all providers at all practice sites.

Also, it is important to note when reviewing the limitations of the studies reviewed here is the fact that while the two randomized controlled trials included do provide a means for demonstrating a cause-effect relationship between the educational intervention and increased STI screening rates, the seven quasi-experimental studies do not. All the quasi-experimental studies used in this literature review provided a comparison of outcomes before and after in the same population. No control groups were utilized for comparison. While the correlation between the educational intervention and increased knowledge or STI screening rates can be assessed based on the data collected, it is evident that it is not possible to evaluate causality from the data. This limitation is important to note as it cannot be stated with certainty that the educational intervention increased provider knowledge or STI screening rates.

Implications for Quality Improvement

Integration of the literature included in this review does provide a solid foundation to support the proposed quality improvement project. The evidence does indicate that providers' education to increase knowledge and STI screening rates are adequate. Additionally, the data suggest that the changes that occur because of education are both substantial and statistically significant. In terms of building the proposed quality improvement project, this data justifies the project and provides a foundation upon which to build the educational program delivered to

providers. Having such a robust foundation upon which to build practice demonstrates the importance of practice change and makes it imperative for Doctor of Nursing Practice (DNP) practice scholars to seek change and implement improvement such that the care of patients can be augmented. Through education, provider knowledge should increase, resulting in a systemic change in practice that will increase STI screening. This should have further effects leading to better patient health through early detection and treatment and better population health as the spread of STIs within the community is markedly reduced.

Synthesis of the Literature

Synthesis of the literature included in this review supports a solid foundation upon which to justify the use of a provider education program to increase STI screening rates in women between the ages of 18 and 36 years seeking medical services for urinary symptoms. While current evidence indicates that UTI symptoms often provide considerable accuracy for clinical diagnosis of this condition (Chu & Lowder, 2018), evidence also indicates that in the presence of a sexually transmitted infection, the diagnostic accuracy of clinical symptoms is unreliable (Sheele et al., 2022). This situation persists even if diagnostic testing for UTI is undertaken and indicates a positive result (Sheele et al., 2022). Without comprehensive STI screening to assess the presence (or absence) of STIs in the patient, there is no way to know for sure if urinary symptoms are solely caused by a urinary tract infection.

Perhaps most distressing about this situation is that providers are often unaware of the frequency of cooccurring UTI and STIs in clinical practice and therefore miss significant opportunities to engage in STI screening (Behzadi et al., 2019). This can have systemic implications for patient health, including exacerbating disease leading to PID or infertility, among other health conditions (Tsevat et al., 2017). Further, this situation has implications for

public health, including increased community spread of STIs and increased costs to treat these infections (Hull et al., 2017). More recently, evidence indicates that increased rates of STI transmission within the community, especially regarding *Neisseria gonorrhea* infections, have increased antimicrobial resistance to these pathogens, rendering the available treatment ineffective (Williams et al., 2021). The problem is so significant that global health agencies, including the WHO, are working to improve capabilities regarding both disease surveillance and reporting of STI antimicrobial resistance within the community (Tien et al., 2019).

Despite efforts to improve disease surveillance for STIs and community antimicrobial resistance to these infections, the reality is that without better prevention, the problem will continue to persist (Hull et al., 2017, Wiskirchen et al., 2016). Consequently, efforts are needed to increase STI screening rates within each community. As demonstrated in this literature review, there are myriad barriers to STI screening that exist at the patient, provider, and institutional levels. Patients may be unwilling to disclose personal information regarding sexual health and behavior (Hutchinson & Dhairyawan, 2017, St. Vil et al., 2019), while providers may be biased toward the topic and may believe that it is the patient's responsibility to disclose information regarding sexual health history (Flynn et al., 2016). Additionally, providers may lack knowledge and education to initiate conversations regarding sexual health and may lack standardized tools to make the process more efficient and effective (Kingsberg et al., 2019). Finally, healthcare facilities may be reluctant to provide the resources and time providers need to address sexual health among patients (Lanier et al., 2014; Kingsberg et al., 2019; Manninen et al., 2021). These structural issues can limit the ability of the provider to address these issues when providing frontline care for the patient.

Combined, it is evident that there are significant barriers to sexual health promotion and STI screening in the clinical setting. However, the literature reviewed here suggests that it may be possible to increase provider knowledge of the topic through provider education while also increasing STI rates in women who report urinary symptoms (Yoo & Vangrafeiland, 2018). Given the scope and strength of the evidence to support practice change and further the need to make a change to stop the spread of STIs within the community, there is an impetus to improve clinical practice through provider education. Without this support, providers may continue to miss critical opportunities for STI screening which can have systemic implications for improving public health.

Chapter III

Purpose/PICO Clinical Questions/Objective

With the realization that providers may be missing an opportunity to screen sexually active women for STIs when they present with symptoms of a UTI, there is an impetus to educate providers about this issue such that they are able to deliver better care and prevent the spread of STIs within the community. Current evidence indicates that approximately one million people are infected with STIs each year and the number continue to increase due, in large part, to the fact that screening for STIs consistently lags (Unemo et al., 2017). Based on this assessment and the fact that STIs are a leading cause of UTI in females, the purpose of this quality improvement project is to educate providers regarding STI screening in young sexually active females that present with symptoms of a UTI to walk-in clinics. This purpose provides a foundation for the construction of a clinical PICO (population, intervention, comparison, and outcome) question to guide the development of this quality improvement project. Specifically, the following PICO question was proposed:

- In healthcare providers working in walk-in clinics, does the use of an educational program regarding STI screening in sexually active women 18 to 36 years old who present with UTI symptoms increase knowledge as compared with knowledge before the educational intervention?

The PICO components included in this question can be further expounded upon as follows:

- P (population): The target population will involve healthcare providers, Advance Nurse Practitioners (APRNs), working in walk-in clinics.
- I (intervention): Educational program regarding the importance of STI screening in sexually active women 18 to 36 years old who present to the walk-in clinic with UTI symptoms, assessing APRNs' level of knowledge and appreciation for the significance of detecting STI in patients reporting UTI symptoms.
- C (comparison): Comparing the baseline knowledge of providers undergoing education with the post-education knowledge of providers regarding STI screening in sexually active female patients 18-36 years old who present with urinary symptoms at a walk-in clinic. Being able to recognize the importance of STI screening in these patients will improve the quality of care for our patients and community.
- O (outcome) increased APRNs' knowledge regarding the importance of STI screening in women 18-36 years old sexually active with UTI symptoms and to evaluate a strategy to facilitate STI test orders when appropriate after education intervention.

Based on this purpose and PICO clinical statement, the following objectives for the project articulated as SMART goals are proposed:

1. By late June 2022, develop a training module to educate providers at the walk-in clinic about the relationship between STIs and urinary symptoms in sexually active young women and the importance of STI screening in this population.
2. By late July 2022, assess baseline provider knowledge of STI screening and UTI symptoms in medical providers working at the walk-in clinics.
3. By early August 2022, use the approved educational module to provide training to all medical practitioners currently working at the walk-in clinics.
4. By mid-August 2022, assess post-education knowledge of STI screening and UTI symptoms in medical providers working at the walk-in clinics.

Chapter IV

Definition of Terms

Three terms relevant to this quality improvement project were identified for review: urinary tract infection, sexually transmitted disease, and sexual activity. Urinary tract infections are defined in the literature UTIs can include a group of infections that can include the bladder (cystitis), the urethra (urethritis), and the kidney (pyelonephritis) (Geerlings, 2016). Most patients who report urinary symptoms to their primary or urgent care providers typically have cystitis or urethritis, as pyelonephritis is often a more serious condition that requires emergency medical treatment (Geerlings, 2016). Therefore, for this quality improvement project, the term UTI refers to patients diagnosed with cystitis or urethritis.

The definition of sexually transmitted infection refers to an infection that is specifically transmitted through sexual contact and can be caused by viruses, bacteria, or parasites (Unemo et al., 2017). The term STI has replaced the term sexually transmitted disease (STD) in the literature (Unemo et al., 2017). Finally, the term sexually active refers to the process of engaging

in sexual relations and can involve any sex acts, including vaginal or anal intercourse or oral sex (Hevesi et al., 2017). Typically, when providers ask patients about sexual activity, the types and frequency of these events are discussed (Hevesi et al., 2017).

Chapter V

Conceptual Underpinning and Theoretical Framework of the Project

The conceptual underpinning and theoretical framework selected for the proposed quality improvement project was Lewin's theory of planned change. Scholars reviewing this theory argue that it can be effectively utilized to coordinate change that can be controlled and planned (Hussain et al., 2018). Lewin's theory of planned change has been used extensively in healthcare, primarily for quality improvement projects that have clearly defined stages (McCarroll, 2018). The theory of planned change includes three stages that can be used to guide project implementors through the change process by organizing and grouping activities geared toward project success (Rosenbaum et al., 2018). The stages include unfreezing, which involves determining what supports are needed to make the change; moving, which is focused on the implementation of the actual change; and refreezing, in which the change, if successful, is adopted as a part of standard operations within the organization (Rosenbaum et al., 2018).

Lewin's change theory was selected for use in the current project since the project clearly has defined activities that could be classified into the unfreezing, moving, and refreezing stages. Unfreezing included all the preparation to build the educational program for staff (APRNs) at the practice site. This includes reviewing the literature, identifying content for the presentation, and having the educational module and pre-/posttests validated for content. Moving, the stage in which change actually occurs, included assessing provider baseline knowledge of the change, providing education, and assessing provider knowledge following the intervention. Evaluation of

the results—i.e., a comparison of pre- and posttest data—could also be included in this stage. The final stage of Lewin's model—refreezing—would require a consideration of the success of the project to determine if the educational module should be retained. If the module is retained, education for providers would be included as part of the onboarding process for new hires. In addition, STI screening rates would be monitored to assess the impact of the educational module on patient outcomes. However, if the program does not yield the desired results—i.e., increased provider knowledge—this would serve as the basis for determining if the educational program should be revised or if the project should be discontinued because it has no merit for increasing provider knowledge.

Chapter VI

Methodology

Setting and Participants

The clinical site where the quality improvement project was implemented was the walk-in clinics at a local retail pharmacy chain, also known as retail clinics. The participants are the providers working there.

Organizational Assessment

The implementation of practice change requires considering what is needed to translate evidence into a particular clinical site (Fort et al., 2017). This quality improvement project focuses on providing education for healthcare providers working at a walk-in clinic regarding sexually transmitted infection (STI) screening in women between the ages of 18 and 36 years presenting with urinary symptoms. While urinary tract infections (UTIs) are among the most common infections diagnosed in clinical practice, evidence indicates that as many as half of patients with urinary symptoms may also have a STI (Behzadi et al., 2019). Providers may not be

aware of the association between urinary symptoms and STIs, leading to misdiagnosis of the patient and a lost opportunity to protect and improve public health (Behzadi et al., 2019). The proposed quality improvement project was implemented at the walk-in clinics at a local retail pharmacy chain. To guide the implementation of the project, a clear understanding of the project's goals, an assessment of the program structure, an organizational SWOT (strengths, weaknesses, opportunities, and threats) analysis, and a review of the conceptual underpinning for the project is needed.

Primary DNP Project Goal

As previously noted, the clinical site where the quality improvement project will be implemented are the Walk-in Clinics at a local retail pharmacy chain. The facility is operated by a local educational organization system and all providers working at the facility are employed, affiliated, or contracted with the Educational Organization System or its subsidiaries. Walk-in clinics provide patients with a cost-effective alternative to emergency care. They can offer services that range from diagnosis of common acute care issues such as otitis media or urinary tract infections to physical exams and vaccinations for travel (Chen et al., 2017). Although walk-in clinics are helpful for the management of acute or single care needs, these facilities have also become a foundation for the management of common chronic health conditions, including asthma, hypertension, and type 2 diabetes (Chen et al., 2017). The walk-in clinics currently offer care for these types of ailments and provide services without an appointment 7 days a week. Additionally, because of the current pandemic, the facility offers both virtual and in-person visits, depending on the patient's specific needs.

There are 12 walk-in clinics at the chain pharmacy located in the three counties (Miami, Broward, and Palm Beach). The staff consists of 26 nurse practitioners who work full-time and

twelve per diem nurse practitioners. Two full-time nurse practitioners are assigned to each clinic. They are supported by the Advanced Practice Provider Supervisor (APP), the Manager Administrator Operations, the Executive Director of Clinical Operations, and the Assistant Vice President for Connected Care. Additionally, a group of four collaborative physicians and the medical director. As noted, the facility operates seven days per week, and consistent staffing is needed to help ensure that a wide range of patient needs can be addressed through the care provided. Because the walk-in clinic is associated with a local educational organization, the parent organization's mission guides operations at the facility. The mission of the organization is unto provide state-of-the-art medical care in the South Florida community and beyond by delivering high-quality, compassionate care, transforming lives through innovative research, educating the next generation of medical leaders, promoting health and well-being of the community, and nurturing diversity and inclusivity. Even though the current medical staff at the facility are highly trained and qualified, recent evidence does indicate that most providers are unaware of the relationship between urinary symptoms and STIs, especially in sexually active young women (Behzadi et al., 2019). Consequently, provider education to fill this knowledge gap would more than likely be beneficial in a practice setting where providers commonly see patients with UTI symptoms. Based on this assessment, the primary Doctor of Nursing Practice (DNP) project goal for the proposed quality improvement project is to provide staff education to augment knowledge of STI screening in sexually active young women who present for treatment of a urinary tract infection.

Description of the Program Structure

The educational program to increase provider knowledge of the need for STI screening in sexually active young women who present to the walk-in clinic with urinary symptoms was

completed by the end of August 2022. This includes both pre- and post-education assessments of provider knowledge. Because each clinic has two full-time providers per clinic, it is anticipated that it could be possible to educate 100% of the providers in each clinic. It is further anticipated that the program's outcome will result in increased knowledge. This increased knowledge should result in a practice change to increase STI screening in the target population, as providers should be able to use the insight gained from the educational program to improve practice. While a review of the literature does suggest that the use of provider education can result in positive gains in provider knowledge of STI screening for the target population (Alam et al., 2015), most of the research conducted on provider education indicates that the increased STI screening rate is the most measured outcome (Myers et al., 2017; Pillay et al., 2018). However, increased STI screening rates indicate that the providers' knowledge and awareness of the issue have increased following education, suggesting that providers' knowledge increases following a training program.

To fully evaluate provider knowledge before (at baseline) and following the intervention, a knowledge questionnaire was provided via Qualtrics requesting providers to check if they agree to participate in the project. To minimize test bias, the questions on the pre- and post-intervention assessments were rearranged and reworded. Test bias has been shown to impact the validity of post-test assessments using the same instrument (Stetz, 2022). Therefore, by taking the steps mentioned earlier, it should be possible to ensure that differences in knowledge measured through the pre- and post-intervention assessments are reliable and valid. All evaluations of the knowledge assessment were provided as an in-kind donation from providers. Because the assessments were emailed, there were no costs associated with evaluating provider knowledge of STI screening.

SWOT Analysis

SWOT analysis of the organization was also conducted to ensure the success of the educational intervention when implemented at the walk-in clinics. SWOT analyses provide a temporal evaluation of an organization to facilitate an understanding of barriers and facilitators that may impact an organization's ability to adapt to change (Vlados et al., 2019). The strengths of the organization identified for this project include staff commitment to implementing evidence-based practice, the presence of a highly educated staff knowledgeable about evidence-based practice, and support from leaders to undertake the change. A commitment to providing the highest quality care coupled with the staff knowledge of evidence-based practice has been noted in the literature as effective facilitators of practice change (Duncombe, 2018). Additionally, leadership support for practice change should also foster the success of the proposed quality improvement project (Sunders & Vehviläinen-Julkunen, 2016).

Despite these strengths, some weaknesses were also noted. Per diem staff at the facility typically work on a less than part-time basis. This may have implications for the willingness of per diem staff to participate in education as engagement with the patient population may be lacking. Further, providers may not believe that the issue is a concern for their work and may find it challenging to approach patients about sexual health issues, especially if patients believe that they only have a urinary tract infection. Research consistently demonstrates that sexual health is often viewed as taboo, and providers often have difficulty addressing these issues (Graugaard, 2017). This may be of particular concern in a walk-in clinic where providers may not have established relationships with patients and are considered fast-paced services.

Even though these weaknesses are present, there are some opportunities for the intervention. Increased STI screening should lead to the early detection of these health issues,

resulting in better health outcomes for both patients and population health. Further, increased STI screening rates within the facility will enable providers to increase patient services, including counseling regarding safe sex practices. This will have implications for the patient and population health while also increasing revenues for the facility. Therefore, these opportunities are important for patient health and the financial well-being of the facility.

Threats to the project's success stem from issues including turnover among providers and the current COVID-19 pandemic, with the latter resulting in higher use of virtual healthcare. Turnover among staff at the facility may reduce the effectiveness of education as new providers hired for the facility do not have the knowledge of current providers regarding STI screening in women presenting with urinary symptoms. Further, due to the current COVID-19 pandemic, telehealth and virtual care are being provided with more frequency both at the facility and across the healthcare system (Doraiswamy et al., 2020). Additionally, research indicates that many patients often seek care for a UTI through various telehealth services based on the commonality of symptoms seem with this condition (Johnson et al., 2020). Therefore, if patients access care through the use of telehealth, STI screening, which requires in-person care, will be limited.

Description of Approach and Project Procedures

Using an internal email list of all medical providers currently working at the walk-in clinics, an email invitation was sent to providers to participate in the quality improvement project. The email included a general overview of the project and included information regarding what was expected of those who participate. The recruitment emails also included an attached informed consent. If a provider is interested in participating in the project, they only need to check the informed consent electronically. After all the interested providers checked the informed consent, these providers were officially enrolled in the quality improvement project,

and they were allowed to start the pretest questionnaire. The pretest included a four-digit record ID (participants needed to remember this record ID for the posttest, so pretest and posttest answers could be compared), the standard demographic section, and the pre-intervention knowledge assessment section. Participants were asked to complete these sections within) 4 weeks. All participants who completed the previous sections were invited to continue the next section. Next section included a link to a voice-over PowerPoint on STI, STI screening, the overlap between SIT and UTI symptoms, and actions that can be taken to help improve care through the discussion of sexual health with the patient. In addition, to the post-test assessment. Participants had four weeks to watch the presentation and complete the final post-intervention knowledge assessment. The post-intervention knowledge assessment was the same as the pre-intervention knowledge assessment, with the questions randomly rearranged and reworded.

Protection of Human Subjects

To protect human subjects, this quality improvement project included several safeguards. First, the project was approved by the Institutional Review Board (IRB) at Florida International University (FIU) to ensure that it was ethically sound and did not pose undue risks for the participant. Second, all medical providers from the walk-in clinics were asked to check if accepting giving consent to confirm that they understand their rights and the benefits and risks of project participation. Third, all participants were provided with the contact information of the principal investigator and were given the option to ask any questions regarding the project and to withdraw from the project at any time for any reason. Additionally, the blind carbon copy feature was used when emailing providers, and all email communication were sent through an encrypted server. These strategies helped to protect the privacy and confidentiality of project participants.

Data Collection

Data collection occurred using two forms: a demographic questionnaire and a pre-/post-intervention knowledge assessment. Participant chosen a four-digit record ID of their preference that they need to remember for the posttest to compare pre- and posttest answers. The demographic questionnaire included standard information regarding participant age, gender, race, number of years in practice, and current role within the organization. No personal identifying information regarding participants, such as names or telephone numbers, were collected. The pre-/post-intervention knowledge assessment contains 23 questions, with each one equally weighted. The knowledge assessment is based on the content of the educational presentation provided via voice-over PowerPoint. Questions on the posttest were randomly rearranged and reworded to reduce test bias, and the scores on the assessments were range between 0 and 100 points, with higher scores indicating better knowledge regarding the topic.

Data Management and Analysis

All data for the project was stored on a password-protected laptop to which only the investigator had access. Since Qualtrics software was used, no hard-copy data from the project needed to be stored. Qualtrics information was accessed via a password-protected laptop. Data was analyzed via Qualtrics and Excel. Data related to the project will be retained for 5 years following the completion of the project, and following this period, it will be permanently removed from the computer's hard drive.

Data analysis for the project included descriptive statistics to describe participant characteristics. This includes frequency, mean, and standard deviation. Scores from the pre-and post-test knowledge assessments were aggregated to provide a mean score for each phase of the project with standard deviation. The mean scores were compared to determine if the scores have

increased or decreased. Assessment of changes in scores provided insight into whether the intervention was successful in increasing the knowledge of providers regarding the topic.

Chapter VII

Results

The results from this project were tabulated using Excel. The data analysis began with the use of descriptive statistics to help identify the characteristics of the sample. A total of 24 nurses participated in the project, and the demographic data for the sample is summarized in Table 1. The data indicated that the sample was comprised of primarily female nurses (*n* = 22, 92%), between the ages of 35 and 45 (*n* = 8, 33%), and of Hispanic descent (*n* = 8, 33%). The average length of employment for nurses in the sample was 11 years with a standard deviation of 6.26. The average length of employment for nurses in a walk-in clinic setting was 7.74 years with a standard deviation of 4.46.

Table 1

Demographic Characteristics of the Sample (n = 24)

Demographic Variable	Result
Gender	
Female	*n* = 22 (92%)
Male	*n* = 2 (8%)
Age Range	
24-34 Years	*n* = 4 (17%)
34-45 Years	*n* = 8 (33%)
46-56 Years	*n* = 7 (29%)
> 57 Years	*n* = 5 (21%)
Race/Ethnicity	
White	*n* = 7 (29%)
African American	*n* = 5 (21%)

Demographic Variable	Result
Hispanic	*n* = 8 (33%)
Other	*n* = 4 (17%)
Average Length of Employment as Nurse	11 years (*SD* 6.26)
Average Length of Walk-in Clinic Employment	7.741 years (*SD* 4.46)

Descriptive statistics were also used to evaluate the mean pre- and post-intervention knowledge scores of nurses participating in the project. Pre- and post-intervention knowledge scores were recorded before and after the intervention and the average scores were tabulated. Table 2 includes an overview of the mean knowledge scores before and following the intervention. Figure 1 includes a bar graph comparing the pre-and post-intervention knowledge scores. It is possible to see that there was a significant increase in the mean knowledge scores from the pre- and posttest intervention, 9.875 and 19.5 respectively.

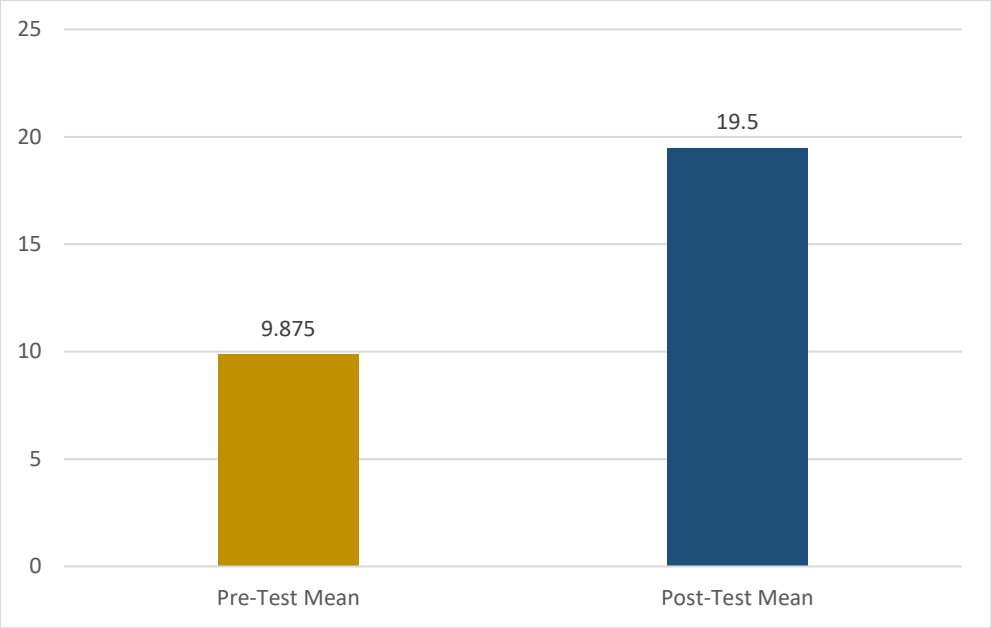
Table 2

Pre- and Post-Intervention Knowledge Scores

	Pre-Intervention	Post-Intervention
Mean Score	9.875	19.5
Standard Deviation	0.4563	0.5143

Figure 1

Pre- and Post-Intervention Knowledge Score Comparison (N = 24)



The bar graph included in Figure 1 indicates that mean knowledge scores did increase from the pre- to the post-intervention period. However, the data does not indicate if the results were statistically significant. To evaluate the statistical significance of the data, a paired *t*-test was undertaken. After evaluating the results of the paired *t*-test, the decision was made to the use *p*-value for the one-tailed *t*-test as the PICO question states that what was anticipated from the education was an increase in knowledge scores. This would suggest that a one-tailed test was conducted, indicating the use of the one-tail *p*-value. The value tabulated as $p < 0.000$. When compared with an alpha value of 0.05, this indicates that the results were statistically significant and were caused by something more than chance, i.e., the educational intervention provided to clinicians.

Chapter VIII

Discussion

With the results provided, it is possible to discuss the outcomes of this quality improvement project. Urinary tract infections are noted in the literature to be one of the most frequently reported infections in ambulatory care (Storme et al., 2019). Additionally, evidence indicates that UTIs are most common among women of childbearing age (Medina & Castillo-Pino, 2019). Unfortunately, urinary symptoms associated with a UTI may be the result of a sexually transmitted infection (Hoffmann et al., 2021). In fact, current evidence suggests that as many of half of all urinary tract symptoms reported by patients are caused by the presence of an STI (Behzadi et al., 2019). Provider education is essential to help increase awareness of this problem, and additionally, it could increase STI screening in women of childbearing age who present with urinary symptoms (McKee et al., 2018). Consequently, this quality improvement project sought to implement an evidence-based practice change (provider education) to increase provider knowledge of the topic. It was assumed that by increasing provider knowledge of the topic, it would be possible for providers to improve practice, including obtaining more thorough sexual health histories, and if needed, STI screening.

This quality improvement project was implemented at walk-in clinic setting. In this environment, acute and episodic care for health issues such as urinary tract infections are commonly delivered (Murray et al., 2020). It was anticipated that by providing clinicians in this setting with education about the overlap between UTI and STI symptoms and screening, it would be possible to reach a large number of patients who could potentially benefit from STI screening. It was further articulated and anticipated through the PICO question that knowledge scores for providers would increase following education. This outcome was achieved. The results from the

project indicate that mean knowledge scores increased from 9.875 before the educational intervention to 19.50 following the intervention. This increase was noted to be statistically significant following the comparison of pre- and post-intervention scores through a paired *t*-test. The identified *p*-value of < 0.000 was compared with an alpha value of 0.05 indicating that the changes in scores from the pre- to post-education phases of the project were not the result of chance.

Based on the results obtained from the project, it is possible to answer the PICO question that was identified as the foundation for this project. Specifically, the PICO question was identified as follows: In healthcare providers working in walk-in clinics, does the use of an educational program regarding STI screening in sexually active women 18 to 36 years old who present with UTI symptoms increase knowledge as compared with knowledge before the educational intervention? After reviewing the evidence and implementing this quality improvement project, it is possible to state with certainty that following provider education, knowledge of the topic did increase. Further, the results were statistically significant, suggesting that improved knowledge for providers was the result of the educational program. Consequently, this project provides an evidence-based solution to addressing the needs of patients with urinary symptoms who may also have a sexually transmitted disease. With this increased knowledge, providers will have the information needed to not only recognize patients with urinary symptoms who may benefit from STI screening but also be better prepared to approach these patients to discuss screening options leading to better quality care for the patient.

Sexually transmitted infections are common among women presenting with urinary symptoms (Gupta et al., 2017). However, providers may not always differentiate between these two specific health issues in practice leading to missed opportunities to prevent the spread of

STIs within the community (Behzadi et al., 2019). The education of advanced practice nurses regarding the topic should not only increase knowledge but also increase STI screening in the target population. Increased screening for STIs in women presenting with urinary symptoms should result in a reduction in the spread of these infections within the community. Over time this will have implications for both the health of the patient—preventing a medical sequela that could end in infertility and other health complications (Patel et al., 2021)—while also improving public health by reducing the spread of STIs and reducing rates of antimicrobial resistance (Tien et al., 2020). This indicates that by undertaking this project, the advanced practice nurse could have a positive and systemic impact on patient health, public health, and the entire healthcare system.

Limitations

Although the current project is an excellent example of the translation of current evidence into practice to improve outcomes for patients, the reality is that this quality improvement project is not without its limitations. The project was conducted at a single walk-in clinic site and utilized a relatively small number of healthcare providers ($N = 24$) in comparison with the large population of practitioners who typically provide care in this setting. This sample selection, which was based on a convenience framework, indicates that the sample was not randomly selected and is not representative of the larger population from which the sample was drawn. A lack of representativeness in the sample may limit the generalizability of the data (Stuart et al., 2018). Even though the results were obtained in a specific walk-in clinic, there is no guarantee that the same outcomes would result in a different walk-in clinic or in the context of a different healthcare setting: i.e., primary care (Stuart et al., 2018).

The project is also limited by the timeframe for implementation. Even though the results of the project do demonstrate that there was a statistically significant change in knowledge scores from the pre- to post-intervention phases of the research, the results do not indicate if provider behavior—including increasing STI screening—has changed as a result of education. This assumption was made based on the current literature indicating that provider education should increase STI screening rate (Myers et al., 2017; Pillay et al., 2018). However, this was not measured as a direct outcome for this project. Consequently, it is not possible to state with certainty that increased provider knowledge of the topic will definitively result in a change in behavior that will increase STI screening in the target population. A follow-up project to assess STI screening rates at the walk-in clinic would be needed to fully understand how the educational program impacted provider behavior in terms of screening women for STIs when presenting with UTI symptoms.

Limitations for the current project also stem from the lack of a control group to compare outcomes. Control groups are typically used in research to provide a matched comparison for research participants that have undergone a specific intervention (Marinescu et al., 2018). The idea is that if the only thing that varies between the two groups is the intervention, the results obtained from research are solely caused by the intervention. This cause-and-effect relationship is what supports decision making to implement a change in practice (Marinescu et al., 2018). In the present project, control or comparison groups were not used (Marinescu et al., 2018). As a result, it is not possible to state with certainty that the educational intervention caused the outcome of increased knowledge. While the tabulated *p*-value does indicate that the change in knowledge for providers enrolled in the project was caused by something more than chance,

without a direct control or comparison group, it is not possible to state with certainty that increased knowledge could be solely attributed to the educational program.

Implications for Practice

In spite of these limitations, the project is an evidence-based intervention that has been shown in the literature to be effective for increasing provider knowledge as well as STI screening rates (Myers et al., 2017; Pillay et al., 2018). Consequently, the results of this project do have implications for nursing practice, education, leadership, and administration. Further, it is helpful to consider the implications of this project for further exploration of the topic. This will help identify next steps in building the project for practice.

Nursing Practice

Considering first the implications of the project for nursing practice, it seems reasonable to argue that the results of this project can and should be added to the current evidence base on STI screening in sexually active females who present to their providers with urinary symptoms to support practice change in other ambulatory care settings. What was made evident through this project is the UTI symptoms are quite common in sexually active women and may not always be identified when patients provide subjective data regarding their symptoms (Behzadi et al., 2019). Sexual health history taking and discussing sexual health issues with patients can be problematic for providers who lack knowledge and training on the subject (Shindel et al., 2016). When this occurs, patients may be treated for a UTI when they actually have an STI. Because screening is the only way to confirm the presence of an STI, there is an impetus to implement a practice change based on the evidence, delivering provider education to help increase STI screening in the target population (Sheele et al., 2022).

Nursing Education

This project addresses pertinent educational concerns for healthcare providers. This includes education to recognize the difference between STIs and UTIs while also educating providers about how to better manage patient discussions about sexual health. As noted, provider knowledge of sexual health topics is often lagging, making it difficult for providers to discuss these topics openly with patients during care encounters (Shindel et al., 2016). Educating providers about these issues and encouraging providers to discuss sexual health topics with patients, this should help to both enhance provider knowledge of the topic while promoting a positive environment in which patients and providers can openly discuss topics related to sexual health (Pillay et al., 2018). In the context of nursing education, it, therefore, seems reasonable to argue that the current project should expand provider knowledge of sexual health topics, facilitating the ability of providers to offer patients the best possible care.

Nursing Leadership and Administration

The implications of this project also extend to nursing leadership. This project was developed as a result of identifying a problem in the practice site and making an evidence-based change to improve outcomes for patients. Without proactive efforts on the part of the principal investigator, the project would not have been developed or implemented in practice. Leadership was needed to not only initiate the project but also to bring team members together and to coordinated various aspects of the project. Nursing leadership is consistently highlighted in the literature as foundational to the advancement of the healthcare system and to the implementation of evidence-based practice (Schaefer & Welton, 2018). This project demonstrates the importance of these actions and the role that leadership will play in mobilizing healthcare staff to make change such that patient care outcomes can be improved.

The implications of the project for nursing administration must also be considered. Nursing administrators should recognize the value of evidence-based practice while advocating for practice change to improve every aspect of patient care (Tussing et al., 2018). This can be challenging for nursing administrators who are pressured to effectively manage budgets while determining which quality improvement or practice change problems should be addressed within the clinical setting. Nurse administrators need to be aware of the importance of evidence-based practice and the need to implement practice change as an integral part of improving the healthcare system. Administrators need to be open to reviewing evidence-based change proposals and must further work with organizational leaders to create a culture and climate in which evidence-based practice change is supported through actions such as providing resources and reducing institutional barriers to practice change.

It is also important to consider next steps in the development of the project. As noted, the project is limited by the fact that there was no control or comparison group and that the site and sample selected were based on a convenience framework. To increase the rigor of the project, a randomized controlled trial framework could be considered for use. This framework would include the use of a control group as well as random assignment of participants to intervention and control groups. Random assignment of healthcare providers to the educational intervention as well as using multiple sites would help to address some of the most pertinent limitations of this project, enhancing the reliability of the results. As part of this undertaking, an effort should also be made to include other types of practice sites including primary care clinics or emergency rooms. As an extension to the current project, data could also be collected on STI screening rates within the facility before and following education. It would be anticipated that STI screening

rates at the clinic should increase following education as more providers offer STI testing for women of child-bearing age who present with urinary symptoms.

Conclusion

Synthesis of the information included in this project clearly demonstrates that the use of evidence-based education to increase provider knowledge of STI screening in sexually active women of child-bearing age who seek care for UTI symptoms does work. Providers enrolled in this quality improvement project experienced a statistically significant improvement in knowledge of the topic following an educational program. The results obtained from the literature suggest that provider increases in knowledge will be translated to changes in practice that will increase STI screening in the target population. By increasing STI screening, this should have a systemic impact on patient health, public health, and the healthcare system. Early identification of STIs will prevent long-term health complications for the patient while reducing the spread of STIs within the community. Reducing community spread of STIs will improve public health while also reducing the costs to provide care. Cost savings will have benefits for all healthcare stakeholders. Consequently, this project demonstrates the importance of making evidence-based practice change to enhance care quality as well as patient and population health outcomes.

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Appendix A: IRB Approval Letter

FIU | FLORIDA INTERNATIONAL UNIVERSITY

Office of Research Integrity
Research Compliance, MARC 414

MEMORANDUM

To: Dr. Eric Fenkl
CC: Oly Mendez

From: Maria Melendez-Vargas, MIBA, IRB Coordinator

Date: July 11, 2022

Protocol Title: "A Quality Improvement Project: Provider education to increase knowledge of STI in sexually active females (aged 18-36 years) reporting symptoms of UTI at Walk-in clinics."

The Florida International University Office of Research Integrity has reviewed your research study for the use of human subjects and deemed it Exempt via the **Exempt Review** process.

IRB Protocol Exemption #: IRB-22-0322 **IRB Exemption Date:** 07/11/22
TOPAZ Reference #: 112048

As a requirement of IRB Exemption you are required to:

1) Submit an IRB Exempt Amendment Form for all proposed additions or changes in the procedures involving human subjects. All additions and changes must be reviewed and approved prior to implementation.
2) Promptly submit an IRB Exempt Event Report Form for every serious or unusual or unanticipated adverse event, problems with the rights or welfare of the human subjects, and/or deviations from the approved protocol.
3) Submit an IRB Exempt Project Completion Report Form when the study is finished or discontinued.

Special Conditions: N/A

For further information, you may visit the IRB website at http://research.fiu.edu/irb.

MMV/em

Appendix B: Letter of Support

UHealth Clinic
UNIVERSITY OF MIAMI HEALTH SYSTEM
at Walgreens

06/02/2022

Eric A. Fenkl, PhD, RN, CNE
Clinical Professor
Nicole Wertheim College of Nursing & Health Sciences
Florida International University

Dr. Fenkl,

We have received the invitation to participate in the quality improvement project of Mrs. Oly Mendez. Mrs. Mendez's project titled *"Provider education to increase knowledge of STI in sexually active females (aged 18-36 years) reporting symptoms of UTI at Walk-in clinics"* will fulfill the requirements to obtain the Doctor in Nursing Practice degree at Florida International University.

As per the project proposal, Mrs. Mendez will virtually develop her project in our setting at the UHealth Clinics at Walgreens. She will deliver an electronic invitation with the option to consent to participation in her project to our providers in the Walk-in Clinics. Additionally, a pre-test questionnaire, an educational intervention, and a post-test questionnaire will be sent online to prospective participants. The data collected will be kept confidential.

It is expected that Mrs. Mendez's activity will not interfere with the normal function of our clinics nor will it involve access to patients' medical records, following our clinics' standards of care and professional behavior. As Director of Clinical Operations at UHealth Clinic at Walgreens and Healthy Canes Clinics, I encourage the involvement of our walk-in Clinics in this initiative in order to promote the personal and professional development of our employees, as well as the well-being of our patients and the community.

Sincerely,

Sarah Flory MSN, APRN, FNP-BC
Director of Clinical Operations
UHealth Clinic at Walgreens and Healthy Canes Clinics
Ph: 954-483-4718
Email: swf22@med.miami.edu

Appendix C: Invitation to Participation Letter

Invitation to email participation in a quality improvement project: Provider education to increase knowledge of STI in sexually active females (aged 18-36 years) reporting symptoms of UTI at Walk-in clinics.

Dear Colleagues,

My name is Oly M. Mendez, and I am a DNP student from Florida International University. I am writing to invite you to participate in my quality improvement project. My project focuses on increasing provider knowledge regarding the presence of STIs in sexually active females who present to the Walk-in clinics with UTI symptoms. As providers working in Walk-in Clinics, you meet the criteria to participate in this quality improvement project since you can take care of sexually active females aged 18-36 years who present to you with UTI symptoms that can be an STI.

Your participation is highly appreciated since it can improve our quality of service; however, it is completely voluntary and anonymous. You can separate from the study at any time without retaliation and/or compensation for participation. To participate in this project, you will need to click and select if you agree or not to participate in this project. By checking below, you confirm that you understand and acknowledge your participation in this study. After agreeing to participate, you will need to complete a pre-test questionary that will take around 20 minutes. You will have access to the pre-test questionnaire. Later, you will have access to a voice-over PowerPoint educational presentation that will take approximately 60 minutes. After the

educational tool, you will be required to complete a post-test questionary that will take about 20 minutes of your time.

Your participation will increase our understanding of UTI vs. STI and its implications in healthcare, improving our quality of service. If you have any questions regarding this study, please do not hesitate to contact me at omend002@fiu.edu or 954-818-4491.

___ I agree; begin the study

___I do not agree; I do not wish to participate

Thank you and best regards,

Oly Mendez, APRN, FNP-BC

Appendix D: Informational Letter

A quality improvement project: Provider education to increase knowledge of STI in sexually active females (aged 18-36 years) reporting symptoms of UTI at Walk-in clinics.

The current quality improvement project focuses on increasing provider knowledge regarding STI presence in sexually active females who present to the Walk-in clinics with UTI symptoms. The study aims to assess and increase providers' knowledge regarding STIs in sexually active females who report UTI symptoms at the Walk-in clinics. After agreeing to participate, your participation will take about four (4) weeks.

You will need to complete a pre-test questionary that will take around 20 minutes and be open for two (2) weeks; later, you will have access to a voice-over PowerPoint educational presentation that will take approximately 60 minutes. After the educational tool, you will be requested to complete a post-test questionary that will take about 20 minutes of your time, and you will have two (2) more weeks to complete the educational module and the post-test sections.

Your participation is voluntary, and as an alternative, you can choose not to participate in this project. This project's data will be kept confidential and secured. Your participation is entirely voluntary and anonymous. You can separate from the study at any time without retaliation and/or compensation for participation. No risk or discomfort is expected to occur. However, as a benefit, it is expected to increase knowledge regarding UTI vs. STI and its implications in healthcare which can improve our quality of service.

If you have any questions regarding this project's purpose, procedures, or other issues, please do not hesitate to contact me, Oly Mendez, at omend002@fiu.edu or 954-818-4491. Also, you can contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu if any questions regarding your rights to be part of this study or about ethical issues with this project.

Please read the whole text carefully before clicking for the participation agreement.

Click here for agreement participation:

___ I consent, begin the study

___I do not consent; I do not wish to participate

Thank you,

Oly Mendez, APRN, FNP-BC

Appendix E: Pretest and Posttest: Introduction

"A Quality Improvement Project: Provider education to increase knowledge of STI in sexually active females (aged 18-36 years) reporting symptoms of UTI at Walk-in clinics."

The present questionnaire is an integral part of a quality improvement project designed to provide education to increase knowledge regarding the presence of STI in sexually active females, especially in 18-36 years old, who report symptoms of UTI at Walk-in clinics.

You will be request to please, answer to all questions the best of your knowledge and provide a four (4) numbers record ID of your preference for Qualtrics to match pre and post-test answers. Your input will aid in identifying possible knowledge gaps and improvement opportunities to test and treat STI in sexually active female with UTI symptoms. The questionary's intention is to assess your awareness, comfort, and knowledge, regarding the presence of STI in sexually active female patient who present to Walk-in Clinics with UTI symptoms.

- ***Please do not provide any personal information such as your name, location, etc. in this questionnaire. It just requires a four number records id of your preference.***
- ***All your answers are anonymous and will be kept confidential. The four number record id of your preference is merely to match pre-test and post-test answers to obtain the best possible data. Please remember this number for the post test.***
- ***Your participation is 100% voluntary and will not have any bearing on your position and no compensation will be provided.***

Thank you for your participation, your participation is very appreciated.

Appendix E: Pretest and Posttest

Demographics: Instructions

Please select a four (4) number record id of your preference and save it for the post-test. If the system does not allow you to save your record id, please select another one, it could mean it is already taken.

Record Id: _ _ _ _

Gender: Female____ Male____ Other____ Please not to disclose____

Age: 24-34 yrs.____ 35-45yrs.____ 46-56 yrs.____ >57 yrs.____

How long have you been working as a NP? _____

How long have you been working at a Walk-in Clinic? _____

Race/Ethnicity: White____ Black____ Hispanic____ Haitian____ Asian____ Other____

Pre-/Posttest

True and False: Instructions

Review each of the statements below. Select the correct answer.

1. One every five Americans has an STI.

   True False

2. Chlamydia, gonorrhea, and herpes are the most common STIs.

   True False

3. 50-60% of all women will experience a UTI at some point in their lives.

   True False

4. Healthcare providers routinely perform sexual health screening.

   True False

5. Sexually transmitted infections can be diagnosed based solely on symptoms and physical exam of the patient.

   True False

6. Men and women may experience different UTI symptoms.

   True False

7. STIs and UTI can cooccur.

   True False

8. A patient's symptoms can be used to confirm a diagnosis of UTI.

   True False

9. Sexually transmitted infections are not very common.

   True False

10. If left untreated STIs can lead to infertility in women.

    True False

11. Do you believe you would be more prompt to order an STI test if easy access to UTI screening (ex: lab orders included in the UTI express lane) were available when sexually active female patients come to the clinic with UTI symptoms?

    True False

Multiple Choice: Instructions

Review the statement/question. Select the correct answer.

12. STIs are present in ____ of patients reporting urinary tract symptoms.

    A. 35%

    B. 50%

C. 65%

D. 75%

13. UTIs most frequently occur in:

    A. Young women and men between the ages of 15 and 25 years.

    B. Older men and women over the age of 65 years.

    C. Young women between the ages of 18 and 39.

    D. Women undergoing menopause.

14. Patients with UTIs may have similar symptoms that can include all of the following EXCEPT:

    A. Genital rash

    B. Lower abdominal pain

    C. Dysuria

    D. Cloudy urine

15. What is the most effective method for diagnosing STIs in patients presenting with urinary symptoms?

    A. Physical exam.

    B. Subjective symptoms reported by the patient.

    C. Taking a sexual health history.

    D. STI screening test.

16. What are the consequences of failing to detect a treat an STI (Select all that apply)?

    A. Pelvic inflammatory disease.

    B. Increased community spread of STIs.

    C. Antimicrobial resistance.

    D. Reduced disease surveillance.

17. Which demographic group is most likely to contract an initial STI?

    A. Adolescents and young adults between the ages of 15 and 24 years.

    B. Adults between the ages of 25 and 35.

C. Adults between the ages of 40 and 50 years.

D. Adults over the age of 65.

18. Which group is likely to have or have had an STI.

A. Adolescents and young adults between the ages of 15 and 24 years.

B. Adults between the ages of 25 and 35.

C. Adults between the ages of 40 and 50 years.

D. Adults over the age of 65.

19. What is the most prevalent STD?

A. Chlamydia.

B. Gonorrhea.

C. HIV.

D. HPV.

20. All of the following symptoms are commonly associated with an STI EXCEPT:

A. STIs can be asymptomatic.

B. Dysuria.

C. Fever.

D. Lower abdominal pain.

21. Which groups should be screened for UTI when presenting with urinary symptoms:

A. Older adults who are sexually active.

B. Women of childbearing age who are sexually active.

C. Adolescents who are sexually active.

D. All of the above.

22. How often do you perform STI testing in sexually active female patients who come to the clinic concerned about UTI symptoms?

A. Always

B. Regularly

C. Sometimes

D. Never

23. How comfortable do you feel performing a brief sexual history on sexually active female patients concerned about UTI symptoms?

A. Very comfortable

B. Comfortable

C. Somewhat comfortable

D. Not comfortable

Appendix F: Literature Matrix

Author/ Year	Purpose/ Problem/Objective/ Aims	Study Design	Sample (Setting)	Data Collection Measures	Results	Strengths/ Limitations	Relationship to Project	Level of Evidence
Alam et al. (2015)	To understand the level of knowledge and skills among healthcare providers in STI screening and management before and after a 2-day educational program	Quasi-experimental before/after design	225 practicing medical providers delivering care in rural primary care clinics	Knowledge of STI screening and management via a tool developed by the authors	Before the educational intervention, only 3% of providers could pass the knowledge test. Following the education, 94.9% passed.	**Strengths**: Demonstrates knowledge gained and usefulness of provider education in primary care practice. **Limitations:** Small sample limits generalizability. Instrument to evaluate knowledge not validated.	Shows the importance of education in improving provider knowledge which is the focus of the project.	Level III
Buffomante et al. (2019)	To assess the practical impact of provider education to increase STI screening rates among women seeking care in a community-based	Quasi-experimental before/after design	Education provided to all personnel working in the emergency department. Emergency room	Electronic health record and patient charts to assess STI screening/ testing rates	STI screening for gonorrhea and syphilis increased from 1% and 2%, respectively to	**Strengths**: Article demonstrates the impact of provider education on clinical practice.	While this research does not demonstrate increases in provider, this is implied through	Level III

	emergency department.		department encounters were evaluated: 24,427 before the educational intervention and one month after the intervention 1,590 screening tests were performed	for different STIs.	31% and 37%, respectively.	Large sample of events reviewed. **Limitations**: Focus on only one facility, limits generalizability. No external controls to prove causality.	increased screening rates.	
Lanier et al. (2014).	The purpose of this research was to evaluate increases in STI screening rates for providers that received education on the topic.	Quasi-experimental before/after design	26 practicing physicians working in a single healthcare system	Electronic health record to assess STI screening rates before and after the educational intervention	Documented STI screening and sexual health history taking increased by 90% from 60 to 114 following education: p = 0.0001	**Strengths**: Strong statistical evidence demonstrating the use of education to increase STI screening. Rigorous training program used. **Limitations**: Small sample drawn from a single site limits the application of the results to all providers. No control to	While this research does not demonstrate increases in provider, this is implied through increased screening rates.	Level III

						demonstrate causality.		
McKee et al. (2018)	To evaluate STI screening rates of providers working at 11 primary care sites where training was provided and 10 where training was not provided	Randomized controlled trial	11 primary care sites where training was provided and 10 where training was not provided. No information regarding number of providers trained was included.	Electronic health record to assess STI screening rates before and after the educational intervention	At sites where education was provided, screening increased from 13% to 88% and no change was found at non-education sites: p = 0.0000	**Strengths**: Robust data demonstrating causality of the intervention. Education increases screening rates of STIs in young women. **Limitations**: Sample clustered in New York. Data may not be applicable outside of this area. Use of data from women only.	While this research does not demonstrate increases in provider, this is implied through increased screening rates.	Level II
McNulty et al. (2014)	To assess the use of practice-based education to increase STI screening rates in primary care practices	Cluster, randomized controlled trial	76 intervention sites where education was provided and 81 control sites where education was not provided.	Electronic health record to assess STI screening rates before and after the educational intervention.	Following the intervention, STI screening use among providers was 1.76 times higher (CI 1.24 to 2.48) when compared with controls.	**Strengths**: Demonstrates causality for the intervention. Large sample used. **Limitations**: Primary practice sites only used.	While this research does not demonstrate increases in provider, this is implied through increased screening rates.	Level II

					This persisted for 9 months post intervention: 1.57 times (CI 1.27 to 2.30).	No blinding of participants.		
Myers et al. (2017).	The purpose of this research was to assess the use of provider education to increase gonorrhea and chlamydia infections in college students aged 25 years and younger.	Quasi-experimental before/after design	A single college campus. Pre-intervention screenings 530 and post-intervention screenings 364. Total number of providers educated no included.	Electronic health record to assess STI screening rates before and after the educational intervention.	STI screening rates from gonorrhea and chlamydia increased from 2% before the intervention to 65.85% following the intervention: *p* = 0.000.	**Strengths**: Demonstrates significant gains in provider screening through education. Statistically significant results. **Limitations**: No control to demonstrate causality. Small sample from single setting serving only college students.	While this research does not demonstrate increases in provider, this is implied through increased screening rates.	Level III
Pillay et al. (2018)	To examine the impact of the SHIP (Sexual Health in Practice) training program on SIT screening rates in primary care practices in London	Quasi-experimental before/after design	A total of 52 primary practices received training between 2009 and 2016. The total number of	Electronic health record to assess STI screening rates before and after the educational intervention	Testing rates increased by a total of 16% across all practices combined: testing rate ratio (TRR)	**Strengths**: Demonstrates positive results for practice across multiple sites. Robust results.	While this research does not demonstrate increases in provider, this is implied through	Level III

			providers was not included.		1.16, 95%, CI 1.05–1.28, p = 0.004	**Limitations**: No control to demonstrate causality.	increased screening rates.	
Samuel et al. (2021)	To evaluate the use of screening tool education to increase STI screening rates at a retail health clinic	Quasi-experimental before/after design	Eight medical providers working at a retail clinic	Electronic health record to assess STI screening rates before and after the educational intervention	Testing rates increased at the facility 1 month following the intervention by 67%, 955 CI -0.83 to -0.09; $p <$ 0.005	**Strengths**: Marked increases in STI screening rates following education. Results statistically significant. **Limitations**: Small sample at a single type of healthcare facility. Results may not be generalizable.	While this research does not demonstrate increases in provider, this is implied through increased screening rates.	Level III
Taylor et al. (2016)	Evaluation of the literature to determine which interventions work best for increasing STI screening rates in clinic-based settings	Systematic review/meta-analysis	38 articles including 42 different interventions	Search of MEDLINE fore articles between January 1, 2000, and January 31, 2014. Publications using clinic-based	33% of the studies utilized some form of provider education and were found to be effective for improving STI screening rates at low cost. Effective	**Strengths**: Demonstrates effectiveness of education and its impact on STI screening rates. **Limitations**: Only one database used for searching with	While this research does not demonstrate increases in provider, this is implied through increased screening rates.	Level I

				screening interventions.	was noted to be a > 20% increase in screening rates.	limited time frame.		
Yoo & Vangrafeiland (2018)	To assess the use of an educational program to increase STI screening in patients presenting with urinary symptoms at an emergency room	Quasi-experimental before/after design	Single emergency room site. All providers educated. Specific number of providers not included.	Electronic health record to assess STI screening rates before and after the educational intervention.	Following education young adults presenting with urinary symptoms were more likely to be screened for STIs: ($p \leq 0.001$)	**Strengths**: Demonstrates that education works. Results statistically significant. **Limitations**: Single site. No comparison to demonstrate causality for education.	While this research does not demonstrate increases in provider, this is implied through increased screening rates.	Level III