

INCREASING ASYMPTOMATIC CHLAMYDIA SCREENING IN THE ED

A Scholarly Project

Submitted to the

Faculty of Liberty University

In partial fulfillment of

The requirements for the degree

Of Doctor of Nursing Practice

By

Mikyung Kim

Liberty University

Lynchburg, VA

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Scholarly Project Chair Approval:

Dr. Vickie Moore, RN, DNP, FNP-C

ABSTRACT

The Centers for Disease Control and Prevention (CDC) recommends chlamydia screening in young women and others who are at risk based on scientific evidence related to the effectiveness of screening to prevent chlamydial infection. Female patients may visit the emergency department (ED) with symptoms such as urethritis, abdominal pain, or vaginal spotting. For men, most complaints are urinary problems, discharge from the penis, and testicular pain. However, most infected patients are never symptomatic and have no abnormal physical findings. Therefore, the question that spurred this project was, “Why aren’t asymptomatic patients screened more often?” Furthermore, “Why are the CDC screening guidelines for chlamydia often not followed by providers?” The purpose of this evidence-based project was to provide an educational intervention to health care providers in the Emergency Department (ED) about the CDC guidelines for chlamydia screening and to encourage them to screen eligible asymptomatic patients in a Bronx community-based ED. As a result of the educational intervention, there was a significant improvement of the ED providers’ knowledge of the CDC guidelines; however, the screening rate remained low. During the period after the educational intervention, the ED participants did not satisfactorily comply with the CDC guidelines; however, ED participants consistently demonstrated their willingness to perform the chlamydia screening for eligible patients. This finding indicates a need for frequent education on the CDC guidelines on the importance of chlamydia testing to effectively improve the screening rates.

Keywords: chlamydial infection, chlamydia screening, emergency department

Acknowledgments

The years of this Doctor of Nursing practice journey have challenged me to grow, not only as a doctorally prepared nurse practitioner, but also as a person who gained deeper relationship with the LORD. I could always feel God's presence and help to get me through this long journey whenever I was in distress.

I would like to thank my DNP chair, Dr. Moore; without her persistent guidance and encouragement, I could not have completed the scholarly project. I would like to thank my mom, my sister, and brother, who supported me during the time I needed emotional support. I would like to thank to my young friends, Zoey and Myeong, for helping with the last parts of the project. Last but not least, I must remember my friend, YoungJin, who is in heaven. I miss you and love you.

Table of Contents

ABSTRACT.....	3
Acknowledgments.....	4
List of Tables	8
List of Figure.....	9
List of Abbreviations	10
SECTION ONE: INTRODUCTION	11
Background	12
Problem Statement	13
Purpose of the Project	13
Clinical Question	14
SECTION TWO: LITERATURE REVIEW	14
Search Strategy	14
Critical Appraisal	14
Synthesis	15
Conceptual Framework	19
Summary	21
SECTION THREE: METHODOLOGY.....	21
Project Design.....	21
Measurable Outcomes.....	22
Setting and Population	22
Ethical Considerations	23
Data Collection	24

Tools	24
Intervention	24
Timeline	25
Feasibility Analysis.....	25
Data Analysis	26
SECTION FOUR: RESULTS.....	26
Descriptive Statistics.....	27
Measurable Outcome 1	27
Measurable Outcome 2	29
Post-Intervention Survey and Results.....	31
SECTION FIVE: DISCUSSION	31
Implication for Practice.....	31
Sustainability.....	33
Limitations	34
Dissemination Plan	35
Summary	35
References	37
Appendix A.....	43
Appendix B	59
Appendix C	60
Appendix D.....	62
Appendix E	64
Appendix F.....	65

Appendix G.....	66
Appendix H.....	67

List of Tables

Table 1. Demographic Characteristics of ED Providers	27
Table 2. Correct Responses on the Pre-Educational Questionnaire and Post-Educational Questionnaire	28
Table 3. Relationships Between the Pre and Post Educational Intervention	29
Table 4. Total ED Patient Visits and Chlamydia Screening Categories	30

List of Figure

Figure 1. Screening Rate.....30

List of Abbreviations

Centers for Disease Control and Prevention (CDC)

Chlamydia/Gonorrhea (CT/GC)

Emergency Department (ED)

Evidence-Based Practice (EBP)

Nurse Practitioner (NP)

Pelvic Inflammatory Disease (PID)

Physician Assistant (PA)

Post-Education Intervention Questionnaire (PEIQ)

Randomized Controlled Trials (RCT)

Sexually Transmitted Infection (STI)

Sexually Transmitted Disease (STD)

SECTION ONE: INTRODUCTION

With the number of chlamydial infections increasing every year, the impact of the disease on society has become a great concern for public health care. In 2017, the Centers for Disease Control and Prevention (CDC; 2017) reported 1.7 million active cases of chlamydia in the United States, an increase of 22% since 2013. In 2013, the estimated direct lifetime cost of treatment for chlamydia and associated complications was \$516.7 million (Owusu-Edusei et al., 2013). Two thirds of new chlamydial infections occur among younger persons aged 15–24 years. Females have nearly twice the rate of chlamydia as males (CDC, 2017). Chlamydia is one of the most common diseases, but it is preventable. Untreated chlamydial infections can lead to serious complications and potential long-term damage to a woman's reproductive system. Chlamydial infection is a public health issue because it is associated with increased rates of transmission of and susceptibility to other sexually transmitted infections (STIs) such as syphilis, gonorrhea, human papillomavirus, and human immunodeficiency virus infection.

The chlamydia rate in the Bronx, New York, has remained higher than other New York City boroughs. According to the New York State Department of Health (2017), in 2017, the number of chlamydia cases per 100,000 people in the Bronx was 1127.9, while the number for Manhattan was 939.5, and 358 for Long Island. In 2019, one emergency department (ED) in the Bronx found eight, 10, and 14 cases of chlamydial infection in March, April, and May, respectively. Each year, the number of cases of chlamydial infection has increased at that hospital.

The CDC (2017) guidelines recommend annual chlamydia screening of all sexually active women aged <25 years, as is screening of older women at increased risk for infection (e.g., those who have a new sex partner, more than one sex partner, a sex partner with concurrent

partners, or a sex partner who has a sexually transmitted infection. All pregnant women aged <25 years and older pregnant women at increased risk should also be screened. Screening of sexually active men should be considered in clinical settings with a high prevalence of chlamydia (e.g., adolescent clinics, correctional facilities, and STD clinics) or in populations with high burden of infection (e.g., men who have sex with men).

Background

Chlamydia trachomatis, also known as chlamydia, is the most common bacterial STI worldwide. Chlamydia is transmitted from person to person during unprotected sexual contact with the vagina, penis, mouth, or anus of an infected sexual partner (CDC, 2017). Many chlamydial infections are asymptomatic. Screening can be the first strategy to early detection and treatment. The prevalence of chlamydia varies with age, race, gender, ethnicity, and county, according to national chlamydia surveillance systems (CDC, 2017). Risk factors for infection include new or multiple sex partners, a history of STIs, presence of another STI, and inconsistent condom use (Ghanem & Tuddenham, 2017).

Chlamydia screening in women is conducted using urine, endocervical, or vaginal samples, while for men, the screening method of choice is a urine sample. Screening for chlamydia in the rectum and pharynx can be performed in persons who are at risk for infection at those sites. Chlamydia testing can be done in a doctor's office, a community health clinic, the health department, or a local Planned Parenthood health center.

The CDC (2017) recommends azithromycin as primary therapy for the treatment of uncomplicated genital chlamydial infections. Single-dose therapy of one-gram oral azithromycin is the first choice of antibiotic for all patients, including pregnant women. Sex partners of those infected should get treated to prevent re-infection of the original patient. Untreated chlamydial

infections can lead to serious complications such as urethritis, cervicitis, pelvic inflammatory disease (PID), ectopic pregnancy, and potential long-term damage to a woman's reproductive system, including infertility (Menon et al., 2015). Untreated chlamydia in pregnant women can lead to an increased risk of preterm delivery (CDC, 2016), as well as ophthalmia neonatorum (conjunctivitis) and pneumonia in the newborn (CDC, 2017). For men, chlamydial infection can cause urethritis, acute epididymitis, chronic prostatitis, reactive arthritis (CDC, 2017), and male infertility (Redgrove & McLaughlin, 2014).

Problem Statement

Even though chlamydia screening has improved over the past decade, lack of awareness of the CDC guidelines among health care providers is still an important concern. The screening rates for *Chlamydia trachomatis* among young women who have no sexually transmitted disease (STD)-related symptoms in the ED remain low despite the recommendations of screening by the CDC.

Currently, the rate of chlamydial infection in the Bronx is a growing problem. The evidence shows that screening asymptomatic patients in the ED who meet the CDC criteria has been an effective method for reducing chlamydial infection.

Purpose of the Project

The purpose of this scholarly project was to increase providers' understanding of the CDC guidelines for chlamydia screening and increase screening rates in asymptomatic patients in the ED. The ED would be a good place for STD screening to identify undiagnosed infections, especially for those patients who meet the CDC criteria for screening and are currently asymptomatic. Testing in the ED will increase early identification and facilitate treatment of diagnosed patients and their sexual partners.

Clinical Question

For health care providers located in an urban ED, does an educational intervention focusing on the CDC guidelines for screening for chlamydia, compared to current knowledge on screening, lead to increased overall knowledge and increased screening rates for chlamydia in asymptomatic patients in the ED?

SECTION TWO: LITERATURE REVIEW**Search Strategy**

The main search engines used were the Cumulative Index of Nursing and Allied Health Literature, PubMed, and ProQuest Nursing and Allied Health Database. The key words searched were *chlamydial infection*, *chlamydial screening*, and *emergency department*. The search was limited to full-text research studies, the English language, and the years 2013–2019. The search strategy identified a total of 102 references, but the articles were narrowed based on the quality of the literature, relevance to alternative areas of screening, type of study, and published date. Ultimately, the search yielded 29 related articles which were used for the literature review.

Critical Appraisal

Each article was reviewed using a summary and synthesis tool and examined for levels of evidence according to Melnyk's Level of Evidence (Melnik & Fineout-Overholt, 2005). The literature findings included systematic reviews, clinical practice guidelines, controlled trials, mixed-method studies, and observational studies which pertained to chlamydia testing and the at-risk, uninsured population. The CDC guidelines for screening of chlamydia are scientific, evidence-based recommendations developed by the workgroup's research, a second independent panel of public health and clinical experts' review, and other professional organizations (CDC, 2015). Explanations of the ratings and of the strength of evidence are given in Appendix A.

All studies included in the evidence table (Appendix A) were published in peer-reviewed literature. The main purpose of most studies was to identify the prevalence of chlamydial infection in the young female population, assess providers' understanding of the CDC guidelines for chlamydia screening, or increase screening rates in asymptomatic patients in EDs. The majority of studies ($n = 24$, 82.8%) were conducted in the United States. Several studies ($n = 8$, 27.6%) reported data relating to EDs. However, the results reported within the systemic reviews with meta-analyses were consistent with the data from the ED studies. Studies have detailed the lack of translation of the CDC guidelines into clinical practice (Carlson, Tschann, Santibenchakul, Hurwitz, & Salcedo, 2017; Goyal, Witt, Hayes, Zaoutis, & Gerber, 2014). These studies were retrospective chart reviews, but they extensively discussed the importance of physicians' adherence to the CDC guidelines. Only three of the 26 randomized controlled trials (RCTs) reported that a similar intervention provided an effective outcome. Sixteen studies provided detailed information for chlamydia prevalence within specific demographics (two level I and one level IV), physician nonadherence (two level V and one level IV), the relationships of chlamydia and PID and infertility (four level I and one level V), and interventions to increase screening (three level III, two level IV). The CDC guidelines are significant because they are backed by evidence. One RCT study conducted in France did not provide sufficient information about the findings because the research is still in progress. Two studies had limited scientific methods which resulted in low quality.

Synthesis

Most chlamydial infections are asymptomatic in both women and men (CDC, 2015; Morhason-Bello et al., 2014). Because of the resultant outcome of untreated chlamydia, the importance of effective STD screening to identify early chlamydial infection was evident in the

literature (Anaene, Soyemi, & Caskey, 2016; CDC, 2015). These studies indicated that the screening for asymptomatic patients should become a standard in today's evidence-based practice (EBP). Screening offers an important and promising adjunct for patients' sexual health. By screening, providers can be sure they are basing important treatment decisions on evidence and that they are providing the best care. Clearly, implementation of asymptomatic STD screening would be a significant benefit to providers' ability to detect and treat chlamydial infection, and screening would have a positive impact on patients' quality of life.

Untreated chlamydia and complications. *Chlamydia trachomatis* is the most common STD in the United States. The actual number of chlamydial infections probably exceeds three million annually because of undetected and untreated infections associated with asymptomatic patients in most cases (Wiesenfeld, 2017). People between 15 and 24 years of age have the highest reported rates of chlamydia, with these rates being higher in women than in men (CDC, 2015). Because of the significant impact of untreated chlamydial infection on reproductive systems, many studies of patients who are infected with chlamydia have shown long-term clinical sequelae of chlamydial infection in women including cervicitis, PID (Gottlieb, Xu, & Brunham, 2013), and infertility (Morhason-Bello et al., 2014). Tamarelle et al. (2017) found that the early screening and treatment for chlamydia in young women less than 25 years of age may reduce the incidence of PID. A study by Morhason-Bello et al. (2015) showed a higher proportion of chlamydial infection in women with infertility secondary to a tubal blockage (20.5%). These studies consistently demonstrate the need for routine chlamydia screening according to the CDC guidelines. The identification of a chlamydial infection can make a difference in the quality of life experienced by infected women. It is important for all providers

to comply with the CDC guidelines to prevent the serious impacts the infection can cause on patients' health and reproductive systems.

Lack of testing by providers. Chlamydia screening may be primarily a provider's decision in clinical settings. Pickett et al. (2018) found physicians to be inadequate in following CDC guidelines for sexually active adolescents in pediatric EDs. The study sought to measure physician adherence to the CDC guidelines for specimen collection and testing for chlamydia with both symptomatic and asymptomatic female patients. A limitation to the study was that only 22.3% of potential participants responded to a mailed survey, and it is possible that not all physicians were identified for inclusion in the survey. The study concluded that the CDC guidelines for chlamydia testing for adolescents in the ED were not adhered by physicians. Many providers appeared to lack recognition of the value of screening (Gift & Hogben, 2016). In their studies, the authors discussed the significant need to implement chlamydia screening according to the CDC guidelines. Despite the high prevalence of chlamydial infection in asymptomatic patients, such screening is not routinely performed due to lack of awareness of the CDC recommendations. The screening should be recognized as important in clinical practice but is often not taken into account when providers determine which specific CDC guidelines apply to a given patient.

Provider education. In a study by Operario et al. (2016), the authors identified that the educational effect of chlamydia screening was significantly related to decreased chlamydial reinfection. Providers could benefit from more education on the screening guidelines and from knowing that appropriate populations can be screened in EDs for asymptomatic chlamydia, which could lead to the diagnosis and treatment of many people before complications become a

problem. In an RCT by McNulty et al. (2013), the authors found that receiving educational interventions doubled providers' chlamydia screening rates in practice over control practices.

Screening in the ED. The demand for ED care is growing for reasons including serious medical problems, the number of patients who are uninsured or who use Medicaid (Gindi, Black, & Cohen, 2016), and limited access to primary care (Coster, Turner, Bradbury, & Cantrell, 2017). Jenkins, Zahnd, Kovach, and Kissinger (2013) studied the prevalence of Chlamydia/gonorrhea infection in ED patients by assessing the treatment and effect of ED screening. Jenkins et al.'s (2013) study was consistent with the other studies (Anaene et al., 2016; Schneider, FitzGerald, Byczkowski, & Reed, 2016) in that they found that screening was cost-effective for high-risk populations. Kreisel, Flagg, and Torrone (2017) conducted a study of the trends in PID in ED visits. Their study demonstrated a decrease in the diagnosis of PID in EDs during 2006–2013, but the number of females diagnosed in reproductive age remained high in the ED. They also found that a certain vulnerable population such as low income, uninsured, and Medicaid visited the ED because of PID. Therefore, the ED provides a window of opportunity for chlamydia screening.

Increasing chlamydia screening. Increasing chlamydia screening is the best approach to detect chlamydial infection, reduce transmission, and decrease the risk of PID. Several interventions have been recommended to promote screening among the sexually active young population, including improving providers' knowledge (McKee et al., 2018; McNulty et al., 2013), targeted outreach (Badarane et al., 2019), education for behavior change (Baird & Merchant, 2014; McNulty et al., 2013; Phillipson, Gordon, Telenta, Magee, & Jansenn, 2015; Tibbits et al., 2018), rapid testing (Natoli et al., 2014; Rivard et al., 2016), and preferred methods of sampling such as self-collected specimens (Eaton et al., 2019; Lunny et al., 2015). Providers'

intention to provide chlamydia screening can be increased when their personal attitude of screening is motivated by a positive behavioral change.

Conceptual Framework

The Iowa Model of Evidence-Based Practice was used for this evidence-based scholarly project. The steps of the Iowa Model include identifying triggers, forming a team, reviewing the literature, designing the practice change, implementing the practice change, and evaluating and disseminating the results (Iowa Model Collaborative, 2017). Permission to use the Iowa Model conceptual framework was granted on July 22, 2019, by the University of Iowa Department of Nursing and a copy is provided in Appendix B.

Identifying a trigger. The trigger for this EBP project was the prevalence of chlamydia in the Bronx community. Statistics show in that 2017, there were 1127.9 cases of chlamydia per 100,000 people in the Bronx, as compared to 939.5 cases in Manhattan and 358 cases in Long Island (New York State Department of Health, 2017). Asymptomatic patients who meet the CDC criteria for chlamydia screening were not being offered screening in the Bronx ED. The project coordinator determined that screening asymptomatic eligible patients in the ED should become a priority among ED providers in an attempt to help decrease the overall chlamydia rate in the Bronx.

Forming a team. Team development for this scholarly project began with identification of key stakeholders. A team was formed in the ED, which included the project coordinator, ED physicians, and ED physician assistants (PAs) who ultimately participated in the EBP project. The project team coordinator and the scholarly project chair worked collaboratively to ensure the scholarly project utilized the most current evidence from the literature during development and implementation.

Reviewing the literature. The literature was collected and critically appraised by the project coordinator. The project coordinator chose 29 research studies which analyzed the strengths and limitations of screening for chlamydia. The evidence clearly showed that screening was needed in asymptomatic high-risk populations. One of the keys to increasing screening was educating providers on the CDC screening guidelines and obtaining their buy-in to screen asymptomatic patients who presented to the ED with non-life-threatening conditions.

Designing the practice change. After the review of the literature, the project coordinator decided to provide an educational intervention for the ED providers which concentrated on the CDC recommendations for screening for chlamydia. This included the recommendation to provide screening for all eligible asymptomatic patients, which was a change in practice for all the ED providers. Prior to and after the educational intervention, a questionnaire was given to the providers, and the results of the pre- and post-intervention questionnaires were compared to measure the change in providers' knowledge.

Implementing the practice change. After the ED provider educational intervention, the practice change was initiated in the ED for a 60-day period. The project sought to increase the providers' knowledge of the CDC screening guidelines for chlamydia and increase the chlamydia screening rates in asymptomatic patients who present to the ED for non-life-threatening conditions.

Evaluating and disseminating the results. Results of the pre- and post-intervention questionnaires were compared by the project coordinator. After the 60-day intervention, the project coordinator compared the screening rate of the intervention with the 60 days prior to the start of the intervention. The results of the project will be shared with the ED provider staff at a

later time, and recommendations will be made for continued provider education and continued integration of the intervention into the providers' practice.

Summary

Educating providers and implementing the CDC chlamydia screening guidelines for asymptomatic patients in the ED setting could decrease the overall rate of chlamydia in the Bronx community. Recent literature points to providers' lack of awareness of the CDC guidelines for chlamydia screening and the providers' lack of recognition of the value of screening as two of the main reasons that patients are not being screened routinely. Furthermore, the literature suggests a need for additional STD screening sites. Several articles focused on the value of screening asymptomatic patients who meet the criteria for chlamydia screening when they present to the ED for other non-emergent conditions.

The literature review supports the need to educate providers on the CDC guidelines for chlamydia screening and to encourage screening of asymptomatic patients. The purpose of this scholarly project was to increase ED providers' awareness of the CDC guidelines about chlamydia screening and increase screening rates in asymptomatic patients in the ED.

SECTION THREE: METHODOLOGY

Project Design

This evidence-based project utilized the Iowa Model for Evidence-Based Practice. Using this model, an education intervention on the CDC screening guidelines for chlamydia was conducted and evaluated with a pilot intervention. The data were interpreted via descriptive statistics at the end of the project.

The purpose of this EBP project was to increase ED providers' awareness of the CDC guidelines about chlamydia screening and improve screening rates in asymptomatic patients in

the ED. The project coordinator conducted a pretest for ED providers and then provided an education intervention. Immediately following the education intervention, the providers were given a posttest to determine if they had an increase in knowledge from the intervention. A retrospective and prospective data analysis was conducted by the project coordinator, and the results were compared to determine if there was an increase in screening of asymptomatic patients per the CDC guidelines by the providers after the education intervention. This EBP project used a prospective cohort design with a retrospective electronic medical record review to examine the association between an evidence-based educational intervention and adherence to guidelines.

Measurable Outcomes

After completion of the educational program on chlamydia screening guidelines, ED providers were expected to show an increase in knowledge about chlamydia screening. This was expected to be evidenced by an increase in the post-test score.

After completion of the chart audit, providers in an urban ED were expected to demonstrate an increase in screening for asymptomatic chlamydia according to the CDC guidelines. This was expected to be evidenced by an increase in the 60 days after the education intervention compared to the previous 60 days screening.

Setting and Population

The evidence-based scholarly project was conducted in the ED of a Bronx hospital. The ED is a Level III in the Bronx, NY. 29.7% of the population in the area lives below the poverty line, and the majority are women aged 25-34 years. The largest ethnic group living in poverty is Hispanic, followed by African American. In 2015, 54,416 adults made visits to this ED. A letter of support from the organization is provided in Appendix F.

During the pre-implementation phase of this scholarly project, the project coordinator researched and compared the chlamydia rates for all New York City boroughs and the rates at the Bronx ED. Chlamydia rates among females 15–24 years of age as well as among non-Hispanic Black individuals were found to be high in the Bronx ED. The staff from the hospital who participated in this project included all ED attending physicians, PAs, and one nurse practitioner—the project coordinator. The providers were a variety of ages and were from a multicultural population composed of Caucasian, Hispanic, Asian, and other ethnicities. They provide care to any patient coming into the ED without regard to age, race, ethnicity, gender, religion, or the ability to pay. The providers see a variety of medical conditions which can range from abdominal pain, urinary tract infections, STIs, respiratory illnesses, cardiac problems, and neurologic problems.

Ethical Considerations

The project team (project coordinator and project chair) completed research ethics training to ensure protection of human subjects. The Collaborative Institutional Training Initiative Certificate is provided in Appendix E. Further, the project was submitted to and received approval from the Liberty University Institutional Review Board. A copy of the approval letter is provided in Appendix G. After data were collected from patient's charts, non-identifying information about the patients was removed. The forms were shredded once the data is extracted, and all the data collected will be kept for three years and then deleted. Furthermore, no patient or provider information will be reported in any future presentations or publications. No consent form was required for the participants. The data from participants will not be released.

Data Collection

The providers participated in a pretest and posttest after the education intervention to test their knowledge and gather demographic information. A retrospective audit was conducted for the 60 days prior to the provider education intervention to determine how many times asymptomatic patients who met the screening criteria were actually screened for chlamydia in the ED. In addition, a prospective audit was conducted for the 60 days following the provider education intervention to determine the number of asymptomatic patients who were screened for chlamydia in the ED according to the CDC guidelines.

Tools

A pre-education questionnaire (Appendix C) and post-education questionnaire (Appendix D) were provided to all ED provider participants. Demographic information from the ED providers was collected. A relevant tool was not found in the literature search; therefore, the pre-education questionnaire and post-questionnaire were modified from the study of Lorch et al. (2013) to reflect the purpose of this scholarly project. Lorch et al. (2013) used a questionnaire to evaluate if annual chlamydia screening for 16- to 29-year-old patients in general practice can decrease chlamydial infection. The contents of the created questionnaires for this project included ED providers' demographics, chlamydia knowledge testing and management, and their barriers to screening.

Intervention

The intervention for this evidence-based project was based on the CDC guidelines for chlamydia screening. A PowerPoint presentation was used for the education intervention, which was approximately 30 minutes. The intervention was conducted at the beginning of each shift

for one week in the conference room of the ED. All ED providers were expected to attend the presentation.

The number of chlamydia screenings for asymptomatic patients in the ED for 60 days prior to the provider education intervention was obtained to determine how many times asymptomatic patients who met the screening criteria were actually screened for chlamydia in the ED. The pre-education questionnaire was provided to all ED provider participants to obtain a measure of their knowledge to the CDC guidelines for chlamydia screening prior to the education intervention. After the provider education intervention, the post-education questionnaire was completed by the ED providers to assess knowledge gained from the education intervention. The prospective audit was conducted for 60 days following the provider education intervention to determine the number of asymptomatic patients who were screened for chlamydia in the ED according to the CDC guidelines.

Timeline

The proposal was finished on July 31, 2019, and the defense of the project proposal was presented on August 2, 2019, then approved by the Liberty University Institutional Review Board on August 7, 2019. The project was conducted in the ED of a Bronx hospital and completed on October 27, 2019. The statistical data was analyzed with SPSS on November 11, 2019. This project's results and discussion were reviewed by chair on November 11, 2019. The final defense will be scheduled after the chair approves the final scholarly project manuscript. The doctoral project will be submitted to the Scholars Crossings after the final defense.

Feasibility Analysis

All ED participants were rewarded with a five-dollar gift voucher for the hospital cafeteria after the post-education questionnaire.

Data Analysis

Measurable outcome 1. The project coordinator reviewed, compared, and analyzed the results of the pre-intervention questionnaire and the post-intervention questionnaire. The project coordinator utilized SPSS to analyze the results. A *t* test was conducted to determine if there was a statistically significant difference in the knowledge the providers gained from the educational intervention on the CDC guidelines for chlamydia screening.

Measurable outcome 2. The project coordinator compared and analyzed the pre-intervention number of asymptomatic chlamydia screenings with the number of post-intervention eligible asymptomatic chlamydia screenings. The project coordinator utilized Excel to compare the results by determining a *p* value. The results did not show a statistically significant difference between the pre-intervention and post-intervention screenings.

SECTION FOUR: RESULTS

The purpose of this scholarly project was to increase ED providers' understanding of the CDC guidelines for chlamydia screening and increase screening rates in asymptomatic patients in the ED. The ED is a good place for STD screenings to identify undiagnosed infections, especially among those with asymptomatic infections or at a higher risk due to their demographic. This would be especially helpful in areas of the country where the rate of chlamydia is higher, such as the Bronx. Testing of asymptomatic patients in the ED can increase early identification of infections and facilitate treatment of patients and their partners.

Before the implementation of an ED provider educational intervention on the CDC screening guidelines for chlamydia, a 60-day chart review was conducted from July 12, 2019, until August 10, 2019. The chart review was performed to determine the number of asymptomatic chlamydia screenings performed in the ED during that period. Prior to and after

the provider educational intervention, a questionnaire was used to determine the providers' level of knowledge on chlamydia screening. Sixty days following the ED provider educational intervention, a repeat chart review was conducted for asymptomatic chlamydia screening.

A post-education intervention questionnaire (PEIQ) was also conducted with the ED providers to uncover any issues the providers had with screening asymptomatic patients for chlamydia (Appendix H).

Descriptive Statistics

Of the 27 Bronx ED participants, 12 were physicians, and 15 were PAs. One participant declined to participate in the pre- and post-educational questionnaires. Demographic information was obtained on age, gender, and years of ED experience. Demographic information can be found in Table 1.

Table 1

Demographic Characteristics of ED Providers

	Frequency	Percent
Age		
< 30	7	25.9
30–49	15	55.6
> 50	5	18.5
Gender		
Male	9	33.3
Female	18	66.7
ED Experience		
< 2 years	5	18.5
2–5 years	8	29.6
> 5 years	14	51.9

Note. $N = 27$.

Measurable Outcome 1

After completion of the educational program on chlamydia screening guidelines, it was expected that the ED providers would show an increase in knowledge about chlamydia screening

between the pre-intervention questionnaire and the post-intervention questionnaire. The educational intervention, utilizing the pre-intervention and post-intervention questionnaire, was conducted from August 11, 2019 until August 17, 2019. Questions on the pre- and post-intervention questionnaire focused on asymptomatic chlamydia infections in women, the age groups of women with the highest rates of infection, and the recommendation for annual screenings for sexually active women under 25 years of age. The ED providers demonstrated a significant increase in total correct answers on the post-intervention questionnaire. Question 1 asked which age group had the highest rate of chlamydia, Question 2 asked whether chlamydia is asymptomatic in most women, and Question 3 asked whether annual screening is recommended for sexually active females under age 25. The results of the questionnaires are presented in Table 2

Correct Responses on the Pre-Educational Questionnaire and Post-Educational Questionnaire

	Pretest		Posttest	
	<i>n</i>	%	<i>n</i>	%
Question 1	18	66.7	27	100.0
Question 2	22	81.5	27	100.0
Question 3	19	70.4	27	100.0

The pre-educational questionnaire scores and the post-educational questionnaire scores were compared utilizing a *t* test. The results of the *t* test were $p = 0.000$, 0.000 , and 0.001 , respectively. After the educational intervention, the ED providers' knowledge about chlamydia and the CDC screening guidelines had remarkably improved for each question. Measurable outcome 1 was achieved since the post-intervention questionnaires indicated that 100% of the ED providers were able to answer all three questions accurately.

Table 3

Relationships Between the Pre- and Post-Educational Intervention Questionnaires

	Mean	Std. Deviation	<i>t</i>	<i>df</i>	Sig. (2-tailed)
Pair 1 (Question 1)	.444	.577	4.000	26	.000
Pair 2 (Question 2)	.407	.501	4.228	26	.000
Pair 3 (Question 3)	.444	.480	3.606	26	.001

Measurable Outcome 2

After completion of the educational intervention on chlamydia screening, it was expected that providers would demonstrate an increase in the rate of screening of asymptomatic patients according to the CDC screening guidelines. The number of asymptomatic screenings was compared for the 60 days prior to the intervention and the 60 days after the intervention.

The pre-intervention data were collected from July 12, 2019, until August 10, 2019. Chlamydia screening rate categories included high risk females older than 25 years, pregnant females of all ages, females 24 years and younger, high-risk males, and patients who were already screened in 2019. In addition, data was collected for patients with a history of chlamydia infections in the category of high risk. No asymptomatic high-risk females 25 years of age and older or asymptomatic high-risk males were screened.

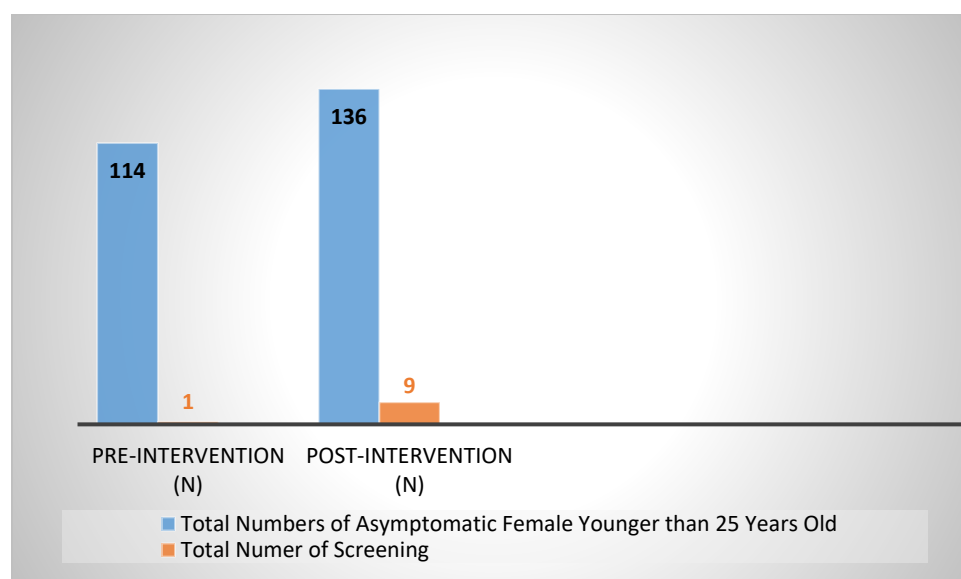
Measurable outcome 2 was only partially met since the screening rate only increased from 0.88% to 6.62% over a two-month period and the screenings only occurred in females 24 years of age and younger.

Table 4

Total ED Patient Visits and Chlamydia Screening Categories

	Pre-Intervention		Post-Intervention	
	<i>n</i>	Screening rates (%)	<i>n</i>	Screening rates (%)
Female	2,470		2,816	
Age 25+	2,273		2,603	
High risk	239		237	
ED screened	128	53.60	121	51.10
Already screened in 2019	52	21.80	48	20.30
Age < 25	197		213	
Symptomatic	84		77	
ED screened	44	52.30	55	71.40
Already screened in 2019	15	17.90	15	19.50
Asymptomatic	114		136	
ED screened	1	0.88	9	6.62
Already screened in 2019	24	21.10	34	25.00
Male	2,117		2,202	
High risk	230		146	
ED screened	75	32.60	50	34.2
Already screened in 2019	13	5.65	6	4.11
Total	4,587		5,018	

Figure 1

Screening Rates

Post-Intervention Survey and Results

Since the screening rates for asymptomatic chlamydia after the intervention were not significantly improved, the project coordinator conducted a PEIQ to identify barriers to provider screening in hopes of establishing effective strategies for encouraging the ED providers to screen. The results of the educational intervention post-questionnaire showed the providers knew the screening guidelines, and the PEIQ noted that all participants were aware of the CDC chlamydia screening guidelines that recommend at least annual screening of asymptomatic females younger than 25 years of age. Despite these factors, screening was found to be low in the asymptomatic groups. The PEIQ survey focused on barriers to screening for the providers.

Twenty-three ED providers from the original group responded to the PEIQ. The providers were asked about chlamydia screening practices and barriers to following the CDC guidelines in the ED for asymptomatic patients. Of the 23 ED providers, four participants chose not to test patients who were asymptomatic in the ED because they felt the ED was not the right place to screen. Three participants thought that gynecology or primary care clinics were more appropriate places for chlamydia screening. Fifteen participants stated that they would screen asymptomatic patients for chlamydia according to the CDC guidelines.

After the PEIQ survey, the chlamydia screening rates were reevaluated for two weeks. Five out of 36 eligible asymptomatic patients (12.9%) were screened in the Bronx ED during the two-week period following the PEIQ.

SECTION FIVE: DISCUSSION**Implication for Practice**

The goal of this scholarly project was to improve ED providers' knowledge about chlamydia and the CDC screening guidelines for chlamydia and increase screening rates in

asymptomatic patients in the ED. Clearly, there was a significant difference in the providers' knowledge level between the pre- and post-implementation questionnaires after the provider education intervention. The providers also indicated on their questionnaires a willingness to screen asymptomatic patients in the ED during an unrelated problem visit.

Although scores on all the post-intervention questionnaires showed 100% provider awareness of the CDC guideline recommendations for chlamydia screening, chlamydia screening rates in the Bronx ED were not significantly improved in the two-month period following the intervention. The screening rate did increase from 0.88% to 6.62% over the two-month period. All the screenings occurred in females 24 years of age and younger. This finding was consistent with the findings of Keegan, Diedrich, and Peipert (2014), who reviewed literature on current criteria and the rationale for *Chlamydia trachomatis* screening and suggested that health practices were not following current screening recommendations satisfactorily.

Chlamydia screening of asymptomatic eligible women increased in the two weeks following the PEIQ survey provided to the staff after the 60-day intervention period. The purpose of this post-project survey was to identify ED provider barriers to screening asymptomatic eligible patients in the ED for chlamydia and to elicit strategies to assist the ED providers in screening their patients. The findings confirm that despite provider knowledge of the screening guidelines for chlamydia, providers are reluctant to screen appropriate patients. Barriers to screening included the fact that some providers felt that the ED was not the appropriate place to screen asymptomatic patients and some providers felt that gynecology or primary care clinics were better screening sites. Over half the providers surveyed reiterated that they would screen asymptomatic patients in the ED according to the CDC guidelines. Clearly, the ED providers will continue to screen symptomatic patients that present to the ED. The ED

providers' new knowledge about chlamydia screening guidelines and the fact that over half of the providers are willing to screen asymptomatic patients is encouraging for future practice, and it is hoped that more than half the eligible patients coming into the ED will be screened for chlamydia in the future. This would help make a difference in the higher-than-average chlamydia rates in the Bronx area.

Patient factors that pose a higher risk for chlamydial infection include gender, age, and previous history of a chlamydia infection. This EBP project sought to increase chlamydia screening in the eligible asymptomatic patient presenting to a Bronx ED. To improve screening rates in the future, ED providers should have frequent educational updates on the CDC practices guidelines for screening for chlamydia. In addition, provider perception was an identified barrier to asymptomatic chlamydia screening the Bronx ED. Hopefully, with frequent provider education and reminder sessions this barrier and misconception will be minimized.

Sustainability

The goal of sustainability for this EBP project was for the Bronx ED staff to continually be aware of the CDC chlamydia screening guidelines, and if the opportunity arises in their practice, to screen any eligible asymptomatic patients for chlamydia. The ED is an excellent place to consider screening for eligible asymptomatic patients who meet the CDC screening criteria. Many patients who use the services of the ED either do not have a primary health care provider or are uninsured or low-income and have limited monetary resources. Screening eligible patients in the ED would ultimately save the patient time and the community added medical costs. Patients who are found positive would benefit from early treatment and may be able to avoid the long-term health consequences of a chlamydial infection. Providers in the ED

and their patients need to realize that screening for chlamydia is as easy as obtaining a urine sample and only rarely would the patient need a pelvic examination.

This EBP project affords an opportunity for NPs to be designated as leaders in ensuring that the ED providers keep current with the CDC recommendations for screening and continually encourage the other ED providers to test their high-risk asymptomatic patients. The NPs could also be responsible for coordinating and initiating the testing on all eligible patients who come into the ED, regardless of the patient's provider. This service could help sustain the practice that was started by this scholarly project. In addition, the NPs could be responsible for educating the patients 24 years of age and younger to help improve their knowledge of chlamydia and other STIs.

Limitations

Several limitations to the normal ED practice occurred during the implementation phase of this evidence-based project. During this time the hospital changed their computer system. This caused many logistical problems for providers because they had to learn where to place their orders, and many providers had a difficult time opening the old computer system to view the patient's previous medical history related to chlamydia infections.

Although all of the ED providers who attended the educational intervention scored 100% on their post-educational questionnaire, there were some ED providers who expressed personal biases against testing asymptomatic eligible patients in the ED. These biases included the thought that screening should be done at a gynecology or primary care office and not in the ED and the notion that the patient was not in the ED with that specific problem and should not be tested.

In addition, the pediatric ED saw many patients up to age 20 years during the project period. Another limitation was that some ED providers were not available to participate in the educational intervention but saw ED patients during the post-intervention phase. In the Bronx area, there are other community hospitals for the patients to use, which may have decreased the number of potential patients screened.

Dissemination Plan

This scholarly project will serve as an initiative for health care providers in the ED and other clinics including primary care, gynecology, and pediatrics. The results of the project will be disseminated at the quality improvement meetings in the Bronx ED, which will include the specific data related to the result of the positive chlamydia test found during the post-educational intervention period in an asymptomatic female patient 24 years of age. Additional dissemination will occur through presentations at conferences, such as NP education, PA education, and medical student education.

Summary

The goal of the project was to increase ED providers' understanding of the CDC guidelines for chlamydia screening, increase screening rates in asymptomatic patients in ED, and provide early identification of chlamydial infections. Although the goal of this evidence-based staff education intervention was to increase screening of asymptomatic eligible patients in the ED, the rate of improvement was only from 0.88% pre-intervention to 6.62% during the 60-day period after the education intervention. Despite the screening rates not being significantly improved, the ED providers appreciated the opportunity to gain more knowledge and understanding about the CDC guidelines for chlamydia and about the high prevalence of chlamydia in the Bronx. Through provider continuing education and reminder sessions, the

practice of screening asymptomatic eligible patients in the ED for chlamydia should become routine as providers see eligible asymptomatic patients for other non-life-threatening problems. In turn, this will ultimately help decrease the number of cases of chlamydia seen in the Bronx, New York.

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Appendix A

Evidence Table

Name: Mikyung Kim

Clinical Question: In healthcare providers located in an urban ED, does an educational intervention focusing on the CDC guidelines for screening for chlamydia, as compared to current knowledge on screening, lead to increased overall knowledge and increased screening rates for chlamydia in asymptomatic patients in the ED?

Author (year)	Study Purpose/ Objective(s)	Design, Sampling Method, & Subjects	LOE	Intervention & Outcomes	Results	Study Strengths & Limitations	Would Use as Evidence to Support a Change?
Anaene, M., Soyemi, K., & Caskey, R. (2016). Factors associated with the over-treatment and under-treatment of gonorrhea and chlamydia in adolescents presenting to a public hospital emergency department. <i>International Journal of Infectious Diseases</i> , 53, 34-38. doi:10.1016/j.ijid.2016.10.009	To evaluate the rates of STDs, the rates of over-treatment (OT) and under-treatment (UT) of STDs, and the factors related to OT and UT.	797 patients aged 13-24 screened for CT/GC in the emergency department (ED) of John H. Stronger Hospital in Cook county	Level V	A non-experimental systemic, retrospective chart review	21.6% showed positive of CT/GC. 21.6% was OT and 43.4% was UT. Patients complaining with sexually transmitted infections exposure or GU symptoms were more likely to be OT.	A single public hospital; the results may not generalize to all hospitals. No cause-and-effect relationships	Yes, the finding was well answered to the purpose of the study. The GC/CT rapid testing would decrease the OT/UT.

Badarane, D., Knox, J., Camacho, A., Magill, M. K., Van Hala, S., & Jones, J. L. (2019). Increasing chlamydia testing rates via targeted outreach. <i>PRiMER</i> , 3(17). doi:10.22454/PRiMER.2019.669190	To assess effectiveness chlamydia screening QI interventions (patient targeted outreach)	Average 60.6 women per month during the 2016-2017 and 60.2 women during 2017-2018	Level IV	Prospective cohort study	Outreach efforts increase chlamydia screening rates	Small sample, single clinic	Yes, successful intervention to target population can improve chlamydia screening and the QI project can be replicated to other clinical settings.
Carlson, A. D.P., Tschann, M., Santibenchakul, S., Hurwitz, E. L., & Salcedo, J. (2017). Physician adherence to sexually transmitted infection screening guidelines in an OB/GYN teaching clinic in Hawai'i. <i>Hawai'i Journal of Medicine and Public Health</i> , 76(11), 299-304. doi:10.1177/1524839918769592	To evaluate physicians adherence to STD screening guidelines and to determine demographic factors such as age group, race, insurance type, and visit type related to STD recommendations among women 14–25 years old	446 patients	Level V	A retrospective chart review	Demographic factors were influenced with a significant gap in physician adherence to STD screening guidelines (71.0% received screening recommendations).	Single outpatient GYN clinic	Yes, this study strengthened the importance of physician recommendations.
Centers for Disease Control and Prevention. (2015). <i>2015 Sexually transmitted diseases treatment guidelines</i> .	To determine the CDC recommendations for screening for	Systematic literature review using an extensive	Level I	High quality prospective cohort study with systematic review	The chlamydia is the most frequently reported infectious	The recommendations might be modified by the	Yes. This CDC recommendations provide validity and reliability of the evidence

Retrieved from https://www.cdc.gov/std/tg2015/screening-recommendations.htm	chlamydial infection and the supporting scientific evidence	MEDLINE database			diseases in the U.S. and prevalence is highest in persons aged less than 25 years.	certain population, prevalence, and providers' perspective in the community	utilization in chlamydia screening.
Natoli, L., Maher, L., Shephard, M., Hengel, B., Tangey, A., Badman, S. G., . . . Guy, R. J. (2014). Point-of-care testing for chlamydia and gonorrhea: Implications for clinical practice. <i>PloS One</i> , 9(6), e100518. doi:10.1371/journal.pone.0100518	To assess whether routine point-of-care (POC) testing for CT/GC is effective in remote settings.	Purposive sampling 18 participants	Level VII	Expert opinion	Identified the POC testing needs management pathways to improve STDs care.	Small sample size, no experiment study	Yes, the POC testing would detect chlamydia for those asymptomatic people and provide better STDs care.
Owusu-Edusei, K., Chesson, H. W., Gift, T. L., Tao, G., Mahajan, R., Ocfemia, M. C., & Kent, C. K. (2013). The estimated direct medical cost of selected sexually transmitted infections in the United States, 2008. <i>Sexual Transmitted Disease</i> , 40(3), 197-201. doi:10.1097/OLQ.0b013e318285c6d2.	To estimate the direct medical cost to sexually transmitted infections.	No applicable	Level V	Decretive retrospective	In 2008, 516.7 million dollars costed for chlamydial infection.	No intervention.	Yes, the findings suggested the need of chlamydia prevention and management. Currently the total costs for the chlamydia would be even greater because of the growing chlamydia rates.

Gindi, R. M., Black, L. I., & Cohen, R. A. (2016). Reasons for emergency room use among U.S. adults aged 18–64: National health interview survey, 2013 and 2014. <i>National Health Statistics Reports</i> , 90. Retrieved from https://www.cdc.gov/nchs/data/nhsr/nhsr090.pdf	To examine the factors associated with patient visit to the ED.	National health interview survey from the 2013 and 2014; 26,825 sample adults aged 18-64 in 2013 and 28,053 aged 10-64 in 2014.	Level V	Descriptive retrospective review	The choice of ED visit for adults was affected by their insurance type. Uninsured adults visited EDs more than private coverage adults. About 79.7% of adults visited ED because of lack of access to other providers.	Possible interviewees' recall bias of the type of illness and insurance.	Yes, the finding are consistent to our ED population. The data will be a good resource to support the project.
Coster, J. E., Turner, J. K., Bradbury, D., & Cantrell, A. (2017). Why do people choose emergency and urgent care services? A rapid review utilizing a systematic literature search and narrative synthesis. <i>Academic Emergency Medicine</i> , 24(9), 1137-1149. doi:10.1111/acem.13220	To identify patients' reasons to visit urgent and emergency care	38 studies from literature review between 1995 and 2016.	Level III	Systemic review with meta-analysis	Identified reasons including unavailable primary clinic, perceived urgency, significant others' recommendation, convenience, and perceived need for emergency services.	Rapid review. No suggestion for change	Yes, this study supports that most ED patients tend to consider EDs are more convenient and accessible for those with low socioeconomic status.

Gift, T. L., & Hogben, M. (2016). Emergency department sexually transmitted disease and human immunodeficiency virus screening: Findings from a national survey. <i>Academic Emergency Medicine</i> , 13(9), 993–996. doi:10.1197/j.aem.2006.04.017	To analyze the screen rates of STD and human immunodeficiency virus by ED providers compared with other settings' providers (primary clinics, hospital ambulatory clinics, or other)	3,838 survey respondents	Level VI	Descriptive study	ED providers were less screening for the STDs and human immunodeficiency virus	Small sample size.	Yes, the findings can be compared to this project.
Eaton, S., Biggerstaff, D., Petrou, S., Osipenko, L., Gibbs, J., Estcourt, C. S., . . . Szczepura, A. (2019). Young people's preferences for the use of emerging technologies for asymptomatic regular chlamydia testing and management: a discrete choice experiment in England. <i>BMJ Open</i> , 9(1):e023663. doi:10.1136/bmjopen-2018-023663	To assess the preference test options and treatment of asymptomatic chlamydia	1230 young people aged 16–24 years	Level IV	mixed methods design	The strongest preference factors were chlamydia test accuracy and followed by time to result. The highest preference for remote chlamydia testing options are self-testing, self-sampling	This study used an online panel that could limit generalizability because only 1,230 young people responded to questionnaires.	Yes, the findings would be a good resource to apply to increase screening according to people's preference.

					and postal testing.		
Baird, J., & Merchant, R. C. (2014). A randomized controlled trial of the effects of a brief intervention to increase chlamydia and gonorrhea testing uptake among young adult female emergency department patients. <i>Academic Emergency Medicine</i> , 21(12), 1512-1520. doi:10.1111/acem.12539.	To evaluate the effect of a brief educational and counseling intervention on increasing the STD testing among asymptomatic young female ED patients.	171 women, a convenience sample of aged 18-35 years in two EDs	Level I RCT	A randomized controlled trial. Offered a brief educational and counselling intervention	48% in the brief intervention group accepted testing while 36% in the control group accepted testing. The chlamydia positivity rate was 7%.	Small sample, a convenience sample (not randomly selected from the ED population)	Yes, most women who are infected with chlamydia appear asymptomatic. Screening is an important strategy in preventing the sequelae of untreated chlamydial infection.
Gottlieb, S. L., Xu, F., & Brunham, R. C. (2013). Screening and treating Chlamydia trachomatis genital infection to prevent pelvic inflammatory disease: interpretation of findings from randomized controlled trials. <i>Sexually Transmitted Diseases</i> , 40(2), 97-102. doi:10.1097/OLQ.0b013e31827bd637	To analyze randomized controlled trial findings (secondary data analysis)	Six randomized trial research review	Level I	Systemic review with RCTs and meta-analysis	Chlamydia screening and treatment is a positive intervention to reduce the risk of PID	Uncertain of timing of PID relative to screening,	Yes, screening strategy would be more enhanced to prevent PID.
Goyal, M. K., Witt, R., Hayes, K. L., Zaoutis, T. E., & Gerber, J. S. (2014). Clinician	To examine physician adherence to guidelines for	1000 randomly selected 13- to 19-year-	Level IV	Retrospective, cross-sectional study	Pediatric primary care physicians infrequently	No control/intervention group	Yes, these findings support physicians' nonadherence to

adherence to recommendations for screening of adolescents for sexual activity and sexually transmitted infection/human immunodeficiency virus. <i>The Journal of Pediatrics</i> , 165(2), 343-347. doi:10.1016/j.jpeds.2014.04.009	documentation of sexual history and screening for STD.	old routine well visits			document sexual histories and practice STD screening		CDC guideline for chlamydia screening.
Jenkins, W. D., Zahnd, W., Kovach, R., & Kissinger, P. (2013). Chlamydia and gonorrhea screening in United States emergency departments. <i>The Journal of Emergency Medicine</i> , 44(2), 558-567. doi:10.1016/j.jemermed.2012.08.022	To evaluate the prevalence of CT/GC infection in ED patients assessing the treatment and effect of ED screening	42 articles from 1995 to 2010	Level III	Systemic review with meta-analysis	Positive rates of STDs is high and are in the high-risk populations in ED.	Exclusion of non-English-speaking nations	Yes, educating ED providers on the topics of chlamydia epidemiology, sample collection, and analysis will enable them to address the risks in their presenting populations.
Kreisel, K., Flagg, E. W., & Torrone, E. (2017). Trends in pelvic inflammatory disease emergency department visits, United States, 2006–2013. <i>American Journal of Obstetrics and Gynecology</i> , 218(1), 117 e1-117 e10.	To assess the prevalence of PID in ED	Data from HCUP NEDS; during 2006–2013, 25.7 million to 31.0 million annual ED	Level III	Systemic review with meta-analysis	A percentage of ED visits with low income, no insurance, public health because of PID increased during 2006–2013 while the episode of ED	No single test or laboratory-based diagnosis, but mostly rely on clinical signs and symptoms.	Yes, the lower incidence of the PID would have related to increase STD screening effort.

doi:10.1016/j.ajog.2017.10.010		visits from 24–30 states			visit with PID in females aged 15-44 years decreased.	As a result, the PID can be diagnosed by physicians' subjective practice.	
Lunny, C., Taylor, D., Hoang, L., Wong, T., Gilbert, M., Lester, R., . . . Ogilvie, G. (2015). Self-collected versus clinician-collected sampling for chlamydia and gonorrhea screening: A systemic review and meta-analysis. <i>PLoS One</i> , 10(7):e0132776. doi:10.1371/journal.pone.0132776	To compare self-collected vaginal, urine, pharyngeal and rectal samples at home-based to providers collected cervical, urethral, pharyngeal and rectal sampling techniques at clinical settings	21 studies based on over 6100 paired samples	Level III	Systemic review with meta-analysis	The significant validity of vaginal self-collected swabs compared to swabs collected by providers and of urine samples for men at home.	No studies included internet-based self-collection, in rural area, and few studies addressed gonorrhea self-collection.	Yes, self-screening would be increasing the rates of STDs screening.
Menon, S., Timms, P., Allan, J. A., Alexander, K., Rombauts, L., Horner, P., . . . Huston, W. M. (2015). Human and pathogen factors associated with Chlamydia trachomatis-related infertility in	To analyze human-based evidence that relates chlamydia with reproductive pathologies in women	Not applicable	Level I	Systemic literature review with RCTs	Described that chlamydia genotypes, immune responses that sexual behavior, coinfections, and repeat infections are	Not applicable	Yes, this literature is a comprehensive review and would encourage to screening for at risk asymptomatic women. Supports that fact PID may

women. <i>Clinical Microbiology Reviews</i> , 28(4). 969-985. doi:10.1128/CMR.000035-15.					all likely to be resulted in development of infertility.		develop infertility and chlamydia infection causes PID.
McKee, D. M., Alderman, E., York, D. V., Blank, A. E., Briggs, R. D., Hoidal, K. E. S., . . . Racine, A. D. (2018). A Learning Collaborative Approach to Improve Primary Care STI Screening. <i>Clinical Pediatrics</i> , 57(8), 895-903. doi:10.1177/0009922817733702	To improve screening for sexual activity and sexually transmitted infections	11 Bronx Ongoing Pediatric Screening (BOPS) and participating sites and 10 non-participating sites.	Level II	Well-designed control trials without randomization	Screening at non–health care maintenance visits improved more at BOPS sites	Less strong in internal validity because of non-randomized	Yes, this research was conducted in the Bronx, New York. The results would be the best resources to this student’s project.
McNulty, C. A. M., Hogan, A. H., Ricketts, E. J., Wallace, L., Loiver, I., Campbell, R., . . . Charlett, A. (2013). Increasing chlamydia screening tests in general practice: a modified Zelen prospective cluster randomized controlled trial evaluating a complex intervention based on the theory of planned behavior. <i>Health Services Research</i> , 90(3).	To assess effectiveness chlamydia screening intervention to general practitioners in England	76 intervention and 81 control practices	Level I	Randomized controlled trial	Doubled chlamydia screening rates	Many components of the theory of planned behavior (TPB) interventions might not fully utilized as education interventions for a research. So the outcomes of another	Yes, consistent to the benefit of intervention to chlamydia screening

doi:10.1136/sextrans-2013-051029.						similar research with TPB would be different.	
Morhason-Bello, I. O., Ojengbede, O. A., Oladokun, A., Adedokun, B. O., Ajayi, A., Adeyanju, A. A., . . . Kareem, O. I. (2014). The prevalence and outcome of asymptomatic chlamydial infection screening among infertile women attending gynecological clinic in Ibadan, South West Nigeria. <i>Annals of Medical and Health Science Research</i> , 4(2), 253-257. doi:10.4103/2141-9248.129057	To evaluate the relationship between an asymptomatic chlamydial infection and infertile women and hysterosalping ogram (HSG).	132 infertile women	Level V	Retrospective study	Asymptomatic chlamydial infection is common among infertile women and it significantly predict HSG blockage.	Small sample, short periods of infertile	Yes, this study can be a significant evidence to treat chlamydia to prevent infertility.
Operario, D., Wang, D., Zaller, N. D., Yang, M. F., Blaney, K., Cheng, K., . . . Coates, T.J. (2016). Effect of a knowledge-based and skills-based programme for physicians on risk of sexually transmitted	To evaluate a knowledge-based and skills-based programme for physicians in China to reduce	249 physicians (121 physicians in the intervention group and 128 in the	Level I	Clustered randomized trial	Significant decrease of chlamydia reinfection rates in the intervention group	Participants within a cluster might be treated similarly and have similar outcomes. As a result, the	Yes, the educational intervention to physicians would increase the screening rate.

reinfections among high-risk patients in China: a cluster randomized trial. <i>Lancet Global Health</i> , 4(1), e29-36. doi:10.1016/S2214-109X(15)00249-1.	patients' STI risk.	control group)				reliability and validity would have been affected.	
Phillipson, L., Gordon, R., Telenta, J., Magee, C., & Janssen, M. (2015). A review of current practices to increase chlamydia screening in the community – a consumer-centered social marketing perspective. <i>Health Expect</i> , 19(1), 5-25. doi:10.1111/hex.12337	To assess effectiveness chlamydia screening interventions in young adults less than 30 years old in community setting (Social marketing benchmark criteria)	30 full-text literature review	Level III	Systemic review with meta-analysis	Social marketing benchmark intervention (a consumer-centered approach to behavior change) resulted positive outcomes (increase screening rate)	Quality of evidence was low	Yes, benchmark criteria would be a good resources to utilize for implementation of intervention

Rivard, K. R., Dumkow, L. E., Draper, H. M., Brandt, L.K. L., Whalen, D. W., & Egwuatu, N. E. (2016). Impact of rapid diagnostic testing for chlamydia and gonorrhea on appropriate antimicrobial utilization in the emergency department. <i>Diagnostic Microbiology and Infectious Disease</i> , 87(2), 175-179. doi:10.1016/j.diagmicrobio.2016.10.019	To evaluate the impact of chlamydia and gonorrhea rapid diagnostic testing (RDT) in an urban emergency department (ED) on treatment appropriateness, time to notification, and cost.	The traditional testing group and the RDT group consisted of 200 consecutive patients from December 2013–January 2014.	Level III	A quasi-experimental study.	The RDT group had a significant increase in treatment, faster notification for results, and cost savings.	Conducted in only one single ED setting, small sample size	Yes, the CT/GC test usually takes 48-72 hours resulted in delaying to treatment positive patients and unnecessary antibiotics for negative patients.
Lorch, R., Hocking, J., Temple-Smith, M., Law, M., Yeung A., Wood, A., . . . Guy, R. (2013). The chlamydia knowledge, awareness and testing practices of Australian general practitioners and practice nurses: Survey findings from the Australian chlamydia control effectiveness pilot (ACCEPt). <i>BMC Family Practice</i> , 14(169). doi:	Evaluate Chlamydia knowledge for increasing screening.	General practitioners and practical nurses.	Level II	A randomized control trial.	Gaps between chlamydia knowledge and practice.	Difference chlamydia knowledge and interest between the general practitioners and practical nurses. General practitioners were recruited while practical	Yes, the questionnaire used by this study would be resourceful to design a modified questionnaire for the project.

10.1186/1471-2296-14-169						nurses were randomized selected at the clinic that chlamydia screening is practiced.	
Pickett Pickett, M. L., Melzer-Lange, M. D., Miller. M. K., Menson, S., Vistocky, A. M., & Drendel, A. L. (2018). Physician adherence to CDC guidelines for sexually active adolescents in the pediatric emergency setting. <i>Pediatric Emergency Care</i> . 34(11), 767-773. doi; 10.1097/PEC.0000000000000873	To evaluate physicians' adherence to CDC guidelines for CT/GC, physicians' characteristics related to guideline adherence, and physicians' knowledge of expedited partner therapy (EPT).	A 257 physician among members of the American Academy of Pediatrics (AAP) Section of ED.	Level IV	A descriptive sturdy, cross-sectional, anonymous, Internet-based survey tool	ED providers; 62.4% females, 46.0% less than seven years working in EDs, 86.2% in academic medicine. 85.6% of participants adhered to CT/GC screening for asymptomatic patients in CDC guidelines. 30.4% of physicians responded about state EPT law knowledge.	The survey was only emailed to members of the AAP (biased sample)	Yes, the study seems a good resource to enhance the current guidelines to the ED providers to improve screening.
Keegan, M. B., Diedrich, J. T., & Peipert, J. F. (2014). <i>Chlamydia</i>	To review current criteria and	2 RCTs literature review	Level I	Systemic reviews with RCTs	Screening for chlamydia for women age	Limited data for men for routine	Yes, current screening recommendations

<p><i>trachomatis</i> infection: Screening and management. <i>Journal of Clinical Outcomes Management</i>, 21(1), 30-38. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4279217</p>	<p>rationale for <i>Chlamydia trachomatis</i> screening, testing methods, and treatment of infection.</p>				<p>25 and younger and men and women of 26 and older at increased risk identifies for the early treatment of disease, avoiding sequelae of untreated chlamydial infection such as PID, ectopic pregnancy, and reducing health care costs.</p>	<p>chlamydia screening</p>	<p>should be practiced in EDs as CDC guidelines</p>
<p>Tamarelle, J., Thiébaud, A. C. M., Sabin, B., Bébér, C., Judlin, P., Fauconnier, A., . . . Delarocque-Astagneau, E. (2017). Early screening for chlamydia in young women for primary prevention of pelvic inflammatory disease (i-Predict): Study protocol for a randomized controlled trial. <i>Europe PMC</i>, 18(1), 534.</p>	<p>To screening and treatment for chlamydia in young women less than 25 years of age in France reduces the incidence of PID over 24 months. evaluate whether early</p>	<p>4000 sexually active female students under 25 years old enrolled at five universities in France</p>	<p>Level I</p>	<p>Randomized prevention trial; experimental group's vaginal home swab samples will be tested and treated immediately according to the positive results. Control group's vaginal home swab samples will be delayed</p>	<p>The study protocol will be implanted with the results of the incidence of first PID over 24 months in the experimental group's and in the control group's measurement of duration of chlamydia</p>	<p>Ethical issues for control group's deferred chlamydia analysis of collected vaginal samples at first. No actual results found in the study.</p>	<p>Yes, this study would support chlamydia screening as a strategy to lower the rate of PID.</p>

doi:10.1186/s13063-017-2211-1				until the end of the study period.	infection at 6 or 12 or over 18 months.	The estimated primary analysis completion date is October 2021.	
Tibbits, M., Maloney, S., Ndashe, T., Grimm, B., Johansson, P., & Siahpush, M. (2018). Impact of the community-wide adolescent health project on sexually transmitted infection testing in Omaha, Nebraska. <i>American Journal of Public Health</i> , 108(6), 782-784. doi:10.2105/AJPH.2018.304391	To evaluate the effectiveness of Adolescent Health Project (media campaigns and free STI testing) to STD screening rate	Young women (64%), and almost half were performed among young people 15 to 24 years of age (46%), ethnicity (Hispanic, 34%; White, 31%; African American, 25%; and other racial/ethnic groups, 10%).	Level IV	Prospective study	Significant increase STD screening rates during the phase 2 (free STI testing).	No control groups	Yes, the outcomes suggested that free STD testing and education through media campaigns would increase screening among young people and adults.

Schneider, K., FitzGerald, M., Byczkowski, T., & Reed J. (2016). Screening for asymptomatic gonorrhea and chlamydia in the pediatric emergency department. <i>Sexually Transmitted Disease</i> , 43(4), 209-215. doi:10.1097/OLQ.0000000000000424.	To evaluate the prevalence of CT/GC in asymptomatic adolescents and barriers to STD screening.	A convenience sample, 719 participants (68% of approached participated) , aged 14-21 in an urban ED	Level IV	Cross sectional and descriptive study	40 participants (9.8%) tested positive for an STD. the main barrier to STD screening was patient-perceived lack of risk.	A convenience sample, only 68% participated	Yes, the findings justify the CDC recommendations.
Redgrove, K. A., & McLaughlin, E. A. (2014). The role of the immune response in Chlamydia Trachomatis infection of the male genital tract: A double-edged sword. <i>Frontiers in Immunology</i> , 5(534). doi:10.3389/fimmu.2014.00534	To examine the effect of persistent chlamydia infection to the male genital tract.	Not applicable (Literature review)	Level V	Systemic review, descriptive study	Chronic chlamydia infection can damage the male reproductive tract resulting infertility.	No intervention, no samples.	Yes, good theoretical work to support the project.

Appendix B

Permission to use Implementation Strategies for EBP

Permission to use Implementation Strategies for EBP



Kimberly Jordan - University of Iowa Hospitals and Clinics

To: [REDACTED]

You have permission, as requested today, to review and/or use the Implementation Strategies for EBP (Evidence-Based Practice Implementation Guide[®]). Click the link below to open.

[Implementation Strategies for Evidence-Based Practice.pdf](#)

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

Citation: Cullen, L., & Adams, S. L. (2012). Planning for implementation of evidence-based practice. *Journal of Nursing Administration*, 42(4), 222-230. doi:10.1097/NNA.0b013e31824ccd0a
In written material, please include the following statement:

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Please contact [REDACTED] or [REDACTED] with questions.

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Appendix C

Pre-Education Questionnaire

A. Characteristic		
Sex	Female	Male
Age group	<30 years	
	30-49 years	
	>50 years	
Years experienced in the ED	<2 years	
	2-5 years	
	>5 years	
B. Statistics		
Which borough has the highest number of chlamydia in New York	Bronx	
	Brooklyn	
	Manhattan	
	Queens	
	Staten Island	
Which age groups have the highest rates of chlamydia infection in women	Aged 15-19 years	
	Aged 20-24 years	
	>25 years	
Most chlamydia infections are asymptomatic in women	Yes	
	No	

C. According to the CDC guidelines 2015, chlamydia		
Annual screening is recommended to sexually active women under 25 years of age	Yes	
	No	
Annual screening is recommended to sexually active women aged 25 years old if an increased risk	Yes	
	No	
Retest approximately 3 months after treatment	Yes	
	No	
Treatment of chlamydia with a single 1 g dose of azithromycin or doxycycline 100 mg twice a day	Yes	
	No	
Chlamydia alternative regimens are Erythromycin, Levofloxacin, or Ofloxacin	Yes	
	No	

Appendix D

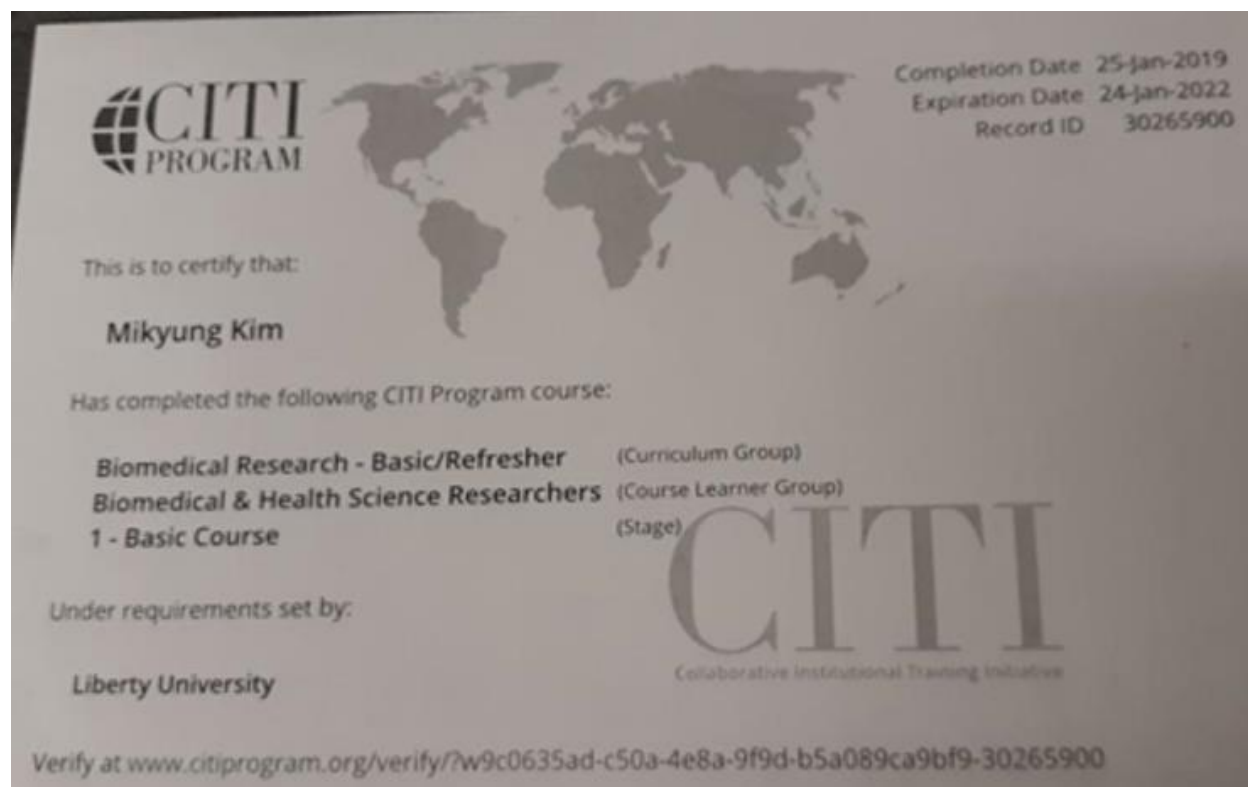
Post-Education Questionnaire

A. Statistics		
Which borough has the highest number of chlamydia in New York	Bronx	
	Brooklyn	
	Manhattan	
	Queens	
	Staten Island	
Which age groups have the highest rates of chlamydia infection in women	Aged 15-19 years	
	Aged 20-24 years	
	>25 years	
Most chlamydia infections are asymptomatic in women	Yes	
	No	
B. According to the CDC guidelines 2015, chlamydia		
Screening is recommended to sexually active women under 25 years of age	Yes	
	No	
Screening is recommended to sexually active women aged 25 years old if an increased risk	Yes	
	No	
Retest approximately 3 months after treatment	Yes	
	No	

Treatment of chlamydia with a single 1 g dose of azithromycin or doxycycline 100 mg twice a day	Yes	
	No	
Chlamydia alternative regimens are Erythromycin, Levofloxacin, or Ofloxacin	Yes	
	No	
C. Possible barriers		
Over treating		
Time constraints		
Religion/ethnicity		
Did not know the CDC guidelines		
Others		

Appendix E

Collaborative Institutional Training Initiative Certificate



Appendix F**A Letter of Support from the Organization**

[REDACTED]

February 27, 2019

Attention: IRB

Liberty University

Lynchburg, Virginia

IRB Members:

Ms. Mikyung Kim, FNP, RN, Liberty University Doctor of Nursing Practice Student (Principal Investigator) and Dr. Vickie Moore, DNP, FNP-C, Assistant Professor of Nursing, and DNP Scholarly Project Chair (Faculty Chair) have proposed to conduct Ms. Kim's Doctor of Nursing Practice Scholarly Project: Increasing Asymptomatic Chlamydia Screening in the ER: Effects of an Evidence-Based Staff Educational Intervention

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

[REDACTED] I is pleased to support Ms. Kim's Scholarly project: Increasing Asymptomatic Chlamydia Screening in the ER: Effects of an Evidence-Based Staff Educational Intervention

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

Respectfully,

[REDACTED]

Appendix G

Copy of Institutional Review Board Approval Letter

LIBERTY UNIVERSITY
INSTITUTIONAL REVIEW BOARD

August 7, 2019

Mikyung Kim

IRB Application 3938: Increasing Asymptomatic Chlamydia Screening in the ED

Dear Mikyung Kim,

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

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

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

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

Sincerely,




G. Michele Baker, MA, CIP


Administrative Chair of Institutional Research
Research Ethics Office


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Appendix H**Post-Education Intervention Questionnaire (PEIQ)****Chlamydia screening (CDC guidelines, 2015) for asymptomatic patients**

 **Routine annual screening for sexually active women and for all pregnant women under 25 years of age**

Others;  **Women** including pregnant older than 25 who are at risk (women who have new, multiple sexual partners, and history of chlamydia)

 **Men** in high prevalence clinical settings, and MSM

1. If a female patient who is sexually active and younger than 25 years old had no symptoms associated with chlamydia/GC, would you still order STD screen?
 - 1) Yes
 - 2) No
 - 3) Yes, if I remember the CDC guidelines
2. **If no**, would you please answer the question why you don't order STDs even though the CDC guideline recommends to screen for female asymptomatic patients who are younger than 25 years old?
 - 1) The patient is asymptomatic
 - 2) Not necessary based on my professional decision
 - 3) Unaware of the CDC guidelines
 - 4) No time; too busy
 - 5) Wasting time/money
 - 6) I don't want to order
 - 7) ER is not the right place, may be GYN/Primary clinic
 - 8) A patient has conditions more serious than chlamydia
 - 9) Others
- 10 If an asymptomatic patient has a history of positive STDs, are you going to screen?
 - 1) Yes
 - 2) No