Syphilis on the Rise: Arizona's Race to Prevention

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I have no known conflict of interest to disclose.

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Abstract

Congenital syphilis (CS) is on the rise nationally; in 2020, Arizona became ranked number one in the nation for CS rates and continued to have the highest rates for three years (Arizona Department of Health Services [AzDHS], 2023). Pregnant women are tested for syphilis twice during pregnancy and once at the time of delivery, yet infants continue to be born with CS at alarming rates (Centers for Disease Control and Prevention [CDC], 2023). CS leads to many complications, including neonatal and fetal demise. A literature review revealed it is common for a pregnant person to have an episodic hospital visit to an obstetrical (OB) triage unit during their pregnancy. The goal of this project is to screen non-laboring OB triage patients through a new protocol that is aimed at testing for syphilis in those who report limited to no prenatal care. Participation is offered to OB providers and is voluntary. The project includes a pre-education questionnaire, a provider education session followed by a post-education questionnaire, along with a three-month follow-up questionnaire. The questionnaires examined the providers' knowledge, attitude, and behavior towards syphilis and the new protocol. Data analysis was completed by the use of descriptive statistics using these data points. Additionally, qualitative answers were studied for recurrent themes. The project results support the use of provider education sessions for the introduction of the new protocol and should be considered as a strategy to continue combating the high CS rates locally and nationally.

Keywords: Congenital Syphilis, prenatal care, provider education, syphilis

Syphilis on the Rise: Arizona's Race to Prevention

Syphilis is a preventable sexually transmitted infection (STI), but somehow this infection continues to be transmitted from one person to another. Recently, there has been a rise in syphilis rates affecting people around the world. Nationally, Arizona has become a top location for congenital syphilis rates; infants are dying due to a completely preventable illness.

Problem Statement

Many people seek prenatal care starting from the time they identify they are pregnant. However, there are many barriers that may prevent a pregnant woman from establishing care during her pregnancy; known barriers that prevent adequate prenatal care include those experiencing housing instability, substance use disorder, and/or a history of previous incarceration (Kimball et al., 2020). A combination of these factors with other social determinants of health could lead a person to have little to no prenatal care visits throughout their pregnancy. With the recent rise in syphilis, there have been increasingly high rates of CS among pregnant people with little to no prenatal care. CS is a condition in an infant that is caused by the vertical transmission of syphilis; when a mother has syphilis and does not receive or complete the full course of treatment while pregnant, it is then transferred through blood to the fetus (Hackley & Kriebs, 2016).

In 2015, syphilis cases started to rise but the CS rates were low across the state of Arizona (AzDHS, 2018). In 2020, Arizona was ranked number six in the nation for primary and secondary syphilis rates, with a total of 1,454 new cases (CDC, 2022a). Even though syphilis is treatable, Arizona had high rates of vertical transmission; this ultimately ranked the state number one in the country for CS (CDC, 2022a). In 2020, Arizona had 120 infants diagnosed with CS, resulting in 12 infant deaths; in 2021, there were 181 infants with CS and 14 deaths (AzDHS,

2024). Proceed to 2023 and there were 2,750 cases of syphilis in females, 213 babies born with CS, and 21 infant deaths (AzDHS, 2024). In Arizona, infant deaths due to CS more than doubled within one year.

When looking at specific counties, Pima County had a total of 27 syphilis cases that involved pregnancy throughout 2020; recent data shows that as of October 2021, Pima County had 25 cases of syphilis that involved pregnancy (Pima County, 2022). Maricopa County is also on the rise; data from 2018 noted that syphilis rates more than doubled within a year (Maricopa County, n.d.). Overall, AzDHS (2024) reports there has been a 449% increase in cases in the last eight years.

The United States has emphasized controlling the increasing rates of syphilis and other preventable infections through the Sexually Transmitted Infections National Strategic Plan [U.S. Department of Health and Human Services (HHS), 2021]. At the state level, AzDHS has provided a $300,000 grant that is aimed at increasing syphilis screening for men and women up to 34 years old (Affirm Sexual and Reproductive Health for All [Affirm], 2023). The CDC recommends that all pregnant women be screened for syphilis at their first prenatal visit, their 28-week gestational visit, and then again at the time of delivery (CDC, 2021). These initiatives play an important role in supporting the screening guidelines outlined by the CDC.

Purpose and Rationale

As infants continue to be diagnosed with CS at an alarming rate and fetal demises continue to increase, it is becoming clear that there is a disconnect between prenatal screening and treatment. Vertical transmission of syphilis is preventable when women are tested and provided with the correct treatment promptly. The purpose of this project is to implement a

provider education session about a new OB triage syphilis screening protocol in effort to prevent vertical transmission and decrease the rates of fetal demise due to CS.

Background and Significance

In the 1920s, syphilis was on the rise in the United States. Information regarding the short and long-term effects of the infection was lacking; this led to what is known as the Tuskegee Study (Barrett, 2019). The study began in 1932 and led to the discovery of penicillin as the standard of care for the treatment of syphilis in the 1940s. Participants were not given sufficient doses of the medication to clear the infection, which contributed to the spread of syphilis and became the cause of death for many of the study participants (Barrett, 2019). The Tuskegee Study is well known for its lack of ethical considerations; elements of the research were leaked to the Associates' Press and the United States Government and the Department of Health, Education, and Welfare got involved. Multiple concerns were brought forward by an Ad Hoc Advisory Panel; on November 16, 1972, the Assistant Secretary of Health, Merlin K. DuVal, notified the CDC that the study should be terminated (Barrett, 2019). In the history of medical research and ethical standards, the Tuskegee Study is regarded as a pivotal event.

Fast-forward to the current time, penicillin G is still the preferred medication for syphilis treatment and is the only treatment for a pregnant woman (CDC, 2021). The most common test for determining whether an individual is infected with syphilis is a serum rapid plasma reagin (RPR) test (Satyaputra et al., 2021). It is important to perform multiple tests throughout pregnancy since it takes two weeks for an RPR to become reactive, also known as positive. A reactive RPR would warrant treatment for the mother to prevent vertical transmission to her fetus (Satyaputra et al., 2021). If a woman tests positive for syphilis and has a penicillin allergy, it is

the standard to provide desensitization therapy so that she can receive a treatment that will penetrate the placenta and provide the antibiotic to her fetus (CDC, 2021).

The increasing prevalence of congenital syphilis is alarming. In the STI national strategic plan, multiple goals are outlined over five years. One of the primary objectives is to reduce STI rates, which include syphilis, as quickly as possible (HHS, 2019). A major goal of the plan is to improve health outcomes for those with current infections and to prevent new infections from occurring.

Population

The increasing rate of CS in Arizona must be spearheaded by targeting the infectious process at the beginning. To prevent CS within a fetus or infant, pregnant people must be screened and treated for syphilis. Therefore, pregnant people, and those of childbearing age, are the target population to prevent CS. It is important to put an emphasis on those who experience homelessness, are diagnosed with substance use disorder, do not have health insurance, have been incarcerated, are late to or lack prenatal care, have multiple sex partners, or live in a rural or low socioeconomic area (CDC, 2022c; Chan et al., 2021).

Current State

The current healthcare delivery system in Arizona has proven that it is unable to prevent syphilis transmission between partners, as well as between a pregnant person and their fetus. In Arizona, the law states that a provider must screen for syphilis at the first prenatal visit, regardless of when that occurs during the pregnancy (Maricopa County, n.d.). In 2021, 8.9% of live births in Arizona were to mothers with little to no prenatal care; it is unclear if any of the people were screened or treated for syphilis during their pregnancy (March of Dimes, 2023). That same year, 18.6% of live births were born to people who did not receive adequate prenatal

care, which makes it very possible that the pregnant person missed their syphilis testing and, or treatment.

In addition to the lack of prenatal care, Arizona lacks sex education. Currently, there is a requirement for parents to provide consent for their child to participate in sexual health courses, but there is no mandate to provide sex education within Arizona school systems (Sex Education Collaborative, n.d.). The lack of education surrounding the prevention of STIs in combination with students who do not have parental consent to participate can have a major impact on the spread of STIs.

Desired Outcome

When testing pregnant people for syphilis throughout their pregnancy, the desired outcome is to identify positive syphilis cases and provide treatment, thus preventing the fetus from contracting syphilis. The project objective is to increase early diagnosis of syphilis with the intent to impact the implementation of treatment for the desired outcome, which is to prevent vertical transmission. Decreasing CS rates to zero is an outcome that can be achieved, and Arizona has previously experienced this in the past.

Once a pregnant person has a positive RPR, their partner(s) must be tested and treated to prevent further transmission of this infection. By treating the pregnant person and their partner, there is an effort made at decreasing overall transmission and improving rates of vertical transmission, poor health outcomes, and infant death.

Internal Evidence

A large tertiary care teaching hospital in the desert southwest was identified as a center with an influx of limited prenatal care population. Stakeholders expressed concerns with the high rates of syphilis and CS in the state of Arizona and the possible association with the high rates

and no prenatal care. There was concern that obstetric (OB) triage visits were not being utilized as an opportunity to test these patients for syphilis. Implementing a screening process specific to syphilis for non-laboring pregnant people who present to OB triage could have a large influence on combating Arizona's rates of CS.

The southwestern United States is vast with many areas lacking healthcare providers and hospitals. Due to the lack of resources, many individuals are transferred to larger facilities for treatment. The chosen site for this project is an OB triage unit at a level-one trauma hospital in southern Arizona. The Obstetric staff have noticed a rise in syphilis rates among pregnant patients and report an increase in CS cases. This hospital has over 600 beds that include an adult and pediatric ED, a labor and delivery unit, and a neonatal intensive care unit (NICU) among many other specialties. The OB triage has four private rooms, and the labor and delivery unit has two operating rooms, three post-anesthesia-care-unit (PACU) beds, and 12 private inpatient rooms. This facility serves multiple ethnicities, including Caucasian, Hispanic, and/or Native American, with approximately 50% of patients being female (The United States Census Bureau, 2022).

In the past, this region did not have any cases of CS; as of 2015, Arizona is one of the states with the highest rates of syphilis transmission (AzDHS, 2023). There has been discussion between the obstetric and pediatric departments regarding this increase; the rise in CS cases these departments have seen individually has brought the departments together to address risk factors, testing, and treatment. Each department is aware of the implications that untreated syphilis can have on their patients and is invested in decreasing syphilis rates in their community. The hospital and the associated organization stakeholders have become aware of this rise as well; they have set a goal to make a healthier community by providing evidence-based care to improve

the community's health with the assistance of health care providers, health departments, and insurance companies. If syphilis-positive pregnant people are treated for the infection promptly, theoretically, the number of infants born with CS and consequential fetal deaths due to untreated syphilis will decrease.

PICO Question

In pregnant women at risk for syphilis, how does a provider-centered information tool, compared to current practice, impact partner notification, transmission, and congenital syphilis rates?

Search Strategy

A comprehensive review of the current evidence was conducted. The three databases used to identify the research studies were CINHAL, PubMed, and SCOPUS. These databases were selected for their relevancy to the topic of syphilis and partner notification.

Keyword Selection

The search addressed portions of the PICO question with specific terms. The following terms were used to identify the population, intervention, and outcome: *pregnant, pregnant women, pregnant female, female, sexually active female, syphilis, congenital syphilis, sexually transmitted infections, high-risk factors, late prenatal care, no prenatal care, OB triage, screening, screening tool, testing, prevention, treatment, provider notification, partner, and partner notification.* MeSH terms were connected as Boolean terms to provide a broad range of research that could be paired down. Specific studies were examined by adding the search terms *qualitative, quantitative, and randomized control trial* (RCT).

Initial and Final Search Yields

An initial search of PubMed using key terms *prevention, CS,* and *RCT*; which yielded one result. Mesh terms were added and the key terms were made less specific to widen the search. This search yielded 32 results; further search terms surrounding STIs and specific populations were added. Filters were then added to further limit the search. Additional searches yielded three to 43 results.

The initial search of CINHAL provided rather straightforward results. The initial search yielded 157 results by the use of a Boolean phrase, *syphilis AND partner notification*. The search was then altered by adding a limitation of studies published from 2018 to the present which yielded 38 studies.

The database search using SCOPUS resulted in an initial 145 results when *syphilis, partner* AND *notification*, and *treatment* were used. This search was entered a second time and the search engine split up the word *notification*. This created *NOT* as a connecting Boolean term and "*ification"* as a search term; the error resulted in 563 studies. Multiple variations were created with MeSH terms; the final search used the words *quantitative* and *congenital syphilis prevention*, which yielded seven studies.

Limitations, Inclusion, and Exclusion Criteria

Limitations were added to narrow the search criteria to exclude studies that are over five years old and outside of the United States. The use of filters was used for the inclusion of studies that have female participants, are randomized control trials, and have free access to the full publication.

The research articles from each database were carefully examined and 12 studies were selected. These studies were chosen for a thorough review that is aimed at answering the PICOT

question. Of the chosen articles, three are randomized control studies, one of which is double-blinded, six retrospective reviews, and one cohort study. Two qualitative studies were selected, two that are a narrative review, and one that follows the random-effects logistic regression model.

Critical Appraisal and Synthesis of Evidence

The studies chosen for review were subjected to the rapid clinical appraisal (RCA) checklist (Melnyk & Fineout-Overholt, 2019). Of the 12 studies, 10 of them were found to be quantitative studies, and these were reviewed through the RCA checklist. By using this method, the quality of evidence was easily identified. The checklist gives a level of evidence (LoE) score, that correlates to the strength of the presented material (Melnyk & Fineout-Overholt, 2019). Eight of the 10 articles have an LoE of two; this means that the research was well designed, and is most likely from a RCT. The two qualitative studies utilized the RCT checklist, however they yielded lower LoE due to the subjective nature of the studies.

Discussion

The research found regarding syphilis rates among pregnant women and their partners were very widespread. Each study had valid points, such as fear of pain during treatment as a barrier to completing care, however, this was not mentioned across many studies. Multiple studies listed similar high-risk demographic factors that are associated with the diagnosis of syphilis, such as substance use, previous incarceration, multiple sex partners, and housing instability. Pregnant women are a group that is difficult to approve research and implement studies on, and this could contribute to gaps within the research. To stop the surge of CS, it is important that people receive sexual health education so that they can prevent the transmission of STIs from the start. Until this form of education is implemented, it is vital for providers to ensure

patients are screened for STIs at routine intervals, tested for syphilis during pregnancy by following standard recommendations combined with their clinical judgment, and incorporate partners into the notification and treatment process.

Theory/Theoretical Framework Application

The theory of health belief is applicable when addressing high syphilis and CS rates. The health belief model (HBM) allows for the patient's perception to be combined with action (Champion & Skinner, 2008). When one has a syphilis-positive lab result, their perception is taken into account, do they feel treatment is necessary, do they think something negative will result if they do not complete or receive treatment? As the person processes the diagnosis, they follow the HBM (see Appendix B, Figure B1) to its final step of if they would act to follow health recommendations (Champion & Skinner, 2008).

Implementation Framework

The model for improvement (MFI) is a framework that can be used to address increasing rates of syphilis (Institute for Healthcare Improvement [IHI], 2022). The MFI asks three questions that guide the researcher. The first question aims to identify what the goal of the project is; in this case, the overall goal is to prevent vertical transmission of syphilis. The next question asks how the researcher will know there is an improvement (IHI, 2022). Theoretically, there will be an improvement as rates of treatment in syphilis-positive pregnant people increase and CS rates decline. The last question is formulated to address any changes that could be made to positively impact improvement rates (IHI, 2022).

The MFI framework also has a guide on how to create and implement a change; it is called the Plan-Do-Study-Act (PDSA) (IHI, 2022). The planning phase includes examining an issue and identifying a potential intervention. Throughout the planning phase, it was determined

that in order to test and treat pregnant people for syphilis who lack prenatal care, it would be important to identify this population during an episodic ED or OB triage visit.

To implement an intervention, Lewin's Change Theory provides a three-step process (Lewin, 1951). The first step is called "unfreezing." This is where project planning occurs; this includes the material creation of protocols, questionnaires, recruitment flyers, and data collection tools. The second step is the "change" portion; during this step, the intervention is presented and implemented (Lewin, 1951). The final step is "refreezing." While in the refreezing step, data is analyzed to identify the intervention's impact.

Implications for Practice Change

When combining the HBM with the MFI and Lewin's Change Theory, the process of creating and implementing an intervention will be well thought out, and improving patient outcomes is bound to happen. By starting with planning from the PDSA portion of the MFI, one could choose to follow the guidance from the research that encourages continuing to screen and treat patients for syphilis (IHI, 2022). To make an impact on syphilis rates, there is an aspect that relies on the provider's ability to recognize high-risk factors that are associated with syphilis. In OB triage, a high-risk syphilis screening tool can be used to identify pregnant people who are at a greater risk for contracting syphilis. The health care provider can then use the screening tool as a reason to order syphilis testing. By ordering testing on people who screen positive, there is an effort being made by the health care team to address unknown syphilis cases, provide treatment, and prevent vertical transmission.

Methods

Ethical Considerations

During project creation, ethics and protection for human subjects were constantly considered. The project itself will not collect any personal health information (PHI) on patients and participants in the project. The project proposal with all supporting documents was submitted to the hospital organization's Research Determination Committee (RDC) and approved on November 14, 2023. After approval from the RDC, the project proposal was submitted to Arizona State University's Institutional Review Board (IRB); approval for project implementation was granted on December 5, 2023.

Population and Setting

The target population for this project is the OB-GYN resident and fellow physicians practicing at the selected site. Participants include consenting medical providers who are employed by the hospital and work in the labor and delivery unit. Providers include maternal-fetal-medicine fellow physicians and OB-GYN resident physicians. The providers who participate in the weekly OB-GYN education days will be eligible to participate; the implementation education session will take in the same room the weekly education is provided. The anticipated participant volume is 20 healthcare providers. Excluded participants are people who are not healthcare providers and do not hold prescriptive authority. No patients, minors, adults who are unable to consent, prisoners, economically or educationally disadvantaged individuals, or pregnant patients will be included in this project.

Project Description

The project will be implemented following the steps described in Lewin's Change Theory (Lewin, 1951). The following steps will be followed:

Unfreezing:

1. On November 15, 2023, the DNP student will spend approximately one hour posting the recruitment flyer in areas where providers for OB triage frequently spend time, including, but not limited to the following (see Appendix B, Figure B3)
    a. OB call rooms, provider break rooms, charting areas, and workspaces
2. On December 20, 2023, at 9 am in hospital 5th floor education room, during the scheduled OB education session, the DNP student will read the consent to participate script (see Appendix B, Figure B4). This script will be provided on paper for participants to read prior to completing step three
3. Distribute the pre-education questionnaire on paper with pens and provide 5 minutes for completion (see Appendix B, Figure B5). DNP student to collect completed or blank questionnaires via a drop box that will be passed around the room

Change:

1. Education session:
    a. Immediately following the collection of the pre-education questionnaire, in the same room, the education session will begin, taking approximately 15 minutes
        i. Distribute a copy of the protocol to all participants and those attending the education session (see Appendix B, Figure B1)
        ii. Presentation (see Appendix B, Figure B7)
    b. Distribute the Post-intervention questionnaire, and provide 5 minutes for completion (see Appendix B, Figure B8)
    c. Collection of completed or blank post-education questionnaires via a drop box

2. Return three months later during the scheduled OB education session in the 5th floor education room for the 3-month follow-up questionnaire completion and collection (see Appendix B, Figure B9)
    a. Re-introduction by DNP student, reminder on subject ID number for data collection correlation.
    b. DNP student to read the consent to participate script
    c. Distribute the 3-month follow-up questionnaire with pens. Provide 5 minutes for completion
    d. Thank each participant individually as questionnaires are returned to the drop box
    e. DNP student to place surveys in a designated folder and locked cabinet.
3. Refreeze (Post-Intervention):
    a. Data collection and comparison

Data Collection

Data will be entered into a spreadsheet created specific to this project (see Appendix B, Figure B10). Descriptive statistics will be completed by inputting the quantitative data collected into Intellectus Statistics (2023) software. Review of the qualitative questionnaire answers will be conducted and common themes will be identified and reported by the DNP student. Results and final presentation will be shared and available to the site's OB-GYN department and Arizona State University.

Budget and Funding

The DNP student will prepare all materials and provide all materials used for the education session. The budget for all supplies needed is to not exceed $250. This will include paper and printing costs for recruitment material, protocol handouts, and questionnaires. In

addition, pens, light snacks, beverage options, and necessary utensils will be provided. There is no additional funding or donations for this project.

Results

All of the data collected was intended to assess the impact of the education session in relation to the participant's knowledge, attitudes, and behaviors for syphilis testing in pregnant patients. Intellectus Statistics (2023) software was used to store, manage, and analyze data sets.

Demographics

The participants were all OB-GYN resident physicians employed at the project site (n = 8). A majority of the sample were between the ages of 24 to 27 and 32 to 35 (n = 4, 50%). The remaining sample were between the ages of 28 to 31 years old (n = 3, 38%) and 35 to 39 years old (n = 1, 13%). Age demographics can be found in Table 1.

Table 1

Frequency Table for Age

Variable	*n*	*%*
Age		
24-27	2	25.00
28-31	3	37.50
32-35	2	25.00
35-39	1	12.50

Descriptive Statistics

Questionnaires were analyzed through the use of descriptive statistics, specifically reviewing the overall competency and each domain in relation to the education session. The pre-competency syphilis screening average score was 17.12 (SD= 2.75); the scores range from 14 to 21 points. The post-competency syphilis screening average score was 17.75 (SD= 2.71); the scores range from 14 to 21 points. The 3-month follow-up competency syphilis screening

average score was 19 (SD= 2.51); the scores range from 16 to 23 points. The competency statistics can be found in Table 2.

Table 2

Competency Statistics

Variable	*M*	*SD*	*n*	Min	Max
Pre-competency syphilis screening	17.12	2.75	8	14.00	21.00
Post-competency syphilis screening	17.75	2.71	8	14.00	21.00
F/U-competency syphilis screening	19.00	2.51	8	16.00	23.00

The different domains assessed were knowledge, attitudes, and behavior. The pre-knowledge had an average score of 1.88 (*SD* = 0.35); the scores range from 1 to 2 points. The post-knowledge had an average score of 2.12 (*SD* = 0.83); the scores range from 1 to 3 points. The follow-up knowledge had an average score of 2.00 (*SD* = 0.53); the scores range from 1 to 3 points. The pre-attitudes had an average score of 9.50 (*SD* = 1.41); the scores range from 8 to 12 points. The post-attitudes had an average score of 10.12 (*SD* = 1.55); the scores range from 8 to 12 points. The follow-up-attitudes had an average score of 10.62 (*SD* = 1.30); the scores range from 8 to 12 points. The pre-behavior had an average of 5.75 (*SD* = 1.75); the scores range from 3 to 8 points. The post-behavior had an average score of 5.50 (*SD* = 1.60); the scores range from 4 to 8 points. The follow-up behavior had an average score of 6.38 (*SD* = 1.30); the scores range from 4 to 8 points. The domain summary statistics can be found in Table 3.

Table 3

Summary Statistics: Knowledge, Attitudes, and Behavior

Variable	*M*	*SD*	*n*	Min	Max
Knowledge					
Pre-knowledge	1.88	0.35	8	1.00	2.00
Post-knowledge	2.12	0.83	8	1.00	3.00
F/U-knowledge	2.00	0.53	8	1.00	3.00
Attitudes					
Pre-attitude	9.50	1.41	8	8.00	12.00
Post-attitude	10.12	1.55	8	8.00	12.00
F/U-attitude	10.62	1.30	8	8.00	12.00
Behavior					
Pre-behavior	5.75	1.75	8	3.00	8.00
Post-behavior	5.50	1.60	8	4.00	8.00
F/U-behavior	6.38	1.30	8	4.00	8.00

Qualitative Results

The post-education and 3-month follow-up questionnaire included written questions that were analyzed for the presence of common themes and the use of the proposed protocol. A majority of participants chose to not answer the written questions. However, those who did provide answers expressed appreciation for the use of informative statistics in the education session, and over half of the participants felt the protocol was clear and easy to follow.

Clinical Significance

Participants overall competency scores increased from the pre-education questionnaire through the 3-month follow-up questionnaire. It is important to note the slight knowledge regression between the post-education questionnaire and the 3-month follow-up. Nonetheless, the competency scores increased and the standard deviations decreased, which indicates the education session was clinically significant.

Project Impact and Sustainability

Organizations often use education sessions to introduce a new workflow to their staff; however, it is not always known if the education ended in a practice change. An organization can attempt to change workflows and implement new protocols, but without thoughtful implementation, the proposed changes may never make it into standard practice. The creation of this protocol was brought to life because healthcare providers in Arizona have seen the increase in CS rates first-hand; they want to be able to influence the CS rates through their practice. This project allows the organization to determine if the education session for implementation of the protocol was beneficial for the providers, thus influencing patient plans of care and aiding in the decrease of CS.

A key component to creating a sustainable change is to methodically implement the desired change; this project follows the steps outlined by Adelman and Taylor (2003) to maintain sustainability. Hospital systems often use education sessions as way to inform their staff of new policies, protocols, and processes. The data analysis highlights the positive impact this form of protocol dissemination had on the OB-GYN resident participants. Combining this educational influence with the potential for positive patient outcomes, provider-education sessions should be considered as a sustainable change.

Discussion

Limitations and Barriers

Although the data reflects a successful quality improvement change project, a thorough reflection of the project identified challenges. The first limitation is that the education session focused on the introduction of the protocol and did not incorporate its use into the standard workflow. This protocol has the potential to make a large impact and would have benefited from

incorporating it into the OB triage standard workflow. Placing more emphasis on the workflow would ensure that the providers screened all non-laboring OB triage patients for the need for syphilis testing.

A barrier that impacted the timely implementation of the project involved communication issues throughout the site organization. The DNP student is not employed by the site and identifying the correct persons within the RDC was extremely difficult. The staff on the labor and delivery unit, including the nurse manager and medical director, were not aware of the RDC and how to go about submitting a project for approval. The project was intended to begin in the fall of 2023 but was not approved until December 5, 2023. During the project, the site champion was inaccessible. This challenged the completion of the project as they were responsible for coordinating and confirming the dates of the education sessions and 3-month follow-up with the DNP student. Consequently, the 3-month follow-up was delayed by three weeks. Effective communication is an essential element for project implementation; in this instance, communication has been identified as a systemwide barrier. This is concerning as the rates of CS continue to rise in Arizona. The protocol was created with the intent to be utilized and spread throughout the multiple hospitals in the organization.

To evaluate the use of the protocol, it was requested to obtain data relating to syphilis testing orders placed in OB triage and the associated results before and after implementation of the new protocol. The project site created a barrier to having comprehensive data to review by denying the evaluation of the site's testing rates and the. Despite attempts to gain approval for this data set, analysis of the use of the protocol through ordered tests was unable to be assessed.

Implications and Future Recommendations

The main implication of this project is that healthcare providers can impact CS rates. Increasing providers' knowledge, attitudes, and behavior towards syphilis testing in OB triage implies that syphilis testing in non-laboring pregnant patients will increase. Therefore treatment rates during pregnancy will increase and CS rates will improve. Literature supports the use of provider-based education sessions as an effective way to implement change. The questionnaire results imply that the education presented to the participants was a successful way of communicating change, however, there is room for improvement. Given that there was a knowledge decline at the 3-month follow-up, there is a need for knowledge reinforcement. The organization could implement a biannual provider-education session to provide updates on statistics, national and local initiatives, changes in practice guidelines, and reinforce the use of the protocol. Many providers besides OB-GYN residents service OB triage, such as OB-GYN attendings, maternal-fetal-medicine fellows, ED residents, family practice providers, and nurses. Nurses play an essential role in OB triage. By educating the nurses and increasing their knowledge of syphilis and CS rates the community is facing, they can encourage provider use of the protocol and impact testing rates. In addition to nurses, nurse managers have a significant role within a hospital unit's education, reinforcing protocols, and monitoring protocol compliance. Consideration to include the different disciplines in project development and future education sessions should be made to expand the use of the protocol and reach more patients.

To successfully implement this project in the future, it is essential to create a realistic timeline and communicate the expectations from the beginning. The timeline should include expected dates for the RDC application review and the anticipated date for project approval. Should the RDC request changes to the project, it would be advantageous to have an alternate

timeline that accounts for delays in project approval. Dates, times, and room locations for all events included in the project should be agreed upon between the site champion and the DNP student prior to the implementation date. After project completion, a results dissemination presentation was offered to the site champion, participants of the project, and OB-GYN-related employees. The project heavily relied on the site champion for scheduling and implementation and the presentation was denied; this could be due to the site champion having many roles with the hospital and associated clinic. The presentation was emailed to the site champion with the ability to disperse it to the department. Openly communicating the results throughout the department and the organization could reinforce the use of this protocol. The future use of the protocol is dependent on the support of the site champion and the OB-GYN providers. The project would benefit from the addition of a site champion who is more administrative; this way communication and decisions for the project timeline and dissemination of the results would not rely on clinical staff.

The final recommendation is for provider compliance to be evaluated through monitored use of the protocol and site testing rates. Compliance is valuable and necessary information when evaluating the protocol's impact. Providers could become more motivated to implement the protocol into their standard practice if compliance was a measurable outcome. To accomplish this, the creation of a reminder, or flag, within the electronic medical record could be used to monitor protocol use.

Conclusion

The OB triage has become a common place for pregnant people to seek and receive care. For many patients who do not receive ample prenatal care, episodic hospital visits are common and present an opportunity for routine care and testing, which is often overlooked in this setting.

It is critical for healthcare providers, of all disciplines, to utilize episodic hospital visits as a point-of-care opportunity. When the organization implements provider education sessions to inform the healthcare team of public health concerns their community is facing, they align themselves with national and local health initiatives. By addressing the identified limitations and barriers, and monitoring the future use of the protocol, there is the potential to impact local CS rates greatly. This project provides a foundation for a necessary quality improvement change and is a starting point to include healthcare providers in transforming the health of pregnant women and their fetus' in an unconventional way.

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Appendix A

Evaluation and Synthesis Tables

Table A1

Evaluation Table for Quantitative Studies

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice/ Generalization
Adachi et al., (2018), Combined evaluation of sexually transmitted infections in HIV-infected pregnant women and infant HIV transmission **Country:** Netherlands	None listed. Presumed Health Promotion Model	**Design:** Retrospective cohort study **Purpose:** To determine if there is a correlation of +STIs and HIV in maternal transmission in mother-infant pairs	**N=** 1684 mother-infant pairs **Demographics:** 53.4% had specimens available for maternal CT, NG, TP, and infant CMV testing. 86.2% were from Brazil,	**IV1:** maternal-infant pair **DV1:** Maternal HIV + **DV2:** Maternal HIV and STI + **DV3:** infant HIV + MTCT -*DV3a*: MCTC of one STI -*DV3b*: MCTC of two STIs	**Tools:** Chart reviews and urine testing **Validity/Reliability:** Large sample size with excluded criteria applied to different aspects of the research, therefore increased validity.	**Statistical Tests Used:** Kruskal-Wallis test & Chi-square test	**DV1:** 69.8% were HIV+ mothers. **DV2:** 30.2% of HIV + mothers had a co-infection. **DV3:** 9.1% HIV+ infants -*DV3a*: MCTC of one STI: 10.8% -*DV3b*: MCTC of two STIs: 23.8%	**Level of Evidence:** Level 3 **Strengths:** Participants wide geographical range, strong correlations represented in data results **Weakness:** Population was not representative of parent study. Unable to test for all STIs, such as bacterial vaginosis

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Funding: National Institute of Child Health and Human Development (NICHD) **Bias:** No conflict reported.			Argentina, and the U.S. 13.8% were from South Africa. 26.5: Mean maternal age 69.4% had PNC. Reports of Substances during pregnancy: 36.5% alcohol, 37 % tobacco, & 9.8% illegal substances 4.8% had stillbirths. **Setting:** Samples were from labor	-*DV3c*:MCTC of three or more STIs **DV4:** Infant HIV- with STI MTCT -*DV4a*: MCTC of one STI -*DV4b*: MCTC of two STIs -*DV4c*:MCTC of three or more STIs **Definitions:** **CMV** Cytomegalovirus **CT** *Chlamydia trachomatis* **MTCT** maternal to child transmission			-*DV3c*: MCTC of three or more STIs: 12.5% **DV4:** 90.9% of infants -*DV4a:* MCTC of one STI: 89.2% -*DV4b:* MCTC of two STIs: 76.2% -DV4c: MCTC of three or more STIs: 87.5%	and herpes simplex virus. **Feasibility:** Very feasible as the recommendation is to follow PNC appointments/screenings **Application:** Able to generalize to the public

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			and delivery units in Brazil, Argentina, and the U.S. **Exclusion:** 47% of the participants due to not having testing results available. Any testing that was indeterminate was rerun two times, if still indeterminant, the sample was removed. **Attrition:** Not mentioned.	**NG** *Neisseria Gonorrhoeae* **TP** *Treponema pallidum*				

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Almeida et al., (2021). Syphilis in pregnancy, factors associated with congenital syphilis and newborn conditions at birth. **Country:** Brazil **Funding:** Federal Council of Nursing and the Coordination for the Improvement of Higher	None listed. Presumed Health Promotion Model	**Design:** Retrospective cohort study **Purpose:** to investigate factors associated with the occurrence of congenital syphilis in pregnant women with syphilis	**N=** 158 pregnant women with syphilis during pregnancy **Demographics:** 71% of women with syphilis were white, had nine or more years of schooling and performed unpaid work. 96.8% had prenatal care. **Setting:** -Botucatu, Brazil -8 traditional health clinics, 12 family health clinics, and 2 labor and	**IV1:** 74 +CS cases (46.8%) **DV1:** Inadequate maternal treatment **DV2:** Late maternal treatment **DV3:** Lack of partner treatment **Definitions:** N/A	**Tools:** Software Statistical Package for the Social Sciences **Validity/Reliability:** n/a	**Statistical Tests Used:** Wald test.	**DV1:** 17.9% of examined CS cases. **DV2:** 3.2% of examined CS cases. **DV3:** 39.0% of examined CS cases.	**Level of Evidence:** Level 2 **Strengths:** reinforces the need for syphilis + people to complete treatment. Large collection of +CS patients which research is lacking. **Weakness:** Unclear what the screening and testing guidelines were for the participants when they had PNC. **Feasibility:** Feasible, however if this is a major changes to have women increase their PNC visits, then there could be a strain on providers in this particular area.

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Education Personnel **Bias:** None listed. No conflict reported.			delivery locations. **Exclusion:** Not mentioned. **Attrition:** Not mentioned.					**Application:** Generalization to other populations is applicable, as CS needs to be prevented.
Biswas et al., (2018). Characteristics associated with delivery of an	None Listed.	**Design:** Retrospective chart review	**N=** 2498 women	**IV1:** Women with positive syphilis test during pregnancy or	**Tools:** Birth records and chart reviews	**Statistical Tests Used:** $\chi 2$ tests and	**DV1:** 134 (17%) gave birth to a CS positive infant	**Level of Evidence**: Level 2 **Strengths**: Ability to determine shared

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infant with congenital syphilis and missed opportunities for prevention—California, 2012 to 2014 **Country**: United State **Funding**: None Declared **Bias**: None declared		**Purpose:** To identify characteristics among women who were syphilis-positive, delivered and infant with or without CS, and missed opportunities for care and/or prevention among syphilis-positive pregnant women	**Demographics:** Age: 15-45 years old **Setting:** Birth records from the California **Exclusion:** -Women who refused to answer or missed a question -Non-pregnant syphilis cases -Syphilis-positive stillbirths	time of delivery **DV1:** Delivery of a CS positive infant **DV2:** Delivery of an infant without diagnosis of CS **Definitions:** *CS* Congenital Syphilis	**Validity/Reliability:** Statewide data, and a large sample size with many syphilis-positive cases	Fisher exact tests	**DV2:** 293 (69%) deliveries were not diagnosed CS	demographic information that are high-risk factors for syphilis-positive pregnancies. Specifically women who have been paid or received money and/or drugs for sex, methamphetamine or cocaine use, and previous incarceration in the last 12-months **Weakness**: Women who had syphilis during pregnancy or at time of delivery, with the delivery of a still birth were excluded. **Feasibility**: feasible to complete since data points have been identified from this study

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			-Women diagnosed with late syphilis **Attrition:** not identified					**Application**: Applicable to review in each State that is experiencing an increase in syphilis and CS cases
Dunseth et al., (2017), Traditional versus reverse syphilis algorithms: A comparison at a large academic medical center **Country:** United States **Funding:**	None listed. Presumed Health Promotion Model	**Design:** Six-year Retrospective Study **Purpose:** To examine the switch from traditional serologic syphilis testing (RPR) to reverse testing models by using syphilis IgG as a screening test.	**N= 23,065** Traditional: (n=12,612) Reverse: (n= 10,453) **Demographics:** *Traditional:* Average age 35.6 years Male to female ratio is 0.35.	**IV1:** Syphilis screening **DV1:** RPR screening **DV2:** Syphilis IgG testing on a Bioplex 2200 analyzer **Definitions:** Syphilis- a sexually transmitted infection *Treponema pallidum*- the organism that	**Tools:** Chart reviews, lab and specimen materials including the Bioplex 2200 **Validity/Reliability:** Large sample size, but low rates of positive syphilis cases.	**Statistical Tests Used:** Chi-square analysis	**DV1:** 93 patients (0.7% of total) had a reactive RPR. 53 patients (0.4% of total) were confirmed + with TP-PA. 29 of these patient had no documentation of a prior infection. 25 of these patients received treatment; the other 24 had documentation of previous	**Level of Evidence:** Level 3 **Strengths:** Large sample sizes with no exclusions. RPR & IgG testing yields similar & high sensitivity rates. Retrospective review provides strong evidence for disease processes that have latency periods.

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None mentioned. **Bias:** No conflict reported.			Obstetrical Department: 47.8% of screens Non-obstetrical and outpatient clinics: 41.3% of screens Inpatient units: 9.9% of screens ED: 1.0% of screens *Reverse:* Average age 35.6 years Male to female ratio is 0.37. Obstetrical department: 49.3% of screens	causes a syphilis infection. Rapid plasma regain (RPR)-non-treponemal test that screens for syphilis. *Treponema pallidum* particle agglutination assay (TP-PA)-when an is positive, this a confirmatory test for syphilis. Syphilis Immunoglobulin G (IgG)-			infection with treatment. Only 5 of the 24 patients received treatment. **DV2:** 13 patients (0.1% of total) screened equivocal with syphilis IgG values. 110 patients who screened positive; of those, 44 confirmed positive with a reactive RPR; all positive patients received treatment.	**Weakness:** Was tested in an area of the U.S with low syphilis rates, therefore there was not many samples to compare. **Feasibility:** Easy to replicate, presumed low cost as this was made from a chart review with statistical analysis. Provider Education will be a large factor in the ease of application. **Application:** Results are between the two variables are very close, application of testing via one variable or the

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			Non-obstetrical and outpatient clinics: 41.2% of screens Inpatient units: 8.7% of screens ED: 0.8% of screens **Setting:** University of Iowa hospitals, clinics, and an academic medical center **Exclusion:** None. **Attrition:** Not mentioned.	serum testing showing an immune response to syphilis infection.			Results: Syphilis IgG is just as sensitive as screening with an RPR. If early syphilis is not a factor being when examining results, the sensitivity of both the IgG and RPR are 100%.	other is dependent on the institution, budget, policies, and provider preference. However, it should be easy to apply the chosen method testing.

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Estrada et al., (2019), Tolerability of IM penicillin G benzathine diluted or not with local anesthetics, or different gauge needles for syphilis treatment: a randomized clinical trial. **Country:** Spain **Funding:** no external	None Listed. Presumed the Health Promotion Model	**Design:** randomized, double-blind clinical trial **Purpose:** To determine if anesthetics and/or needle gauge size impacts pain associated with IM injections of PGB.	**N=** 108 **Demographics:** 94.4% male, 41.7% have HIV, and the mean age is 36.6 years. **Setting:** Centro Sanitario Sandoval and Hospital Clinico San Carlos **Exclusion:** Under 18 years of age, no diagnosis of syphilis, diagnosis of	**IV1:** IM injection of PGB 2400,00 IU diluted with 6mL of sterile water. **DV1:** PGB with a 19G long needle **DV2:** PGB diluted with 0.5 mL MV 1% with a 19G long needle. **DV3:** PGB without anesthetic and with the use of a 21G short needle. **DV4:** PGB diluted with 0.5 mL MV 1%	**Tools:** Serum testing, PGB, MV, 19G long needles, and 21G short needles, injection supplies, and a visual pain scale. **Validity/Reliability:** all participants received and injection and provided real time pain results feedback	**Statistical Tests Used:** multiple linear mixed model performed by STATA 12.0 software.	**DV1:** n=25 average pain rating 5.56 **DV2:** n=27 average pain rating 2.92 **DV3:** n=28 average pain rating 5.06 **DV4**: n=27 average pain rating 3.36	**Level of Evidence:** Level 1 **Strengths:** Double-blinded study; the person administering the medication along with the patient/participant were unaware of group assignments. **Weakness:** Largely a young male population. **Feasibility:** Feasible as the injection of PGB recommended treatment. Including an anesthetic is low cost and provides patient comfort.

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funding identified **Bias:** Estrada, V. is a member of the editorial board for BMC Infectious Diseases. No other conflicts identified.			secondary, latent, or tertiary syphilis. Patients with any sensory perception diagnosis or cognitive impairment unable to understand or evaluate the visual analog score on pain. Patients with previous penicillin allergy. **Attrition:** none identified.	with a 21G short needle. **Definitions:** G-Gauge, needle width IU-International Unit of measurement mL- milliliters, Unit of fluid measurement MV-Mepivacaine hydrochloride, an anesthetic medication PGB- Penicillin G Benzathine, an antibiotic medication used to treat syphilis				**Application:** Generalizable to the public

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Folke et al., (2022), An evaluation of digital partner notification tool engagement and impact for patients diagnosed with gonorrhea and syphilis. **Country:** United States and London, England **Funding:** UnLtd & 4iP grant number APP1/1/12055, Guy's & St Thomas' Charity grant G101010,	None listed. Presumed Health Promotion Model	**Design:** Retrospective Review Partner notification data from 2019 were extracted from a cloud database that records the activity of health care providers using dPNt. Each partner informed by SMS or email is allocated a unique partner code that is associated with the index patient who notified them. **Purpose:** To support PN in syphilis-positive patients; Ultimately to encourage testing and treatment.	**N=** 5715 **Demographics:** Primarily Caucasian males that engage in sexual activities with other males. Age ranging from late teenage years to early 80's. **Setting:** Combination of 23 clinics in the United States and United Kingdom	**IV1:** Partner verified as tested after PN. **DV1:** Partners who tested before PN. **DV2:** Partners who self-identify with the use of dNPt. **DV3:** partners verified in clinic using dNPt. **Definitions:** dPNt- A digital PN tool PN- Partner Notification	**Tools:** dPNt software **Validity/Reliability:** Large sample size, many clinics involved.	**Statistical Tests Used:** Hierarchical logistic regression model	**DV1:** not statistically significant **DV2:** not statistically significant **DV3:** 0.67	**Level of Evidence:** Level 2 **Strengths:** Allows for anonymous PN, applies to other STIs besides syphilis and multiple diagnosis, the number of partners who were screened and tested for syphilis increased by 23%. **Weakness:** The need for a digital communication device that is compatible with dPNt. **Feasibility:** Overall feasible- there is a cost for the program to integrate into the EHRs and Clinics,

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Public Health England HIV Prevention Innovation Fund grant 092 BSP 2459, Comic Relief / MAC AIDS Fund, HIV in the UK: Think digital grant 2778545 and SXT Health CIC customers in 2019. **Bias:** Menon-Johansson is the Founder & Director of SXT Health CIC. Thomas Folke declares no conflicts of interest.			**Exclusion:** Negative STI results **Attrition:** Not mentioned					along with training HCPs. **Application:** Can easily be generalized to many populations, especially young adults who are sexually active.

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Mmeji, O. et al., (2015). Discordant syphilis immunoassays in pregnancy: perinatal outcomes and implications for clinical management. **Country**: United States **Funding**: NIH training grant (T32AI065388) from the National Institute of Allergy and Infectious	None Listed.	**Design:** Retrospective review **Purpose:** To examine reverse sequence algorithm with negative RPR syphilis testing and associated birth outcomes	**N=** 194 **Demographics:** Pregnant women 18 years and older with a positive CIA test and a negative RPR, with known birth outcomes **Setting:** Kaiser Permanente Northern California **Exclusion:**	**IV1: +** CIA and - RPR women **DV1:** + TP-PA **DV2:** - TP-PA **Definitions:** CIA-chemiluminescence immunoassay TP-PA-*Treponema pallidum* particle agglutination assay	**Tools:** Lab test materials for CIA and RPR testing, maternal and infant medical charts for review Stata version 12 (StataCorp, College Station, Texas) and SAS version 9.2 **Validity/Reliability:** Unknown	**Statistical Tests Used:** $\chi 2$ or Fisher's exact test, and Student t test was used for continuous variables.	**DV1:** 38 women with 4% resulting with a + RPR in subsequent testing **DV2:** 77 women with 1% having a +CIA and +RPR in subsequent testing	**Level of Evidence**: Level 2 **Strengths**: Uncovered the CIA test is not reliable on its own. **Weakness**: No strong correlation identified More than half of the women had false + CIA test results 1/3 of infant follow-up charts were not obtained No control group

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Diseases, and the CDC (grant number H25PS001379-01). **Bias**: No reported conflicts			Women with a positive RPR test before CIA testing Pregnant women under the age of 18 **Attrition:** Not identified					**Feasibility**: Patients could incur unnecessary lab costs **Application**: Not recommended as there are many false positive results for the CIA testing, this could lead to overtreatment with antibiotic or undertreatment of syphilis for patient/provider pairs who doubt the result. Should not be generalized to areas with high-syphilis rates.
Obure et al., (2017), A comparative analysis of costs of single and dual rapid HIV	None Listed. Presumed the Health	**Design:** cluster randomized controlled study **Purpose:**	**N=** 2214 Single RDT (N= 1048)	**IV1:** Testing pregnant women for syphilis and HIV	**Tools:** SAS software, Microsoft Excel	**Statistical Tests Used:** Cost analysis	**DV1:** 0.28% tested positive for HIV and 2.8% tested positive for syphilis. Of those who	**Level of Evidence:** Level 2 **Strengths:** Large sample size.

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and syphilis diagnostics: results from a randomized controlled trial in Colombia **Country:** Columbia **Funding:** The Bill and Melinda Gates Foundation and PATH through the Dual Testing to Eliminate Congenital Syphilis project and the UNDP/UNFPA/ WHO/World Bank Special Programme of	Promotion Model	To determine if single RDT for syphilis is more cost effective than dual RDT for syphilis and HIV.	Dual RDT (N=1166) **Demographics:** Pregnant women living in Colombia. **Setting:** 4 hospitals and 8 health centers in Columbia **Exclusion:** None identified. **Attrition:** None identified.	**DV1:** Single RDT for syphilis and HIV **DV2:** Dual RDT for syphilis and HIV together **Definitions:** RDT- Rapid Diagnostic Test	**Validity/Reliability:** The convenience of dual RDTs may have impacted the type of test chosen.		tested positive for syphilis 83% received timely treatment. Average total cost U.S. $1847.99 **DV2:** 0.42% tested positive for HIV and 1.7% tested positive for syphilis; 100% of the women who tested positive for syphilis received timely treatment. Average total cost: U.S. $3074.43	100% of syphilis + cases in the dual RDT group received treatment on time. **Weakness:** Costs for the dual RDT is more expensive. **Feasibility:** Clinic and patient preference based **Application:** Easy to generalize to other populations as the testing had high treatment rates.

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Research Development and Research Training in Human Reproduction **Bias:** No conflict reported.								
Parkes-Ratanshi et al., (2020), Low male partner attendance after syphilis screening in pregnant women leads to worse birth outcomes: The syphilis treatment of partners (stop)	None Listed. Presumed the Health Promotion Model	**Design:** Randomized controlled trial **Purpose:** To determine what is the best way to contact partners of pregnant women with syphilis to increase the number of partners screeded and treated.	**N=** 17,130 pregnant women **N=** 442 women enrolled **Demographics:** Women with a + pregnancy test & treponemal	**IV1:** - PN slip given pregnant woman with positive syphilis screening. **DV1:** Text message notification with PN slip. **DV2:** Phone calls from the	**Tools:** PN slips, access to send text messages, and telephones **Validity/Reliability:** n/a	**Statistical Tests Used:** Chi-square test, multivariable logistic regression model	**IV1:** 7.4% did not give the PN slip to their partner. **DV1:** 33.1% follow up. **DV2:** 32.6% follow up.	**Level of Evidence:** Level 2 **Strengths:** Identifying and treating syphilis in the pregnant women. Preventing congenital syphilis and associated poor outcomes.

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randomized control trial. **Country:** Uganda **Funding:** Foundation for the National Institutes of Health **Bias:** Receives grant funding through the Infectious Diseases Institute from Janssen, the Pharmaceuticals Company of Johnson and Johnson.			antibody rapid POCT were offered study inclusion. Other inclusion criteria were age >18 years or 14-17 years and being a mature and emancipated minor, having a known sexual partner, having access to a cell phone, and being willing and able to use and receive SMS or phone calls. Average age- 25 **Setting:**	clinic staff with PN slip. **Definitions:** STI- sexually transmitted infections DALY- Disability Adjusted Life Years HCP- Health care provider PN- Partner notification IDI- Infectious Diseases Institute POCT- point-of-care tests ANC- antenatal clinic/care				**Weakness:** Small enrollment compared to overall sample size. Unclear if every partner who tested positive received treatment; therefore, not able to prevent congenital syphilis as a whole. DV1 and DV2 were not shown to be a better option. **Feasibility:** Low cost to implement reminder text messages and phone calls if statistically appropriate as an intervention.

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			Antenatal clinic in Kampala, Uganda **Exclusion:** Illiteracy, inability to use a mobile phone, confirmed neurosyphilis, not interested, or is not pregnant. **Attrition:** 71 women who do not access to telephones. 55 women due to partner	MOH- Ministry of Health				**Application:** Can be generalized to large population and applied to other STIs and screening tests.

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			attending the ANC visit. 33 women due to various reasons.					
Wu et al., (2021), Addressing the crisis of congenital syphilis: Key findings from an evaluation of the management of syphilis in pregnancy and the newborn in South-East Queensland	None listed. Presumed Health Promotion Model	**Design:** Retrospective Review **Purpose:** To evaluate the management of syphilis in pregnant women and their newborns and compare the three most commonly used guidelines available between 2016 to 2018.	**N=** 30 **Demographics:** Syphilis + pregnant women, median age of 27, and 50% of participants have had 2-4 pregnancies.	**IV1:** Syphilis + pregnant women **DV1:** Guidelines from the Australasian Society of Infectious Diseases **DV2:** Guidelines from the Communicable Diseases	**Tools:** Data collected from the Queensland Perinatal Data Collection **Validity/Reliability:** Reliance on public health documentation for syphilis staging, and incomplete records from four deliveries at private hospitals	**Statistical Tests Used:** Not mentioned	**DV1:** Not specifically addressed. **DV2:** Not specifically addressed. **DV3:** 73% of women completed the CDC recommended	**Level of Evidence:** Level 2 **Strengths:** Reinforces treatment through IM injection **Weakness:** does not discuss the different guidelines and how they compare to each other. **Feasibility:** Feasible as it should not inquire more costs

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Country: Australia **Funding:** Queensland Sexual Health Research Fund **Bias:** No conflict reported.			Average age- 27.9 **Setting:** Southeast Queensland **Exclusion:** False- positive serological result, documentation of previous appropriate syphilis treatment not requiring further treatment in pregnancy or termination of pregnancy for unrelated reasons.	Network Australia DV3: Guidelines from the U.S. Centers for Disease Control and Prevention **Definitions:** N/A			treatment course	as women should be tested during pregnancy. **Application:** Easily applied to practice as CDC guidelines are the current standard of care for syphilis treatment.

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			Attrition: Not mentioned.					

Key: **ANC** antenatal clinic/care, **CDC** U.S. Centers for Disease Control and Prevention, **CIA** Chemiluminescence Immunoassay, **CMV** Cytomegalovirus, **CS** Congenital Syphilis, **CT** *Chlamydia trachomatis*, **DALY** Disability Adjusted Life Years, **dPNt** digital Partner Notification tool, **DV** Dependent Variable, **ED** Emergency Department**, G** Gauge**, HCP** Health care provider, **HIV** Human Immunodeficiency Virus**, IDI** Infectious Diseases Institute, **IgG** Immunoglobulin, **IM** Intramuscular, Institutional Review Boards**, IU** International Unit, **IV** Independent Variable, **mL** milliliters, **MOH** Ministry of Health**, MTCT** Maternal to Child Transmission, **MV** Mepivacaine hydrochloride, **NG** *Neisseria Gonorrhoeae*, **GNICHD** National Institute of Child Health and Human Development, **PGB** Penicillin G Benzathine**, PN** Partner Notification**, PNC** Prenatal Care, **POCT** point-of-care test, **RDT** Rapid Diagnostic Test, **RPR** Rapid Plasma Reagin, **STI** Sexually Transmitted Infection, **STOP** Syphilis Treatment of Partners Trial**, TP** *Treponema pallidum*, **TP-PA** *Treponema pallidum* particle agglutination assay, **UCSD** University of California San Diego

Table A2
Evaluation Table for Qualitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method/ Sampling	Sample/ Setting	Major Themes Studied/ Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Themes	Level/ Quality of Evidence; Decision for/ Application to practice; Generalization
Nakku-Joloba et al., (2019), Perspectives on male partner notification and treatment for syphilis among antenatal women and their partners in Kampala and Wakiso districts, Uganda **Country:** Uganda	None Listed. Presumed narrative research framework.	**Design:** Narrative Review **Method:** Recruitment of participants in the Syphilis Treatment of Partners (STOP) Trial **Purpose:** to understand factors influencing male partners to seek treatment after syphilis notification by their pregnant partners.	**Sample:** (n= 54) **Demographics:** -24 women, 30 male partners with a mean age of 32. -87% were married. - 48% are self-employed. -57.4% had secondary education.	Individual research questions not discussed. **Definitions:** **STOP** Syphilis Treatment of Partners Trial	**Data Collection:** In-depth interviews that were audio recorded, transcribed, and analyzed using the thematic approach. Interviews followed a guide and were conducted in Luganda. **Data Dependability:**	Examination of interview quotes to identify common themes across genders.	Notification of male partners by pregnant women treated for syphilis was low due to individual characteristics. (1) Men reported fear of finding out HIV status as a reason for not returning after partner notification.	**Level of Evidence:** Level 3 **Strengths:** Emphasis on accurate language and translation. Allowed for participants to expand their answers to questions, allowing for more data collection. **Weakness:** Needs more information on the fear of domestic violence impacting

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Funding: The Foundation for the National Institutes of Health. **Bias:** None.			-63% of female participants reported that they sometimes experienced domestic violence. **Setting:** Infectious Diseases Institute Clinic in Mulago **Attrition:** None listed.		-Medical and social scientists with experience in qualitative research and fluent in English and Luganda. -Standardized interview guide was developed and a Professional translator was used. -Interviewers were fluent Luganda and English speakers.		(2) Lack of knowledge of syphilis as a disease (3) Fears of domestic violence. (4) Male fears of injection/treatment pain, cost of treatment, and lack of trust in health care system. (5) Males report limited resources of care, long wait times in clinic for treatment	notification and treatment**.** **Feasibility:** Implementing the interviews in different areas of the world is feasible. Proper translation will be needed in different areas. **Application:** Can be generalized to other clinics to collect information.

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							*Improved public awareness about syphilis is needed	
Park et al., (2022), Gaps in the congenital syphilis prevention cascade: Qualitative findings from Kern County, California **Country:** United States. **Funding:** March of Dimes and the Centers for Disease	None Listed. Presumed narrative research framework	**Design:** Five focus groups, and ten interviews with prenatal care (PNC) providers **Method:** Focus groups and interviews were recorded, transcribed, and analyzed **Purpose:** To identify facilitators and barriers that are contributing to increased CS rates.	**Sample:** (n= 52) Focus groups n=42 PNC provider interviews n=10 **Demographics:** **Focus groups:** 18 years and older, receiving PNC or early postnatal care in Kern County, a resident of Kern County for at least six months, currently	Individual research questions not discussed. **Definitions:** PNC- prenatal care providers- clinicians who provide care to pregnant women.	**Data Collection:** semi-structured guides with open-ended questions **Data Dependability:** n/a	**State type used.** Content analysis, interpretation of patterns and themes recorded data.	(1) Barriers to accessing care: long wait times, geographic location, transportation and insurance issues. (2) social, economic and cultural barriers- unemployment, homelessness, to unmet linguistic needs including culturally competent PNC	**Level of Evidence:** Level 6 **Strengths:** Use of the CS prevention cascade to identify themes in areas with high CS rates **Weakness:** Small sample size that cannot be generalized to other populations, and not all participants had had infants born with CS. **Feasibility:** Feasible, relatively low cost and incentive gift cards

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Control and Prevention (CDC) Participants received a $25 gift card and prenatal care providers received a $50 gift card funded by Tulane and the University of California, San Diego (UCSD). **Bias:** No conflict reported.			pregnant or delivered an infant less than 12 months prior, considered as "high-risk" for CS, has a phone or another way of being contacted, and is able to consent to the study. **PNC Providers:** PNC providers who work in Kern, County and have been in their position for six months or more, identified as possessing knowledge about the healthcare setting and dynamics relevant				(3) Contributing factors: substance use and intimate partner / domestic violence	may not be necessary, especially for provider interviews. **Application:** results cannot be generalized as the sample population was small.

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			to CS and pregnant women in the region, currently working with high-risk pregnant women, has a phone or another way of being contacted and is able to consent to the study. **Setting:** Kern County, California **Attrition:** Not indicated					

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Table A3

Synthesis Table

Study (Author, year)	Adachi et al., 2018	Almeida et al., 2021	Biswas et al., 2018	Dunseth et al., 2017	Estrada et al., 2019	Folke et al., 2022	Mmeje et al. 2015	Nakku-Joloba et al., 2019	Obure et al., 2017	Park et al., 2022	Parkes-Ratanshi et al., 2020	Wu et al., 2021
Design	Retrospective cohort study	Retrospective cohort study	Retrospective Review	Six-year Retrospective Study	Randomized double-blind clinical trial	Retrospective Review	Retrospective Review	Narrative Review	Cluster randomized controlled study	Five focus groups, and ten interviews with PNC providers	Randomized controlled trial	Retrospective Review
LOE	II	II	II	III	I	II	II	II	II	VI	II	II
Sample												
n subjects	1,684	158	2498	23,065	108	5,715	194	54	2,214	52	17,130	30
M-Age	26.5	-	-	35.6	36.6	-	-	32	-	-	25	27.9
% of males	-	-	-	-	94.4%	-	-	55.5%	-	-	-	-
Setting												
OP clinic	-	+	-	+	+	+	-	+	+	+	+	-
Hospital	+	+	+	+	-	-	+	-	+	-	-	-
U.S.	-	-	+	+	-	+	+	-	-	+	-	-
Other Country	+	+	-	-	+	+	-	+	+	-	+	+
Intervention												

Key: **dPNt** digital Partner Notification tool**, Dx** Diagnosis, **HIV** Human Immunodeficiency Virus**, LOE** Level of Evidence, **MTCT** Maternal to Child Transmission **n** number, **OP** Outpatient, **PN** Partner Notification, **Pn** Pain, **PNC** Prenatal Care, **PNS** Partner Notification Slip, **SMS** text message, **Tx** Treatment, **U.S.** United States

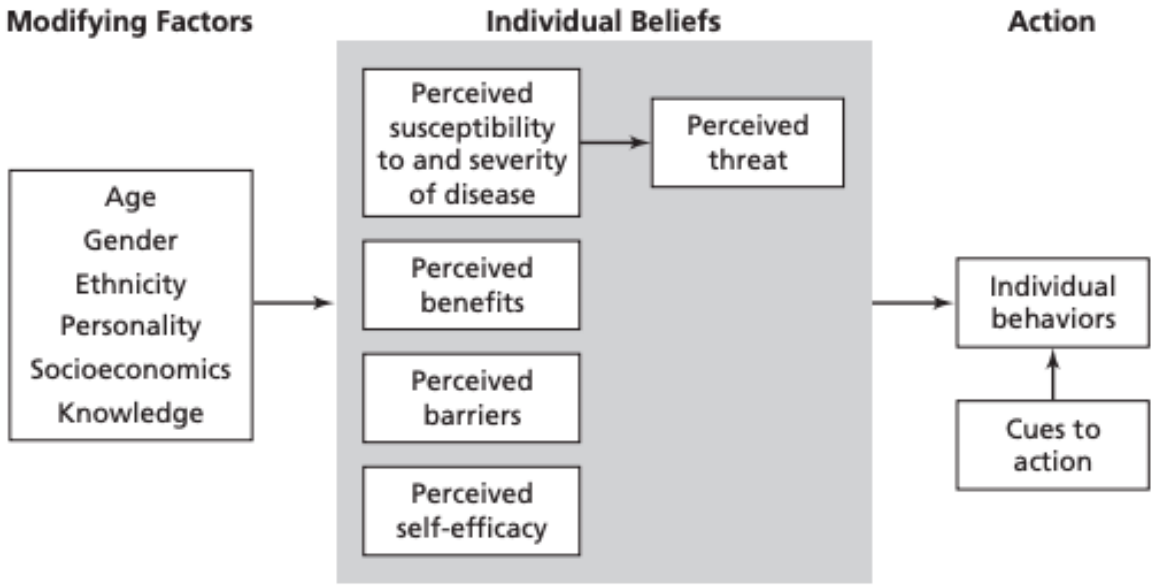
Study (Author, year)	Adachi et al., 2018	Almeida et al., 2021	Biswas et al., 2018	Dunseth et al., 2017	Estrada et al., 2019	Folke et al., 2022	Mmeje et al. 2015	Nakku-Joloba et al., 2019	Obure et al., 2017	Park et al., 2022	Parkes-Ratanshi et al., 2020	Wu et al., 2021
Change in serum testing				↔								
PN tools				dPNt							SMS & PNS	
Outcomes and Themes												
Correlation between HIV+ and syphilis+	+		+		+		+		+			
Reinforces need for screening and Tx	+	+	+	+	+	+	+	n/a	+	+	n/a	+
Fear associated with pain or dx					+ (Pn)			+ (Pn) + (Dx)				

Key: **dPNt** digital Partner Notification tool**, Dx** Diagnosis, **HIV** Human Immunodeficiency Virus**, LOE** Level of Evidence, **MTCT** Maternal to Child Transmission **n** number, **OP** Outpatient, **PN** Partner Notification, **Pn** Pain, **PNC** Prenatal Care, **PNS** Partner Notification Slip, **SMS** text message, **Tx** Treatment, **U.S.** United States

Appendix B

Models, Frameworks and Project Materials

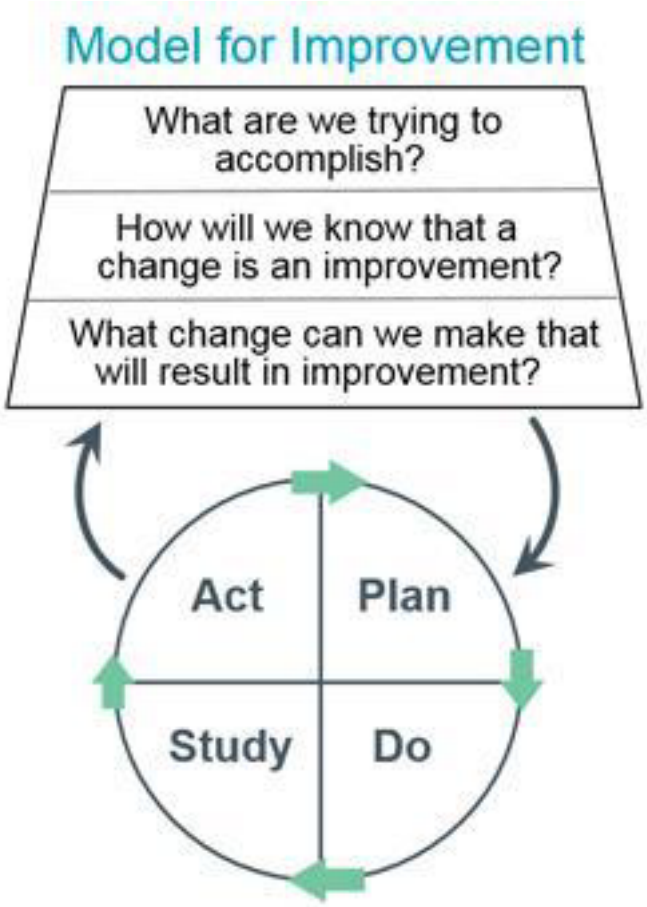
Figure B1
Health Belief Model



The HBM is used to understand the patient's perspective and what leads them to completing screening, testing, and/or treatment.

(Champion & Skinner, 2008)

Figure B2
Model for Improvement



The MFI was idnetifed as a framework to implement changes with the intent decrease CS rates.

(IHI, 2022)

Figure B2
Recruitment Material

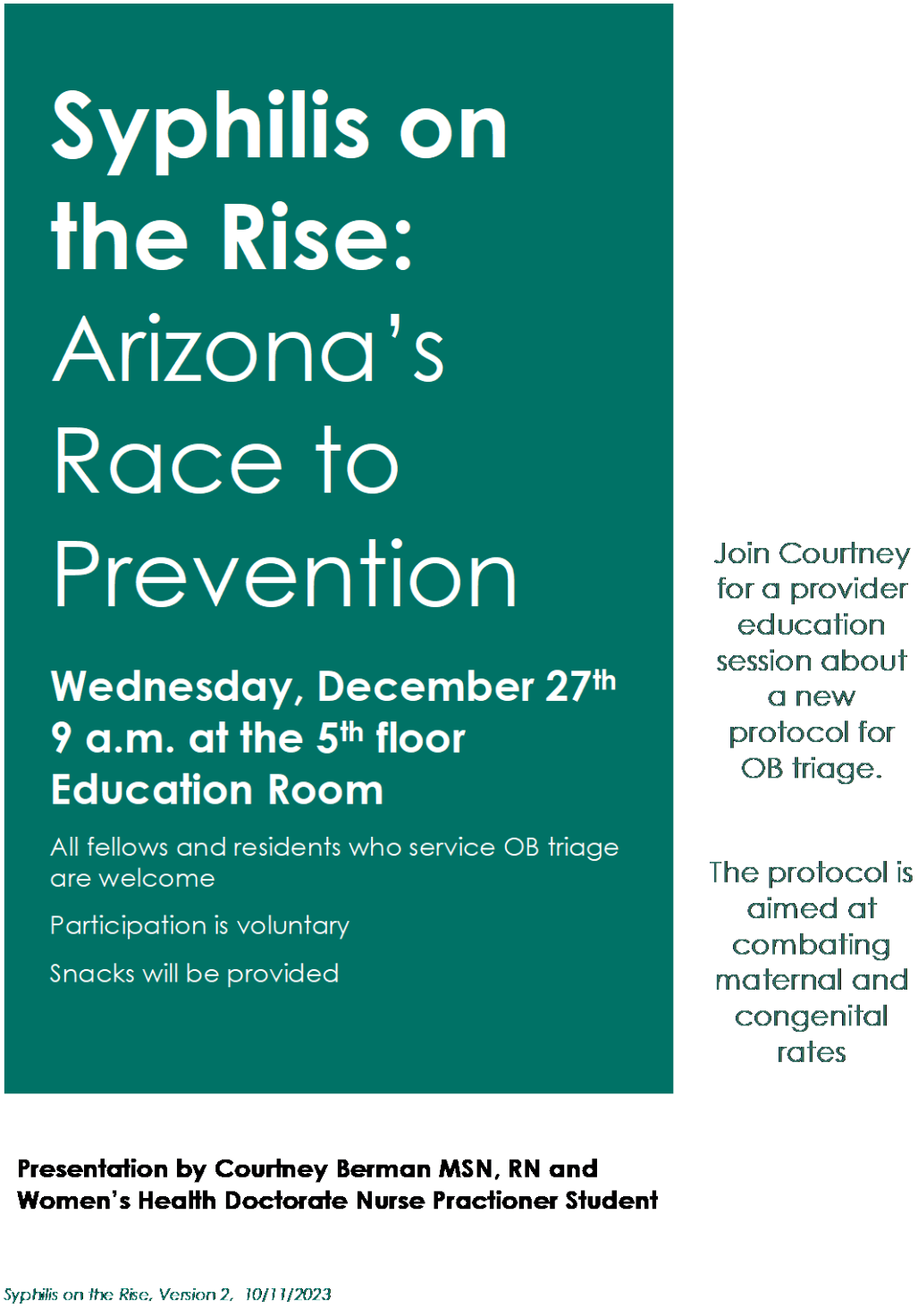


Figure B4
Voluntary Consent Script

Syphilis on the Rise: Arizona's Race to Prevention

Recruitment and Consent to Participate Script

I am a graduate student under the direction of Professor Dr. Patricia Janicek, in the Edson College of Nursing and Health Innovation at Arizona State University. I am conducting a quality improvement (QI) project to decrease the rates of congenital syphilis in our community. I am recruiting individuals to participate in a 15-minute education session that is informative of a new OB triage protocol. This will entail a series of three questionnaires, two that will take place today, and one that will be distributed in three months from today. Each questionnaire will take approximately five minutes of your time. Completion of the questionnaire and participation in this quality improvement (QI) project is voluntary.

If you complete the questionnaire, you are confirming that you voluntarily consent to participate in this QI project and you understand that participation in this project is not a condition of employment at Banner Health.

Should you have any questions concerning this project, please call me at (520) 661- 8212 or email me at cmberman@asu.edu. If you are not interested in participating in the QI project questionaries, you may still attend the presentation.

Thank you,

Courtney Berman MSN, RN

Figure B5
Pre- Education Questionnaire

SUBJECT ID: _____ Date_____ 1

Pre- Knowledge, Attitudes, and Beliefs about Syphilis Testing Protocol

If you complete the questionnaire, you are confirming that you voluntarily consent to participate in this QI project and you understand that participation in this project is not a condition of employment at Banner Health. Should you have any questions concerning this project, please call me at (520) 661- 8212 or email me at cmberman@asu.edu .

To create a unique subject ID, please use your mother's birth date in the following format, MMDD.

Demographics:

Please place an ***X*** on which best describes you:

1. Age: ___ 24-27 ___28-31 ___32-35 ___36-39 ___40-44 ___45+
2. Degree: ___ MD ____ DO
3. Role: ___ MFM Fellow ___ Resident physician

Please Circle the answer that you feel is correct or best answers the question:

1) In what year did rates of syphilis in Arizona begin to dramatically increase?

a. 2015
b. 2020
c. 2018

2) As of 2021, Arizona was ranked what number in the United States for congenital syphilis rates?

a. 4th
b. 1st
c. 7th

3) The Centers of Disease Control and Prevention recommends testing for syphilis at what times during pregnancy?

a. At the first prenatal visit, during the second trimester, and at the time of delivery
b. At the 28-week visit, the 34-week visit, and at the time of delivery
c. At the first prenatal visit and at the time of delivery
d. At the 28-week visit and at the time of delivery

Data Entry: _____ Data Validation : _____ Data Analysis: _____

SUBJECT ID: _____ Date_____ 2

4) How relevant do you think syphilis is to your patient population?

a. Not at all
b. Slightly
c. Moderately
d. Very
e. Extremely

5) Do you think that syphilis testing is beneficial to your patient population?

a. Not at all
b. Slightly
c. Moderately
d. Very
e. Extremely

6) Do you think your patients would like to be tested for syphilis during pregnancy?

a. Not at all
b. Slightly
c. Moderately
d. Very
e. Extremely

7) I currently assess patient needs for syphilis testing at each hospital visit

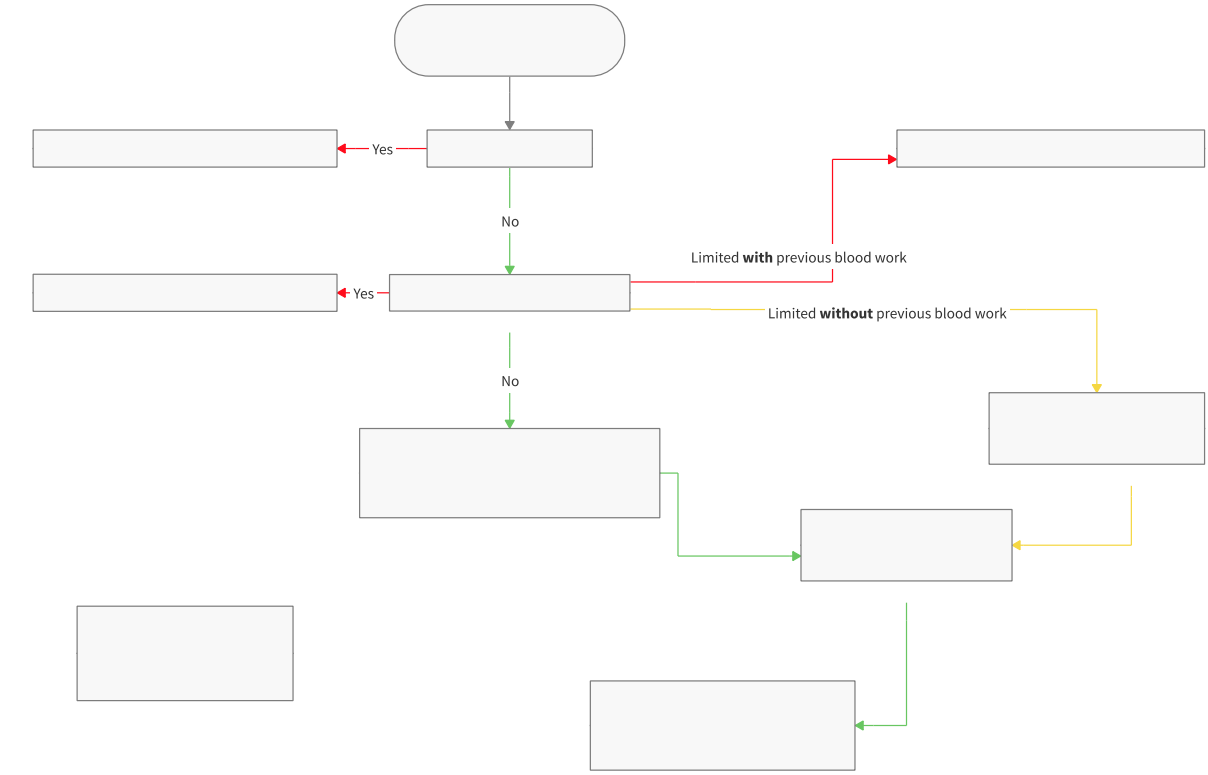
a. Never
b. Rarely
c. Sometimes
d. Often
e. Always

8) I currently incorporate syphilis testing guidelines into the care I provide to every patient

a. Never
b. Rarely
c. Sometimes
d. Often
e. Always

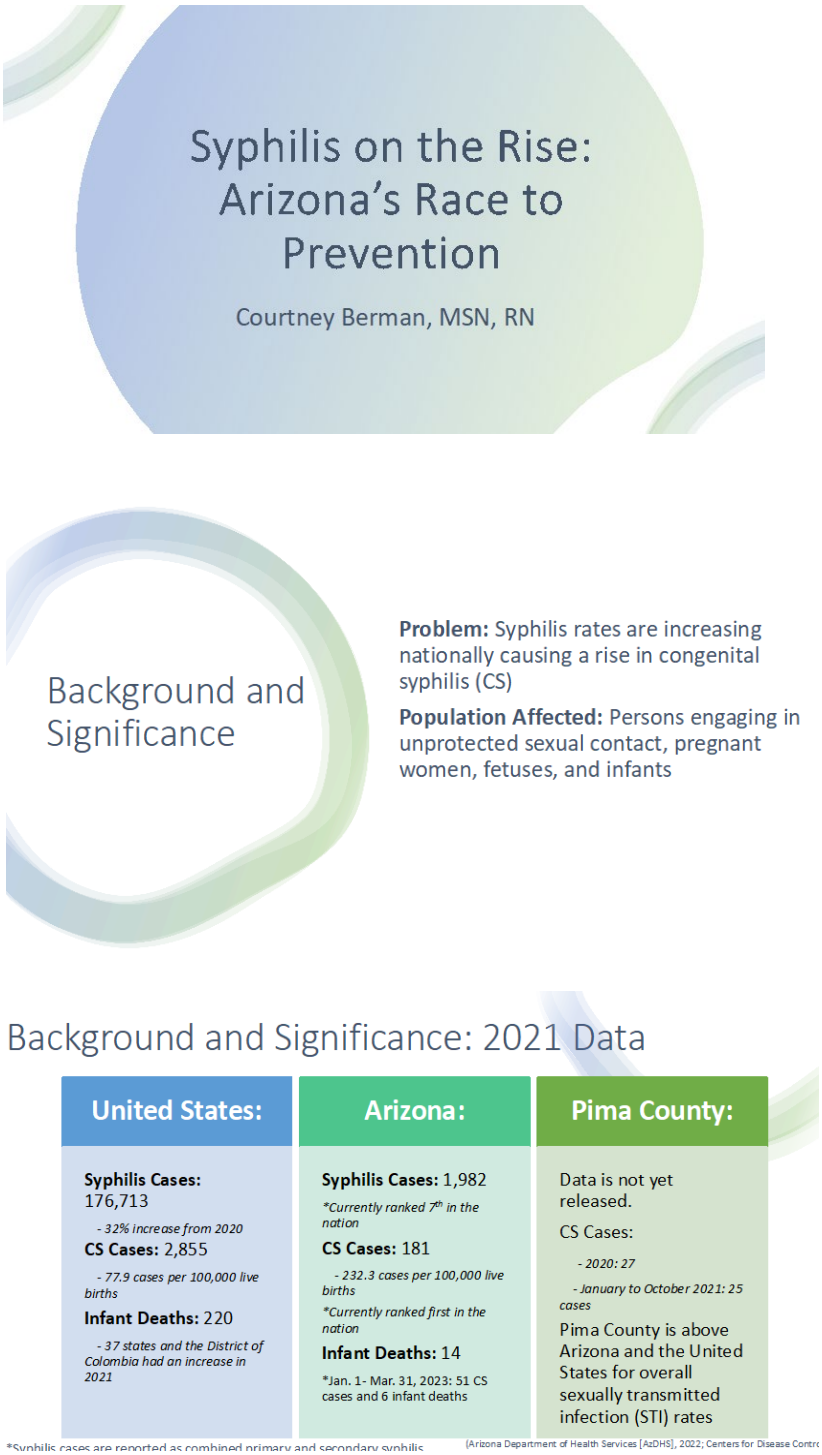
Data Entry: _____ Data Validation : _____ Data Analysis: _____

Figure B6
OB Triage Syphilis Protocol



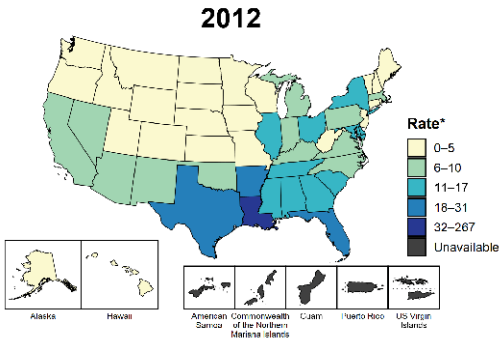
ly Report, 69(22), 661–665. https://doi.org/10.15585/mmwr.mm6922a1

Figure B7
Education Session Presentation



Epidemiological Data

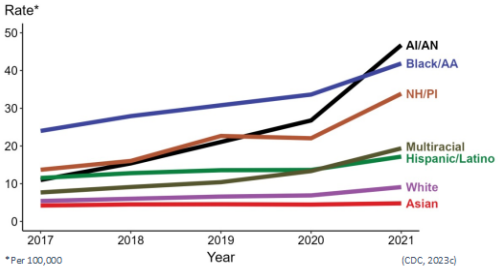
Primary and Secondary Syphilis — Rates of Reported Cases Among Women Aged 15–44 Years by State, United States and Territories, 2012–2021



(CDC, 2023c)

Epidemiological Data

Primary and Secondary Syphilis — Rates of Reported Cases by Race/Hispanic Ethnicity, United States, 2017–2021



*Per 100,000

(CDC, 2023c)

National Initiatives and Practice Guidelines

DHHS STI National Strategic Plan

AzDHS Grant to Increase STI Screenings

CDC Screening Reccomendations

Internal Evidence

Site: Banner University Medical Center-Tucson, Labor and Delivery Triage

-Why not in clinic?

Problem: Increase in congenital syphilis cases; *many cases have not received ample syphilis testing during pregnancy*

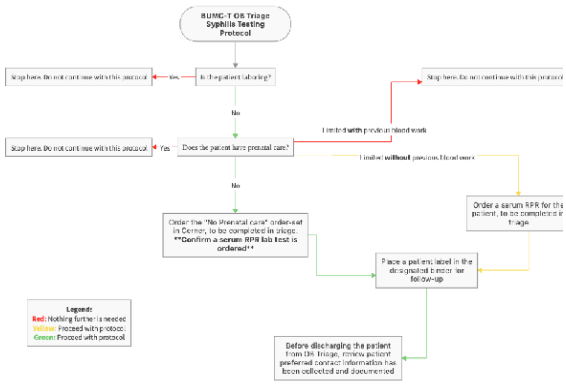
Possible factors: No prenatal care, multiple partners, high risk behaviors (substance use and sex work), housing instability, previous incarceration, and no insurance

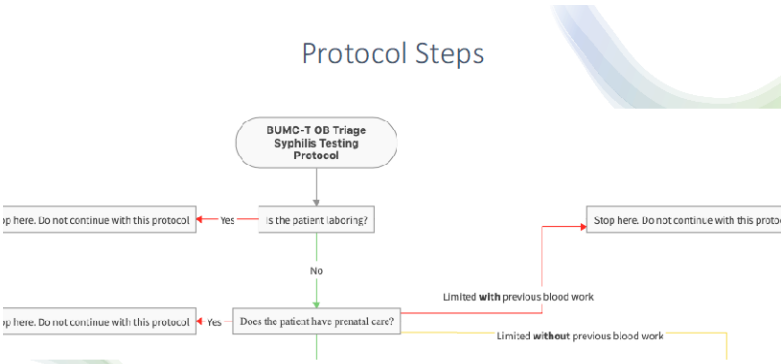
Project Goal

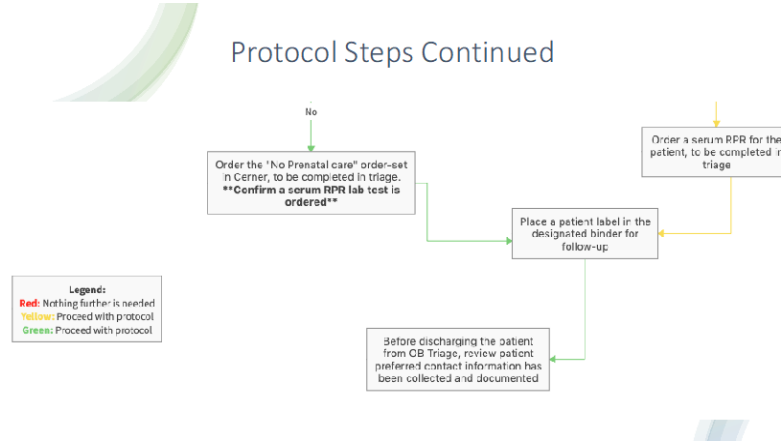
Primary: To educate OB Fellows and Residents regarding the need to screen non-laboring pregnant women who present to OB triage for the need for syphilis testing

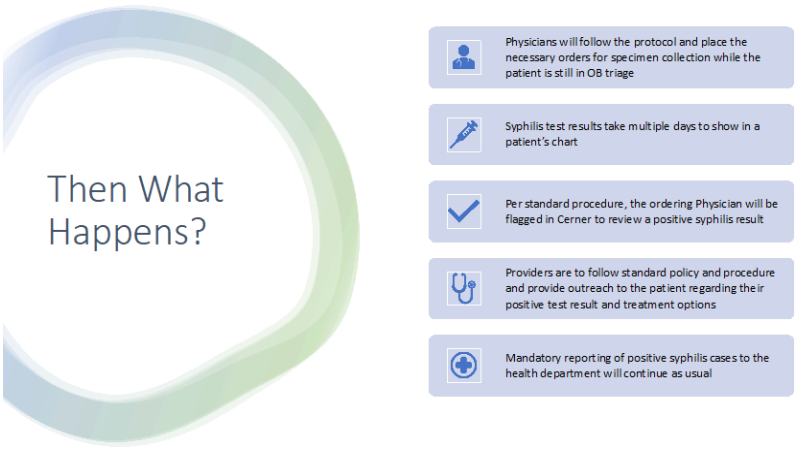
Secondary: To increase testing and treatment for syphilis among non-laboring pregnant women who present to OB triage

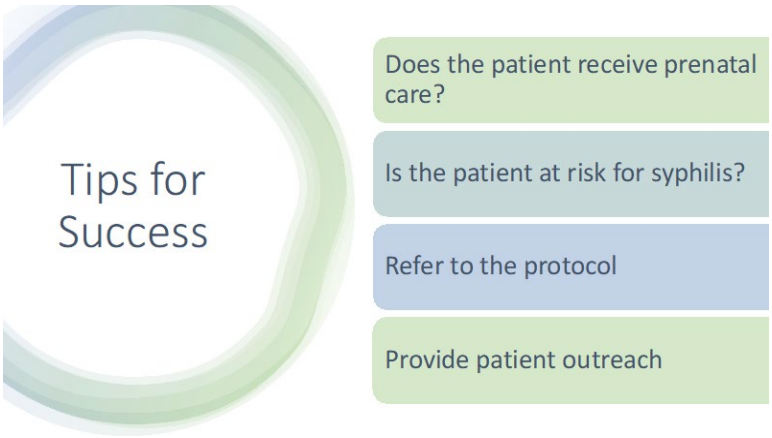
New Protocol for OB Triage




Protocol Steps
BUMC-T OB Triage Syphilis Testing Protocol
Yes
Is the patient laboring?
Stop here. Do not continue with this protocol
No
Limited with previous blood work
Yes
Does the patient have prenatal care?
Limited without previous blood work


Protocol Steps Continued
No
Order the "No Prenatal care" order-set in Cerner, to be completed in triage. **Confirm a serum RPR lab test is ordered**
Order a serum RPR for the patient, to be completed in triage
Place a patient label in the designated binder for follow-up
Before discharging the patient from OB Triage, review patient preferred contact information has been collected and documented
Legend:
Red: Nothing further is needed
Yellow: Proceed with protocol
Green: Proceed with protocol


Then What Happens?
Physicians will follow the protocol and place the necessary orders for specimen collection while the patient is still in OB triage
Syphilis test results take multiple days to show in a patient's chart
Per standard procedure, the ordering Physician will be flagged in Cerner to review a positive syphilis result
Providers are to follow standard policy and procedure and provide outreach to the patient regarding their positive test result and treatment options
Mandatory reporting of positive syphilis cases to the health department will continue as usual



Next Steps

Implement the protocol into your standard practice

I will return in 3 months for a follow-up survey

Should you need to contact me for any reason, please use the following information:

Courtney Berman

cmberman@asu.edu

520-661-8212

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Questions or Comments?

Thank you for attending and participating in this quality improvement project

Figure B8
Post-Education Questionnaire

SUBJECT ID: _____ Date_____ 1

Post- Knowledge, Attitudes, and Beliefs about Syphilis Testing Protocol

If you complete the questionnaire, you are confirming that you voluntarily consent to participate in this QI project and you understand that participation in this project is not a condition of employment at Banner Health. Should you have any questions concerning this project, please call me at (520) 661- 8212 or email me at cmberman@asu.edu .

To create a unique subject ID, please use your mother's birth date in the following format, MMDD.

Please Circle the answer that you feel is correct or best answers the question:

1) In what year did rates of syphilis in Arizona begin to dramatically increase?

a. 2015
b. 2020
c. 2018

2) As of 2021, Arizona was ranked what number in the United States for congenital syphilis rates?

a. 4th
b. 1st
c. 7th

3) The Centers of Disease Control and Prevention recommends testing for syphilis at what times during pregnancy?

a. At the first prenatal visit, during the second trimester, and at the time of delivery
b. At the 28-week visit, the 34-week visit, and at the time of delivery
c. At the first prenatal visit and at the time of delivery
d. At the 28-week visit and at the time of delivery

4) How relevant do you think syphilis is to your patient population?

a. Not at all
b. Slightly
c. Moderately
d. Very
e. Extremely

Data Entry: _____ Data Validation : _____ Data Analysis: _____
Syphilis on the Rise, Version 2, 10/11/2023

SUBJECT ID: _____ Date_____ 2

5) Do you think that syphilis testing is beneficial to your patient population?

a. Not at all
b. Slightly
c. Moderately
d. Very
e. Extremely

6) Do you think your patients would like to be tested for syphilis during pregnancy?

a. Not at all
b. Slightly
c. Moderately
d. Very
e. Extremely

7) I currently assess patient needs for syphilis testing at each hospital visit

a. Never
b. Rarely
c. Sometimes
d. Often
e. Always

8) I currently incorporate syphilis testing guidelines into the care I provide to every patient

a. Never
b. Rarely
c. Sometimes
d. Often
e. Always

9) This training was applicable to my clinical practice.

a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

Data Entry: _____ Data Validation : _____ Data Analysis: _____

SUBJECT ID: _____ Date_____ 3

10) I intend to use the protocol discussed in this educa7on session

a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

11) What did you like about the educa7on session?

_____
_____
_____

12) How could the educa7on session be improved?

_____
_____
_____

Data Entry: _____ Data Valida7on : _____ Data Analysis: _____

Figure B9
3 Month Follow-up Questionnaire

SUBJECT ID: _____ Date_____ 1

Post- Knowledge, Attitudes, and Beliefs about Syphilis Testing Protocol

Three Month Follow Up

If you complete the questionnaire, you are confirming that you voluntarily consent to participate in this QI project and you understand that participation in this project is not a condition of employment at Banner Health. Should you have any questions concerning this project, please call me at (520) 661- 8212 or email me at cmberman@asu.edu .

To create a unique subject ID, please use your mother's birth date in the following format, MMDD.

Please Circle the answer that you feel is correct or best answers the question:

1) In what year did rates of syphilis in Arizona begin to dramatically increase?

a. 2015
b. 2020
c. 2018

2) As of 2021, Arizona was ranked what number in the United States for congenital syphilis rates?

a. 4^{th}
b. 1^{st}
c. 7^{th}

3) The Centers of Disease Control and Prevention recommends testing for syphilis at what times during pregnancy?

a. At the first prenatal visit, during the second trimester, and at the time of delivery
b. At the 28-week visit, the 34-week visit, and at the time of delivery
c. At the first prenatal visit and at the time of delivery
d. At the 28-week visit and at the time of delivery

4) How relevant do you think syphilis is to your patient population?

a. Not at all
b. Slightly
c. Moderately
d. Very
e. Extremely

Data Entry: _____ Data Validation : _____ Data Analysis: _____

SUBJECT ID: _____ Date_____ 2

5) Do you think that syphilis testing is beneficial to your patient population?

a. Not at all
b. Slightly
c. Moderately
d. Very
e. Extremely

6) Do you think your patients would like to be tested for syphilis during pregnancy?

a. Not at all
b. Slightly
c. Moderately
d. Very
e. Extremely

7) I currently assess patient needs for syphilis testing at each hospital visit

a. Never
b. Rarely
c. Sometimes
d. Often
e. Always

8) I currently incorporate syphilis testing guidelines into the care I provide to every patient

a. Never
b. Rarely
c. Sometimes
d. Often
e. Always

9) This training was applicable to my clinical practice.

a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

Data Entry: _____ Data Validation : _____ Data Analysis: _____

SUBJECT ID: _____ Date_____ 3

10) I have been able to implement the protocol in OB-Triage

a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

11) I have increased the number of syphilis tests I have ordered on non-laboring OB-triage pa7ents

a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

12) I have seen a decrease in the amount of posi7ve syphilis tests at the 7me of delivery

a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

13) I have seen a decrease in the number of congenital syphilis cases

a. Strongly disagree
b. Disagree
c. Agree
d. Strongly agree

14) How has the protocol helped you in your prac7ce as a medical provider?

_____
_____
_____

15) If any, what barriers have prevented you from using the protocol?

_____
_____
_____

16) How could the protocol be improved?

_____
_____
_____

Data Entry: _____ Data Valida7on : _____ Data Analysis: _____

Figure B10
Data Collection Sheets

Subject ID	Age	Degree	Role

Subject ID	Session	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7	Question 8
Example-1234	pre								
Example-1234	post								
Example-1234	3 months								
Example- 5678	pre								
Example- 5678	post								
Example- 5678	3 months								
Example-1234	pre								
Example-1234	post								
Example-1234	3 months								
Example- 5678	pre								
Example- 5678	post								
Example- 5678	3 months								

Subject ID	Question 9	Question 10	Question 11 (written)	Question 12 (written)
Example-1234				
Example- 5678				
Example-1234				
Example- 5678				

Subject ID	Question 9	Question 10	Question 11	Question 12	Question 13	Question 14 (written)	Question 15 (written)	Question 16 (written)
Example-1234								
Example- 5678								
Example-1234								
Example- 5678								