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**Promoting Antibiotic Stewardship in Primary Care Setting: An Evaluation Process of Treatment Practices for Uncomplicated Urinary Tract Infections in Premenopausal Non-Pregnant Women**

Ira Amayun

University of San Francisco

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## **Promoting Antibiotic Stewardship in Primary Care Setting: An Evaluation Process of Treatment Practices for Uncomplicated Urinary Tract Infections in Premenopausal Non-Pregnant Women**

### **Abstract**

#### **Problem**

Inappropriate antibiotic prescribing increases the prevalence of antibiotic resistance. While evidence-based practice guidelines can reduce antibiotic use, inconsistent adherence to these guidelines results in ineffective treatment, increased cost, and increasing antibiotic resistance.

#### **Context**

At Athena Med-Monterey, a multi-provider primary care clinic where approximately 90% of the patients are women, written guidelines for uncomplicated urinary tract infections (uUTIs) in premenopausal non-pregnant women (PrMNPW) are lacking. In addition, there are no processes for assessing adherence to clinical guidelines.

#### **Interventions**

The advanced practice nurse (APN) led a quality improvement process to assess and promote adherence to practice guidelines using a small test of change and the plan-do-study-act (PDSA) method. Qualitative assessment and retrospective chart review were performed to measure outcomes.

#### **Measures**

This project examined the clinicians' adherence to evidenced-based guidelines and use of first-line agents to treat uUTIs in PrMNPW, and evaluated opportunities for ongoing practice improvement in treating uUTIs and adherence to clinical practice guidelines.

## **Results**

The quality improvement process successfully evaluated and promoted adherence to evidence-based practice guidelines. Both the qualitative assessment and retrospective chart reviews found that the clinicians used evidence-based guidelines and first-line agents to treat uUTIs in PrMNPW. No practice improvement intervention was needed for antibiotic treatment of this specific condition.

## **Conclusions**

The clinicians' adherence to the guidelines yielded desired practice and patient outcomes. The APN-driven small test of change and PDSA method demonstrated success in implementing a process to evaluate and promote evidence-based guidelines and first-line agents to treat infections in primary care.

*Keywords:* small test of change, plan-do-study-act, uncomplicated urinary tract infections, premenopausal non-pregnant women, adherence to first-line agents

# **Promoting Antibiotic Stewardship in Primary Care Setting: An Evaluation Process of Treatment Practices for Uncomplicated Urinary Tract Infections in Premenopausal Non-Pregnant Women**

## **Background**

Antibiotic resistance leads to approximately 2.8 million infections and 35,000 deaths per year in the United States. Growth of pathogens resistant to first-line agents can require management with expensive and toxic alternative agents, leading to increased antibiotic-resistant conditions and death rate. Inappropriate antibiotic prescribing in primary health care setting is the foremost modifiable risk factor for antibiotic resistance (CDC, 2021). While, antibiotic stewardship requires adherence to evidence-based recommendations for diagnosis and management, outpatient stewardship efforts could improve antibiotic prescribing practices and clinical outcomes (Sanchez, et al., 2016).

## **Problem Description**

Urinary tract infections (UTIs) are the most common outpatient infection in primary healthcare, generating an overall annual cost of \$1.6 billion in the United States (Medina & Castillo-Pino, 2019). UTIs are prevalent in women 14–24 years old, and more than half of all adult women will have at least one UTI in their lifetime. The unnecessary use of antibiotics for treating such infections contributes to the increasing national and global prevalence of antibiotic resistance (Llor & Bjerrum, 2014). While practice guidelines and other research studies have aimed to reduce antibiotic use, few primary care providers (PCPs) rely directly on these guidelines to treat uncomplicated UTIs (Grigoryan et al., 2019).



In 2011, the International Clinical Practice Guidelines for the Treatment of Acute Uncomplicated Cystitis (AUC) and Pyelonephritis in Pre-Menopausal Non-Pregnant Women (PrMNPW) were published by the Infectious Diseases Society of America (IDSA) and the European Society for Microbiology and Infectious Diseases (Gupta et al., 2011). These guidelines were released to decrease the occurrence of treatment-resistant uropathogens. According to the guideline, women who have dysuria with no complicating features can be treated for cystitis without any further diagnostic evaluation (Michels & Sands, 2015). Regarding acute pyelonephritis, the 2011 IDSA guidelines emphasized treatment with oral ciprofloxacin, levofloxacin, or sulfamethoxazole-trimethoprim (SMX-TMP) appropriately tailored to the patient's urine culture and susceptibility test results.

### ***Setting***

Athena Med-Monterey (Athena Healthcare Systems, 2020) is a multi-practice clinic with multiple providers who are experts in their fields (including obstetrics and gynecology, internal medicine, occupational medicine, and advanced practice nursing). About 90% of patients seen in the clinic are women. Women who present with UTI symptoms are prescribed antibiotics, either at the initial visit or after two days, when the urine culture and sensitivity results are available. If available, the clinicians refer to the urine culture results to confirm the antibiotic chosen for UTI treatment. To meet and quantify the organization's goal of efficient and timely treatment, the clinic could use quality measurement tools or evaluation processes to measure practices and outcomes. This action plan would ensure use of practice guidelines for consistency of care and provide decisive recommendations that would reassure clinicians of the appropriateness of the planned treatment (Woolf et al., 1999).

## Specific Aims

The overarching goal of this project was to improve patient outcomes by promoting practice improvement in primary healthcare, specifically adherence to evidenced-based clinical practice guidelines in antibiotic prescribing. The project evaluated the opportunities for practice improvement in the treatment of uUTI. The process of small test of change and PDSA method was developed for continuous evaluation and promotion of adherence to clinical practice guidelines. This project examined Athena Med-Monterey's multi-provider primary clinic's adherence to following evidenced-based guidelines, such as the 2011 IDSA guidelines, to treat PrMNPW presenting with symptoms of uUTI.

The overall goal of the proposed project was to design and implement a process for evaluating and supporting adherence to evidenced-based clinical practice guidelines. This project focused on using this process to promote prescription of first-line agents for treating uUTIs (as determined by clinical practice guidelines), a process that could be used in the future to evaluate adherence to other antibiotic prescribing guidelines. The 2011 IDSA guidelines are an evidenced-based tool that clinicians in primary healthcare should reference when treating uUTIs. The following objectives were used in the development of a process for evaluating and promoting adherence to clinical practice guidelines:

1. Perform a provider-led small test of change using the PDSA method and the 2011 IDSA guidelines to establish clinical guidelines for treating uUTIs in PrMNPW.
2. Evaluate clinicians' adherence to use of evidence-based guidelines and first-line agents for treating uUTIs in PrMNPW, utilizing the small test of change and PDSA processes.
3. Measure symptom resolution at 28 days post-uUTI treatment to evaluate the treatment efficacy.

4. If applicable, integrate the 2011 IDSA guidelines into the clinic's current clinical practices for treating uUTIs in PrMNPW.
5. Provide evaluation feedback to the clinic leadership.

### **Available Knowledge**

#### **PICOT Question**

The PICOT question that guided this project is: Does primary healthcare clinicians' (P) adherence to utilization of evidenced-based clinical practice guidelines (I) improve patient outcomes (O), compared with treatment without the use of clinical practice guidelines (C), over 4 weeks of small test of change (T)? State authorized prescribing clinicians in primary healthcare is the population of interest in this project. The use and availability of evidence-based clinical practice guidelines (vs. no use of clinical practice guidelines) increase adherence to prescribing first-line agents for treating uUTIs in PrMNPW and yield desired outcomes in terms of symptom resolution and cost-effectiveness. This literature reviewed for this project sought to evaluate whether provider adherence to evidenced-based clinical guidelines has improved since the 2017 Centers for Disease Control and Prevention (CDC) guidelines for treating uUTIs were released (Table 1). The literature review also examined whether integrating the 2011 IDSA guidelines into multi-provider primary care organizations increases adherence to the prescription of first-line agents and thereby improves the quality of clinical decisions and patient outcomes.

#### **Search Strategy**

The literature review was conducted in compliance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA), and a systematic search for articles was conducted in the PubMed and Cochrane search engines using Boolean operators (AND, OR).

The inclusion criteria were articles that were published between 2017 and 2020, had text in English, and were peer-reviewed. The search terms “first-line antibiotics AND acute uncomplicated cystitis OR uncomplicated urinary tract infection” AND “prescription adherence AND first-line antibiotics AND acute uncomplicated cystitis OR uncomplicated urinary tract infection” were used initially. The search terms were then modified to “outcomes AND first-line antibiotics AND acute uncomplicated cystitis OR uncomplicated urinary tract infection.” The search resulted in 15 publications from 2017–2020 from both the PubMed and Cochrane databases. Additional search terms were “nitrofurantoin AND cystitis,” “fosfomycin AND cystitis,” and “sulfamethoxazole-trimethoprim AND cystitis.” Of the 15 publications, five aimed to evaluate prescriber adherence to the guidelines for treating uUTIs (Diagram 1).

### **Integrated Review of the Literature**

Robinson et al. (2019) evaluated the appropriateness of empiric fluoroquinolone (FQ) use compared to nitrofurantoin (NTF) use for treating AUC and determined the trends and predictors for using FQ. Women aged 19–64 who were given NTF, ciprofloxacin, or levofloxacin for AUC at five family medicine clinics were included in the study. Data regarding symptoms, comorbidities, allergies, creatinine clearance, recent antibiotic use, and urine cultures were used to determine whether empiric antibiotic treatment was appropriate based on national guidelines and local susceptibility data. Of the 567 women included in the study, 395 were given NTF, and 172 were given FQ. Of these, 343 (86.8%) and 18 (10.5%) were appropriately prescribed NTF and FQ, respectively. Of the women inappropriately prescribed FQ, 15 (87.8%) lacked contraindication to NTF. Therefore, the study suggested the need for additional intervention and education to improve and decrease the use of FQ.

Yu et al. (2020) aimed to track and report outpatient antibiotic prescriptions in Medicare Part B older adult enrollees who were diagnosed with cystitis in an outpatient setting between 2016 and 2017 in New York State (NYS). The inclusion criteria included an oral antibiotic prescription given less than three days after diagnosis of cystitis in Part D claims. According to the retrospective cohort study, 50,658 prescriptions were written upon discharge diagnosis of cystitis in NYS from 2016–2017. First-line antibiotic prescriptions of NTF, SMX-TMP, and fosfomycin (FM), as well as  $\beta$ -lactamase, increased, while FQ use decreased in both older female and male adults. The study suggested that the widespread prevalence of FQ and  $\beta$ -lactamase prescriptions requires outpatient antimicrobial stewardship.

Giancola et al. (2019) conducted a quasi-experimental study that included women aged 18–64 who were prescribed NTF, SMX-TMP, or ciprofloxacin within seven days of encounter at five family medicine clinics. Adherence to duration of treatment (DOT) based on the 2011 IDSA guidelines was evaluated. A stewardship intervention included revising/adding default prescription instructions to targeted antimicrobials in an EHR and performing a one-day in-service at two (intervention group) of the five clinics. A total of 787 pre-intervention patients were compared to 862 post-intervention patients. After the intervention, the adherence rate to the recommended DOT increased from 31–89% for NTF and from 22–60% for SMX-TMP. Additionally, adherence to the recommended DOT increased in clinics that received education (33.7% vs. 90.2%;  $p < 0.01$ ); these clinics' adherence increased from 22.1–58.8% ( $p < 0.01$ ). Revising/adding default prescription instructions and DOT to targeted antimicrobials in an EHR and providing a clinician in-service also increased adherence to first-line antibiotic DOT guidelines.

Pedela et al. (2017) evaluated changes in outpatient FQ and NTF use and resistance among *E. coli* isolates after a change in institutional guidelines that stipulated the use of NTF instead of FQ to treat AUC. The study compared the period from January 2003 to June 2007, when FQ was recommended as a first-line therapy for acute uUTIs, with the period from July 2007 to December 2012, when NTF was recommended as the first-line therapy. The retrospective time series study included 5,714 adults treated for AUC and 11,367 outpatient *E. coli* isolates. After the change in institutional guidelines, FQ use showed an immediate 26% reduction, and FQ-resistant *E. coli* were stabilized. The use of NTF increased without changing NTF resistance.

To identify the sources of information that guide antibiotic prescription decisions, Grigoryan et al. (2019) sought to understand why PCPs choose certain antibiotics or DOT. The study conducted a semi-structured interview with 18 PCPs in two family medicine clinics in Texas. Most PCPs reported that they prescribed SMX-TMP or NTF, but sometimes for a longer duration than recommended by the IDSA (2011). The PCPs also described multiple considerations when prescribing antibiotics, including allergies, sex, pregnancy, older age, past antibiotic experience and susceptibilities, familiarity with the antibiotic, shorter treatment duration and better compliance, UTI frequency, diabetes, and cost. Many PCPs mentioned that NTF was not as “strong” or as “quick” as SMX-TMP, and most were unfamiliar with FM. Few PCPs relied directly on guidelines to treat uUTIs; only two recalled and mentioned the 2011 IDSA guidelines. Additionally, the PCPs had widely differing opinions on the extent to which antibiotic resistance was a problem in their practice.

### **Summary of Evidence**

Evidence-based, multidisciplinary clinical guidelines are clear, reproducible, and flexible, and they assist clinicians in making decisions about appropriate healthcare for specific clinical circumstances (Field & Lohr, 1990). Trials, systematic reviews, and meta-analyses conducted after the CDC's 2017 review of the 2011 IDSA guidelines (Table 2) found that clinicians who referenced these guidelines to manage uUTIs were most likely to achieve positive outcomes. The use and availability of evidence-based clinical practice guidelines (vs. no use of clinical practice guidelines) increased adherence to prescribing first-line agents for treating uUTIs in PrMNPW and yielded desired outcomes in terms of bacterial resolution and cost-effectiveness. The research in this literature review supports the potential efficacy of the 2011 IDSA guidelines into Athena Med-Monterey's current uUTI management practices to potentially increase adherence to prescribing first-line agents for treating uUTIs in PrMNPW and improve the quality of clinical decisions and patient outcomes. The literature also supports the usefulness of implementing a process to evaluate and support clinicians' adherence to antibiotic prescribing clinical practice guidelines for other infectious conditions in primary care.

## **Rationale**

### **Theoretical Framework**

The transtheoretical model (TTM) was used to predict and guide behavior changes among prescribing clinicians. This model elucidated how prescribing clinicians changed their behaviors at different stages of readiness to improve the quality of practice when treating uUTIs. People are at different stages of readiness when making health behavior changes, and analyses of the processes of change can help identify strategies for overcoming particular barriers to behavioral change (Glanz et al., 2015). If the perceived barriers are greater than the perceived benefits, the likelihood of behavior change decreases.

The TTM was augmented with the diffusion of innovations model, which focuses on the role of change agents in disseminating health interventions. Key constructs to behavior changes included the extent of effectiveness, *cost* (i.e., perceived cost, time, and effort), *simplicity* (i.e., ease of understanding), *compatibility* (i.e., fit with the intended audience), *observability* (i.e., observable outcomes), and *trialability* (i.e., the extent to which the innovation can be tried before commitment to change; Oldenburg & Glanz, 2008).

Strong motivation is also needed to yield behavior change in different settings and populations (Webb & Sheeran, 2006); the motivation to improve and evaluate current practice triggers behavioral changes. In the present project, the medical director and the director of allied education agreed (*motivation*) to set evidence-based clinical guidelines for quality practice improvement and outcomes (*perceived benefit*) and therefore approved the proposal. The clinic's advanced practice nurse (APN) and the advanced practice nurse student (APNS; i.e., the change agents) were assigned responsibility for this project. After project approval, the change agents developed strategies to reduce restraining forces (*barriers*); these barriers included loss of patient time, use of break hours for training, and worries about the complexity of the change. Short, face-to-face change agents' meetings were held during break times over food or snacks. The APNS was given safe and remote access to patients' EHRs, from which the student collected data for review.

## Methods

### Context

Athena Health strives to provide the highest quality of care and customer service to residents and their families through best practices, highly trained staff, and



innovative programs and services designed to meet patients' needs (Athena Healthcare Systems, 2020). As mentioned above, Athena Med-Monterey is a multi-practice clinic with multiple providers who are experts in their fields (these include obstetrics and gynecology, internal medicine, occupational medicine, and advanced practice nursing). Patients presenting with UTI symptoms are prescribed antibiotics, either at the initial visit or after two days, once urine culture and sensitivity results are available.

### **Intervention**

The PDSA method was used to guide the small test of change that aimed to measure practice outcomes and set the clinic's evidenced-based uUTI treatment guidelines. This shorthand cycle was conducted in the initial phase of the three-year proposed intervention, from October 21, 2020, through January 4, 2021. A small test of change using the PDSA is an action-oriented method of testing a change by planning the change, trying it, observing the results, and acting on what is learned (Institute for Healthcare Improvement, 2020). Within the time allotted for the small test of change, the PDSA method was conducted in cycles as needed in the hope that the proposed changes led to the desired improvement. Project roles, communication delivery, and deliverables were clearly stated and followed.

The small test of change, which was guided by the plan-do-study-act (PDSA) method, was utilized because of its simplicity, fit, observability, and trialability. In the present project, the *plan* was to review practice, integrate the 2011 IDSA uUTI guidelines, and set the clinic's treatment guidelines for treating uUTI. The change agents conducted (*do*) the qualitative assessment and the retrospective chart review. The current practices were also reviewed against

the 2011 IDSA treatment guidelines. Analyses (*study*) of the assessment results, as well as chart reviews and quality measurement, were used to determine an action. The change agents decided whether to adapt, adopt, or abandon (*act*) the plan for establishing clinical treatment guidelines for uUTI. The *stages of behavior change* were also observed and identified during this initial phase of the three-year proposal.

### **Gap Analysis**

Although the patients' treatment plans for uUTIs are clearly written in their EHRs, the clinic has no written clinical guidelines that reference evidence-based treatment guidelines such as the 2011 IDSA guidelines. Furthermore, the quality measurements for evaluating the treatment outcomes and clinical practices for treating uUTIs are currently not available (Table 2). Thus, inconsistencies could exist among the clinicians in the management and prescribing of antibiotics to treat uUTIs in PrMNPW. In addition, there are no supporting data available to indicate the clinic's adherence to evidence-based clinical guidelines for the treatment of uUTIs, no supporting data to indicate the clinic's adherence to prescribing first-line agents for uUTI, and no data available to quantify symptom resolution post treatments. Having written evidence-based treatment guidelines for uUTIs in PrMNPW could promote the adherence to these guidelines and support clinicians to consistently follow them and prescribe the defined first-line agents. Using real-time interoperable EHRs with electronic charting and prescription capabilities could likely influence this quality practice improvement. Further, continuous electronic monitoring could be performed using the clinic's EHRs. The practice outcomes that the clinic could measure include adhering to the use of evidence-based practices and

prescribing first-line agents for the treatment of uUTI and not performing a urine culture when treating AUC. Furthermore, the additional treatment outcomes that the clinic could measure include symptom resolution at 28 days after the uUTI treatment.

### ***Gantt Chart***

After approval (Letter 1) was obtained from the clinic's allied health education director in October 2020, two small tests of practice change or improvement were attempted during the initial phase of the three-year project timeline (Table 3). The APN and the APNS formed a team and were assigned as the change agents to lead the small test of change. The qualitative assessment survey and retrospective review of the records were performed in October 2020. The records of women aged 18–50 with symptoms of uUTI (dysuria and frequency of urination) were collected for review. The clinicians' references for treatment practices and adherence to prescribing first-line agents for treating uUTIs in PrMNPW were also reviewed in accordance with the 2011 IDSA evidence-based guidelines. During this initial phase, the attempt to establish clinic guidelines was abandoned, as the investigation found that the clinicians used resources that were based on the 2011 IDSA guidelines. Therefore, no practice changes were proposed. Then, the aspects of the clinicians' adherence to prescribing first-line agents for treating uUTIs in PrMNPW as well as symptom resolution within 28 days post treatment were measured. The first phase was completed on January 1, 2021.

The subsequent chart review was completed, and the second attempt at proposing practice changes or improvements was identified on January 7, 2021. The second small test of change aimed to get clinicians to prescribe a first-line agent without performing a

urine culture for treating AUC. The 2011 IDSA and 2017 CDC guidelines do not recommend performing a urine culture for the treatment of AUC. This second small test of change was carried out from February 9, 2021 to February 20, 2021. A pre-implementation clinician survey and a short face-to-face project review were conducted a week prior to commencing the second small test of change.

This second attempt at practice improvement was not completed due to having limited access to EHRs. The planned intervention for this second attempt at practice improvement would have been as follows. Upon the acknowledgement of the uUTI symptoms being the patient's chief complaint, the scheduling medical assistant would have added the following urine culture smart phrase to the problem alert box (Fig. 1): *“Urine culture is not recommended for managing acute uncomplicated cystitis in non-pregnant premenopausal women. However, for acute pyelonephritis and any type of complicated UTIs, a urine culture should be obtained before empiric therapy. Consider pyelonephritis or complicated UTI in the presence of fever, flank pain, and/or nausea and vomiting.”*

### **Work Breakdown Structure**

The director of allied health education represents the clinic's leadership and was informed and consulted throughout the project's initial phase. The APN and the APNS are the change agents and were responsible for completing the project's tasks. The tasks included performing a review of the clinic's current uUTI practices in comparison with the 2011 IDSA guidelines, completing the qualitative assessment and retrospective chart review, analyzing and reporting the outcomes obtained, and presenting recommendations

to the director of allied health education. The director of allied health education and the change agents interpreted the findings and outcomes and made the decision to abandon the proposed practice improvement. In addition, the clinicians were informed of the evaluation process and participated in the qualitative assessment (Table 4).

### ***Responsibility/Communication Matrix***

The short face-to-face meetings between the change agent/s and the director of allied health education were held in an office during break times, over food, or after the last patients are seen on Wednesdays. The meeting agendas included discussing the plan and action items as well as the outcomes evaluation and analyses. The project updates and decisions produced during these meetings were recorded on paper by the APNS. The qualitative assessment and the remote electronic retrospective chart review were performed by the APNS, and the findings of these were reported by the APNS to the clinic leadership twice a month during the face-to-face meetings or through the University of San Francisco email system (Table 5).

### ***SWOT Analysis***

It is evident that the clinic has two strengths (S) with regard to quality practice and treatment outcomes. They are the real-time interoperable EHRs and the effective collaborations among clinicians. The electronic charting and prescription capabilities likely influenced the quality of the practices and treatment outcomes, with easily accessible electronic resource applications such as UpToDate, Medscape, Epocrates, and the CDC guidelines. Patients' treatment plans are clearly written in their EHRs, and the

collaborations between clinicians are recorded through the clinic's secure email and phone system for when questions regarding patient care arise. In addition, 75% of the clinicians are obstetricians and gynecologists. Their expert opinions are highly sought out in the clinic, the patient population of which is 90% women. The opportunities (O) for quality practice and treatment outcomes include establishing a culture that is supportive of practice changes and the existence of allied health education that accommodates students for health professional development. The weaknesses (W) include the unavailability of antibiograms, or records of local antibiotic resistance patterns, and the unavailability of continuous quality improvement tools. The constraints in the clinicians' time and schedule could be considered threats (T) to quality practice and treatment outcomes (Figure 2).

### ***Budget***

The first phase of the small tests of change did not have a negative financial impact. The estimated total budget for the three-year program was \$8,015 (Table 6). An estimated \$5,000 was spent on data collection and analysis, and \$3,000 was spent on meetings, trainings, and collaborations. About \$15.00 was used to copy papers and purchase office supplies; however, the clinic had the office supplies and devices to meet these needs. Funds for this budget were taken from the clinic's quality improvement and staff education and training funds.

The clinicians' offices were conducive for one-on-one in-service that maintained six feet of safe distance, given the COVID-19 pandemic precautions. The APNS was given remote EHR access and performed safe retrospective chart review of records. As previously mentioned, the clinic was equipped with interoperable EHR with real-time patient data and electronic charting

and prescription capabilities. The use of the clinic's EHR incurred no additional expenses and most likely influenced this quality practice improvement.

The estimated return of investment for prescribing first-line agents when treating uUTIs was no recurrence or no return visit within 28 days post-treatment. The individual cost of UTI recurrence work-up ranges from \$390–730 per individual (Gaitonde et. al, 2019). The clinic saw an average of eight cases of uUTI in two months; therefore, the savings were estimated to be \$3,120–5,840 per patient with no recurrences at 28 days post-treatment. Additionally, not performing urine cultures for AUC eliminates additional documentation and follow-up calls for patient notification. If a clinician, with a salary of \$100/hour, spent approximately 10 minutes calling and notifying a patient of a normal urine culture, the clinic could save approximately \$800 per year by not performing urine cultures for AUC.

### **Study of the Intervention**

A retrospective chart review was performed to collect and use data to evaluate clinicians' adherence to current evidence-based guidelines, such as the 2011 IDSA guidelines, when treating uUTI in PrMNPW. Additionally, structured qualitative surveys were conducted prior to each small test of change. The first survey (Deliverable 1) evaluated clinicians' referencing of evidenced-based practice guidelines and their use of first-line agents for treating uUTI. The second survey (Deliverable 2) evaluated clinicians' decisions to order urine cultures for AUC. Analyses of these data were used to guide proposed plans for practice improvements.

Post-implementation surveys were intended to measure the practice improvement outcomes when an intervention occurred. However, analysis of both the initial qualitative survey and retrospective chart review found that clinicians adhered to the 2011 IDSA guidelines and prescribed first-line and alternative agents when treating uUTI in PrMNPW. Thus, the first planned intervention to establish clinic guidelines was abandoned. Furthermore, limited access to EHRs led to unmeasurable outcomes for the second planned intervention for practice improvement, which was a small test of change regarding not performing a urine culture when treating AUC.

### **Outcome Measures**

A completed cycle of the small test of change, guided by the PDSA method, is considered a successful practice and treatment outcome evaluation process. That is, a practice change was planned, tried on a small scale, studied, and an acted upon (whether to adopt, adapt, or abandon the planned practice change). Two primary outcome measurements were proposed to measure adherence to the guidelines. The first primary outcome involved the use of evidence-based clinical practice guidelines for treating uUTI in PrMNPW. The second primary outcome is adherence to prescribing the first-line agents NTF, SMX-TMP, or FM as opposed to prescribing FQ or  $\beta$ -lactams. Clinicians achieved adherence if a first-line antibiotic was not prescribed in the absence of contraindication showing that the patient did not meet the criteria for receiving first-line antibiotic treatment. The proposed secondary outcome measurement was symptom resolution. Absence of recurrences or return visits for the same uUTI symptoms within 28 days post-treatment was considered symptom resolution. Furthermore, not performing a



urine culture when treating AUC was considered adherence to evidenced-based guidelines. However, as previously mentioned, limited EHR access did not allow for this small test of practice change.

### ***CQI Method***

The PDSA method guided the small test of change (Fig. 3). The evaluation of clinicians' adherence to evidence-based clinical practice guidelines for the treatment of uUTI in PrMNPW was successfully completed using the small test of change process in the first phase of the three-year proposed intervention. Two qualitative pre-implementation surveys were conducted prior to each small test of change. The data from the retrospective patient chart review was used to quantify the total number of patients seen for uUTIs and to measure prescribing rate of first-line agents.

### **Analysis**

The rate of appropriately prescribing first-line agents for symptoms of uUTIs was used to determine prescription adherence. The rate was computed as the number of clinicians who adhered to prescribing first-line agents divided by the total number of patients seen for uUTIs. Summary statistics (frequencies and percentages) were used to quantify symptom reoccurrence. The retrospective review of data from October 25, 2021, through December 2, 2020, was used to measure these outcomes. A chi-square analysis would have been used to determine whether any significant increase in adherence to prescribing first-line agents to treat uUTIs in PrMNPW occurred after the proposed small test of change was implemented.

Initial reviews found that clinicians at Athena Med-Monterey used guidelines and resources referring to the 2011 IDSA guidelines. These resources guided them in prescribing first-line agents for treating uUTI. Therefore, no quality improvement intervention was needed; setting the clinic's practice guidelines for treating uUTI would have been futile.

Two qualitative pre-implementation surveys were conducted prior to each small test of change. The first face-to-face semi-structured interview was conducted in the first phase on November 4, 2020, before the intended timeline for establishing clinical guidelines. This initial, qualitative pre-implementation survey identified two themes: resources clinicians referred to for antibiotic prescription decisions, and tailoring antibiotic treatments according to urine culture results in accordance with guidelines. The answers to the survey halted the small test of change and prompted the next phase of attempted practice change. The second face-to-face semi-structured interview was conducted on January 30, 2021, and was used to plan the second small test of practice change. The survey evaluated the clinicians' practices and perceptions of performing urine cultures for AUC.

### **Ethical Considerations**

This project was guided by the American Nurses Association (2015) *Code of Ethics with Interpretive Statements*. It was also guided by the Jesuit values (University of San Francisco, 2001) of protecting, promoting, and optimizing health and abilities, preventing illness, alleviating suffering through the human response to diagnosis and treatment, and advocating for the care of the individuals and populations served. By

promoting use of clinical practice guidelines based on evidence, the study aimed to guide clinicians to choose first-line agents for treating uUTI in women, thereby preventing unnecessary use of antibiotics in treating such infections. Decreasing the prevalence of antibiotic resistance applies the principle of nonmaleficence (i.e., do no harm), a nursing duty to protect patients' safety.

Every effort was made to protect the patients' privacy and rights and to respect and promote each person's dignity. The aggregation of data for this project did not contain any patient information and was stored on a locked computer with two-factor authentication. The data were destroyed four months after the project was completed. This project was approved by the University of San Francisco's Doctor of Nursing Practice program as a quality improvement project not requiring review by the Institutional Review Board (Statement 1).

### **Results**

The evaluation of clinicians' adherence to evidence-based clinical practice guidelines for the treatment of uUTI in PrMNPW was successfully completed using the small test of change process in the first phase of the three-year proposed intervention. The PDSA method guided the small test of change. The evaluation of clinicians' adherence to prescribing first-line, or alternative agents, and symptom resolution at 28 days post-uUTI treatment were also successfully completed. This first phase was initiated on October 21, 2020 and was completed on January 1, 2021, with planned quality practice improvement aimed to establish evidenced-based clinical guidelines for treating uUTI in PrMNPW. The change agents performed the qualitative pre-intervention survey on November 4, 2020, and initiated the retrospective chart review on

October 28, 2020. Findings of both the qualitative interview and retrospective chart review were reviewed on December 5, 2020, and these findings guided the decision to abandon the first planned quality improvement intervention.

The change agents then decided to continue the retrospective chart review until January 1, 2021, to collect more data to measure the following: use of evidenced-base clinical guidelines or references, such as the 2011 IDSA guidelines; adherence to the evidence-based guidelines as measured by prescription of first-line agents for uUTI; and practice outcomes as measured by no symptom recurrence within 28 days post-treatment.

All eight prescribing clinicians participated in the structured pre-intervention survey. The face-to-face in-office interviews were scheduled in advanced and recorded on paper by the APNS. Out of eight of the prescribing clinicians at Athena Med-Monterey, 6 (75%) were obstetricians and gynecologists; one was a general medicine doctor, and one was an APN. The pre-intervention clinician survey identified guidelines that the clinicians referred to for treating uUTIs. All eight (100%) of the clinicians used the resource applications UpToDate, Medscape, and Athena Med's Epocrates. The review found that these electronic resource applications refer to the 2011 IDSA guidelines for treating uUTI.

The qualitative assessment questions revealed that all eight (100%) of the prescribing clinicians strongly agreed that other clinicians prescribing in their absence would prescribe first-line agents for treating AUC in PrMNPW, in accordance with guidelines. Furthermore, all eight (100%) strongly agreed that clinicians prescribing in their absence would prescribe antibiotics according to urine culture results when treating uUTI, in accordance to guidelines, and all eight (100%) strongly agreed that clinicians prescribing in their absence would start, stop, or tailor antibiotic treatment according to urine culture results and guidelines for treating uUTI. The pre-

intervention survey also found that all eight (100%) of the clinicians ordered urine cultures for AUC symptoms.

Data from September 25, 2020 to January 1, 2021 were collected for retrospective chart review. The data were used to measure the rate of adherence to prescribing first-line agents, measure the rate of adherence to not performing urine cultures for AUC, and quantify the number of patients who had uUTI symptom recurrence within 28 days post-treatment. A total of seven PrMNPW with documented symptoms of uUTI were seen. Their ages ranged from 18–47 years old. Urine dipstick was performed for five (71%) of the seven patients, and urine cultures were performed for all (100%) seven patients. Of the patients who did not receive urine dipstick, two (29%) were seen via telehealth; therefore, urine dipstick could not be performed. All seven (100%) were treated for uUTIs in accordance with the 2011 IDSA guidelines. Four (57%) were appropriately prescribed first-line or alternative agents, and three (43%) were not prescribed antibiotic agents as indicated by urine culture results. No symptom recurrences were noted at 28 days post antibiotic treatment. Furthermore, no cases of pyelonephritis were seen.

## **Discussion**

### **Summary**

The small test of practice change using the PDSA method demonstrated success in implementing a structured and inexpensive provider-driven process for evaluating adherence to evidence-based clinical practice guidelines at Athena Med-Monterey, a multi-provider primary care organization. Both qualitative assessment and retrospective chart review found that the clinicians at Athena Med-Monterey maintained consistent behaviors of using evidenced-based guidelines and adhered to prescribing first-line and alternative agents for treating uUTI in PrMNPW. No quality practice improvement intervention was needed, and the plan to establish

clinical treatment guidelines for uUTI was abandoned. The clinicians' utilization of guidelines results in positive practice and treatment outcomes. The clinicians at Athena Med-Monterey are comfortable other clinicians, on his/her behalf, prescribe a first-line agent for the treatment of uUTI. The retrospective chart review also revealed that the clinicians' adherence to prescribing first-line and alternative agents resulted in no symptom recurrence 28 days post-treatment.

The FNP led the quality improvement process using the small test of change and PDSA method, the TTM of behavior, and the clinic's EHRs. This quality improvement intervention was carried out over a three-month period. The intention to improve the quality of practice was planned, trialed, evaluated, and acted upon. The TTM was used to predict and guide the clinicians' expected behaviors to trial the quality improvement intervention. The qualitative assessment and retrospective chart review were used to measure practice behavior and outcomes.

### **Interpretations**

The findings aligned with the trials, systematic reviews, and meta-analyses conducted after the CDC's 2017 review of the 2011 IDSA guidelines (Table 1). Clinicians who referenced evidence-based guidelines to manage uUTIs were most likely to prescribe first-line agents and yield desired patient outcomes in terms of bacterial and symptom resolution as well as cost-effectiveness. The use of EHRs and resource applications, such as UpToDate, Medscape, and Athena Med's Epocrates, influenced this quality practice at Athena Health. Real-time patient information and updated resource applications supported efficient and well-informed electronic prescription capabilities, and retrospective chart review (through EHRs) was also a cost-saving process for measuring quality practice outcomes.

The TTM's stages of behavioral change occurred among the clinicians at Athena Med-Monterey when evaluating the clinical practice and implementing processes to further improve

practice quality. Although no intervention was needed to change the current practice for treating uUTIs in PrMNPW, the motivation to improve and evaluate the current practice triggered behavioral changes. Four stages of behavior changes were observed during the initial phase of the three-year project proposal:

1. Stage 1: The clinicians were aware of the need to evaluate the practice and practice outcomes but had no thought of adopting evaluation tools or processes.
2. Stage 2: The clinicians acted on their decision to trial the small test of change and the PDSA processes for evaluating and improving the practice.
3. Stage 3: The clinicians maintained their behavior of using current evidenced-based references when treating uUTIs in PrMNPW.
4. Stage 4: The clinicians acted on a decision to abandon the planned practice improvement. They are yet to decide whether to adopt a further small test of change and PDSA processes to continue quality improvement.

Both the qualitative assessment and the retrospective chart review found that clinicians at Athena Med-Monterey were consistent in using evidenced-based clinical guidelines and prescribing first-line agents for treating uUTI in PrMNPW. How and when this behavior change occurred was not assessed in this project.

Consistent utilization of evidence-based guidelines could advance adherence to prescribing first-line agents for treating uUTI in PrMNPW, specifically in a multi-provider primary healthcare organization. The small test of practice change using the PDSA method could be used to establish processes to evaluate and promote the use of evidence-based clinical guidelines and the use of first-line agents for treating other uncomplicated infections commonly seen in primary care, such as respiratory and skin infections. Clinicians at Athena Med-Monterey

will consider the possibility of adopting a small test of change and PDSA processes for other potential practice improvement in antibiotic prescribing.

### **Limitations**

Although uUTI are also common in women older than 50 years, this project only examined quality improvement for treating uUTIs in PrMNPW aged 18–50 years. Treatment guidelines for uUTIs in postmenopausal women were not included in the 2011 International Clinical Practice Guidelines for the Treatment of AUC and Pyelonephritis published by the IDSA and the European Society for Microbiology and Infectious Diseases.

Given the limitations surrounding healthcare during the COVID-19 pandemic, physical examinations and in-clinic urine dipstick tests were infeasible. Review of symptoms was performed through telehealth for two of the seven cases included in the retrospective chart review, and urine collection for culture was carried out in a laboratory (vs. clinic-performed urine dipstick). Also, local susceptibility information was unavailable, which limited the use of SMX-TMP as a first-line antibiotic choice for treating AUC.

As previously mentioned, both the qualitative assessment and the retrospective chart review found that clinicians at Athena Med-Monterey used evidenced-based clinical guidelines and first-line agents for treating uUTIs in PrMNPW. Since no practice change intervention occurred, pre- and post-intervention comparison was not conducted. Additionally, quality measurement tools were not available for comparing and quantifying the clinic's practice outcomes.

The 2011 IDSA and 2017 CDC guidelines do not recommend performing urine cultures when treating AUC. Thus, not performing urine cultures is considered adherence to evidenced-



based guidelines. This project attempted to measure this adherence, but limited access to EHRs did not allow for this small test of practice change.

### **Conclusion**

uUTIs are diagnosed and managed in primary healthcare. To control for antibiotic resistance and reduce antibiotic use, the small test of practice change using the PDSA method could be used to establish processes to evaluate and promote the use of evidence-based clinical guidelines in a multi-provider organization like Athena Med-Monterey. Consistent utilization of evidence-based guidelines advances adherence to prescribing first-line agents, improves the quality of clinical decisions, allows for the delivery of consistent care, and yields high-quality patient outcomes when treating uUTIs in PrMNPW. Therefore, this project recommends these APN-driven processes to promote the use of evidenced-based practice guidelines and first-line agents for the treatment of other uncomplicated infectious conditions seen in primary care, such as uUTIs in post-menopausal women and respiratory and skin infections.

### **Funding**

This project received no external funding.

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## Appendix

## Statement 1

**DNP Statement of Non-Research Determination Form****Student Name: Ira Amayun****Title of Project:**

A Quality Improvement Project: Utilizing Clinical Practice Guidelines for Women Presenting with Symptoms of Uncomplicated Urinary Tract Infections

**Brief Description of Project:****A) Aim:**

The overall goal of the proposed project is to promote adherence to evidence-based guidelines for treating uncomplicated urinary tract infections (uUTIs) for premenopausal non-pregnant women.

**B) Description of Intervention:**

The proposed project will use the 2011 IDSA clinical practice approach for treating uUTIs in pre-menopausal non-pregnant women, as well as the clinicians' practice preferences, to set or modify practice guidelines. The plan-do-study-act method will be used to guide the small tests of practice change.

**C) How will this intervention change the practice?**

The proposal will examine whether integrating the 2011 IDSA approach into a primary clinic's current uUTI management practices (vs. the clinic's current practices alone) will increase adherence to evidence-based guidelines and evaluate opportunities to improve the quality of clinical decisions and patient outcomes over a few weeks' series of small tests of change.

**C) Outcome measurements:**

The following measures could be used to evaluate the proposal's outcomes:

1. Clinicians who prescribed antibiotics in the four weeks after the implementation of the small tests of change referenced the clinical practice guidelines in the treatment of 80% of all the PrMNPW seen with UTI symptoms.

2. Out of all the PrMNPWs seen with UTI symptoms in the four weeks after the implementation of the small tests of change, 80% are prescribed the appropriate first-line agents for AUC.
3. Out of all the PrMNPWs seen with UTI symptoms in the four weeks after the implementation of the small tests of change, 80% are prescribed the appropriate first-line agents for acute pyelonephritis.

This proposal will also attempt to quantify improvement in the quality of clinical decisions using clinical practice guidelines and measure symptom resolution at 28 days post uUTI treatment.

To qualify as an evidence-based change in practice project, rather than a research project, the following criteria outlined in federal guidelines will be used (<http://answers.hhs.gov/ohrp/categories/1569>):

- This project meets the guidelines for an evidence-based change in practice project as outlined in the project checklist (attached). Students may proceed with implementation.
- This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

Comments:

### EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST \*

**Instructions: Answer YES or NO to each of the following statements:**

<b>Project Title:</b>	<b>YES</b>	<b>NO</b>
The aim of the project is to improve the process or delivery of care with established/accepted standards or to implement evidence-based change. There is no intention of using the data for research purposes.	<b>X</b>	
The specific aim is to improve performance on a specific service or program and <b>is a part of usual care</b> . ALL participants will receive standard care.	<b>X</b>	
The project is <b>NOT</b> designed to follow a research design (e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does <b>NOT</b> follow a protocol that overrides clinical decision-making.	<b>X</b>	
The project involves the implementation of established and tested quality standards and/or systematic monitoring, assessment, or evaluation of the organization to ensure that existing quality standards are being met. The project will <b>NOT</b> develop <u>paradigms</u> , untested methods, or new untested standards.	<b>X</b>	
The project involves the implementation of care practices and interventions that are consensus-based or evidence-based. The project does <b>NOT</b> seek to test an intervention that is beyond current science and experience.	<b>X</b>	

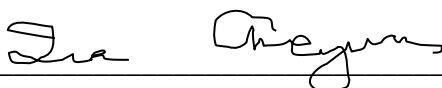
The project will be conducted by the staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.	X	
The project has <b>NO</b> funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.	X	
The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., <b>not</b> a personal research project that is dependent upon the voluntary participation of colleagues, students, and/or patients.	X	
If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: <i>“This project was undertaken as an evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board.”</i>	X	

**ANSWER KEY:** If the answer to **ALL** of these items is yes, the project can be considered an evidence-based activity that does NOT meet the definition of research. **IRB review is not required. Keep a copy of this checklist in your files.** If the answer to ANY of these questions is **NO**, you must submit for IRB approval.

\*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

**STUDENT NAME (Please print):** Ira Amayun

**Signature of Student:**



**DATE:** Oct. 31, 2020

**SUPERVISING FACULTY MEMBER (CHAIR) NAME (Please print):**

**Dr. Alexa Curtis**

**Signature of Supervising Faculty Member (Chair):**

**DATE**



## Letter 1

### *Letter of Support from the Agency: Athena Med-Monterey*



10 Harris Court Suite A2  
Monterey, CA 93940  
Tel: 831-900-5115 Fax: 844-560-2476

Date:

Letter of support for Ms. Ira Amayun

In my capacity of Director of Allied Health Education at Athena Med-Monterey clinic, please accept this letter as support and confirmation that I am aware of Ms. Ira Amayun's DNP project proposal entitled "A Quality Improvement Project: Utilizing Clinical Practice Guidelines for Women Presenting with Symptoms of Uncomplicated Urinary Tract Infections".

The proposed work in primary healthcare is relevant and in-line with the goal of the clinic. The clinic will make effort in order to ensure a successful setting for the project.

Sincerely,

A handwritten signature in black ink that reads "Mali Bakshi".

Mali Bakshi, DNP, FNP  
 Director of Allied Health Education  
 335 Katherine Avenue  
 Salinas, CA 93901  
 831-751-6222  
 athenamedical.org

**Table 1***Synthesis Table*

Study	Design	Sample	Outcomes/Findings
Qualitative analysis of PCPs' prescribing decisions for urinary tract infections Grigoryan et al. (2019)	Qualitative semi-structured interviews and thematic analysis	Eighteen PCPs practicing in two family medicine clinics in a large urban area in Texas between July 2017 and November 2017	Few providers relied on the IDSA guidelines for treating uUTIs.
Antibiotic prescribing in New York State Medicare Part B beneficiaries diagnosed with cystitis between 2016 and 2017 Yu et al. (2020)	Retrospective cohort study of Medicare Part B enrollees in New York State	There were 23,981 and 26,677 prescriptions written for cystitis across New York State in 2016 and 2017, respectively.	SMX-TMP, fosfomycin, and B-lactamase prescriptions increased, and FQ use decreased in older female and male adults.  The results suggested that the widespread prevalence of FQ and B-lactamase prescriptions necessitates outpatient antimicrobial stewardship.
Preferential use of NTF over FQ for AUC and outpatient <i>E. coli</i> resistance in an integrated healthcare system Pedela et al. (2017)	Retrospective pre-intervention post-intervention study	An urban setting in Colorado, a 477-bed hospital, an emergency department, an urgent care department, eight community health clinics, and 15 school-based clinics  This study included 5,714 adults treated for acute cystitis and 11,367 outpatient <i>E. coli</i> isolates.	After a change in institutional guidelines, there was an immediate 26% reduction in FQ use and stabilization of FQ-resistant <i>E. coli</i> . NTF use increased without any change in NTF resistance.
Evaluation of the trends and appropriateness of FQ use in the outpatient treatment of AUC at five family practice clinics Robinson et al. (2019)	Retrospective study	Women aged 19–64 years old were seen at five family medicine clinics and prescribed NTF, ciprofloxacin, or levofloxacin for uncomplicated cystitis.	Of the 567 women included in this study, 395 were given NTF, and 172 were given FQ; 343 (86.8%) and 18 (10.5%) were appropriately prescribed NTF and FQ, respectively. Of the women who were inappropriately prescribed FQ, 15 (87.8%) lacked contraindication to NTF.
Improvement in adherence to antibiotic duration of therapy recommendations for uncomplicated cystitis: A quasi-experimental study Giancola et al. (2019)	Quasi-experimental study	Women aged 18–64 years old who were prescribed NTF, SMX-TMP, or ciprofloxacin within seven days of encounters at five family medicine clinics	Clinics that received education increased adherence from 22.1% to 58.8% ( $p < 0.01$ ). Revising/adding default prescription instructions to targeted antimicrobials and DOT, and staff in-service increased clinician adherence to uncomplicated cystitis first-line antibiotic DOT guidelines.

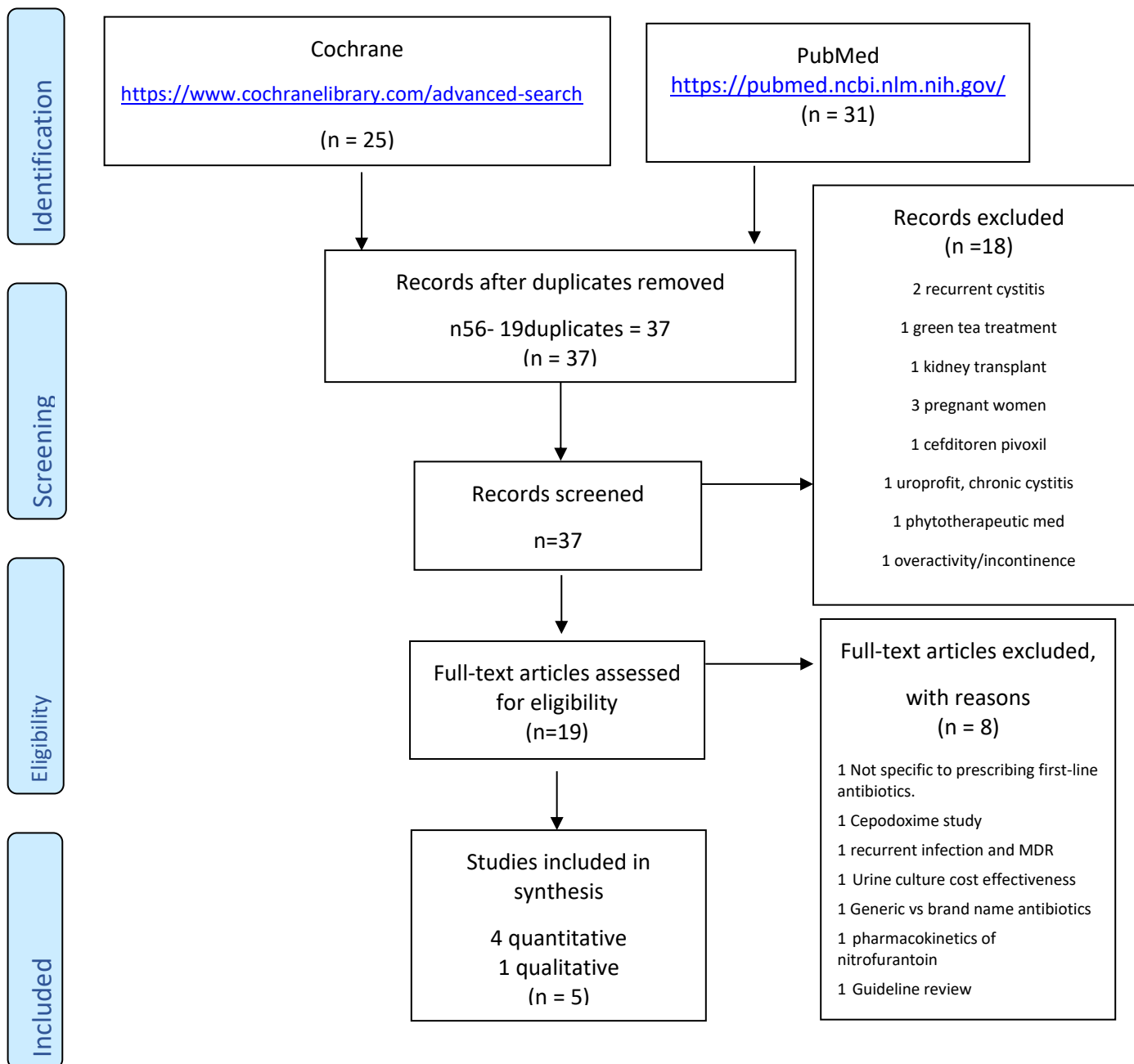
## Diagram 1

Reviews based on Prisma Diagram



### PRISMA 2009 Flow Diagram©

Criteria: Literature in English, published between 2017 and February 21, 2020, meeting medical search terms.



**Table 2***Gap Analysis*

Focus Area	Current Situation	Desired Situation	Gap Factor/ Deficiency	Action Plan
Use of clinical practice guidelines, such as the 2011 IDSA, in the treatment of uUTIs.	No available data	Use of the 2011 IDSA approach to uUTI treatment is evident and available for reference.  A diagram of the 2011 IDSA approach to uUTI treatment is available for clinicians to reference.	No available data	Perform clinician survey.  The 2011 IDSA approach to AUC treatment is available for reference. This may be modified according to survey results and according to the PDSA method to reflect what would work with the current practice.
PrMNPWs with symptoms of AUC are prescribed appropriate first-line agents in accordance with the 2011 IDSA guidelines.	No data	PrMNPWs with symptoms of AUC will be prescribed appropriate first-line agents in accordance with the 2011 IDSA guidelines.	No available data	Recommend use of clinical practice guidelines and quality measurement tools and/or evaluation process.
PrMNPWs with symptoms of acute pyelonephritis will have their urine sent for culture in accordance with the 2011 IDSA guidelines.	No data	Clinicians wait for urine culture results and prescribe first-line agents in accordance with the 2011 IDSA guidelines.	No available data	Recommend use of clinical practice guidelines and quality measures.
Patients with uncertain diagnoses will have their urine sent for culture to confirm antibiotic treatment.	No data	Patients with uncertain diagnoses will have their urine sent for culture to confirm antibiotic treatment.	No available data	Continue practice.
PrMNPW treated for symptoms of uUTI report symptom relief within 48 hours after being seen at the clinic, and symptom resolution at 28-days post uUTI treatment.	No data	Patients report symptom relief within 48 hours after being seen at the clinic or symptom resolution at 28-days post-uUTI treatment.	No available data	Recommend use of quality measurement tools and/or evaluation process.

**Table 3***Timeline (Gantt Chart)*

Year 1 Tasks	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Formation of one clinician team for a small test of change using the PDSA method		■										
Four-week retrospective chart review of the target population treated for UTI symptoms			■									
Integration of the 2011 IDSA Approach to uUTI Treatment into the clinic's current practices												
Initial small test of change begins			■	■	■							
Use of the PDSA method												
Initial small test of change evaluation					■							
Plan second small test of change												
Outcome measurement and report												
Full implementation						■	■	■	■	■	■	■
First-year post-implementation survey												■
Report distribution												■

Year 2 Tasks	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Full implementation of the PDSA method	■	■	■	■	■	■	■	■	■	■	■	■
Outcome measurement and report						■						
Second-year post-implementation survey												■
Outcome measurement and report												■
Report distribution												■

Year 3 Tasks	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Full implementation of the PDSA method	[Blue bar spanning Oct to Sep]											
Outcome measurement and report						[Blue bar]						
Third-year post-implementation survey												
Outcome measurement and report												[Blue bar]
Report distribution												[Blue bar]

**Figure 1***Urine Culture Smart Phrase Box*

The screenshot displays the athenaNet interface for a patient named 'Test TEST INACTIVE', 32yo F, born 05-17-1988, with ID #4847. The 'Problems' section is active, showing a list of problems with 'acute urinary tract infection' selected. The smart phrase box provides clinical guidance on when to obtain a urine culture.

**Problems** HISTORICAL (0) | (+)

Show ICD-10 codes  
Arrange by: Name ▼

**acute urinary tract infection** (X) (W)

Onset date: 11-21-2017

Add to pregnancy problem list

Type: Acute | Chronic

Urine culture is not recommended for managing acute uncomplicated cystitis in non-pregnant premenopausal women. However, for acute pyelonephritis and any type of complicated UTIs, a urine culture should be obtained before empiric therapy. Consider pyelonephritis or complicated UTI in the presence of fever, flank pain, and/or nausea and vomiting.

**Table 4***Small Test of Change Work Breakdown Structure*

Project clinic leadership: Allied Health Education Director
Change agents: APN and APNS
Participants: All of the clinic's prescribing clinicians

Responsible (R): Member is responsible for completing the task

Consulted (C): Member was communicated with regarding the decision and task

Informed (I): Member was updated on decisions and actions

Role Deliverable/Activity	Project Leader	APN and FNP student
<b>Initialization Phase</b>		
Review the 2011 IIDS A Approach to uUTI Treatment vs Athena Med-Monterey clinicians' resource/guidelines	I/C	R
<b>Planning Phase</b>		
Perform a four-week retrospective chart review of the target population treated for UTI symptoms.  Print and laminate the modified approach diagram and place it in a visible position for reference.  Staff in-service sessions given prior to implementation.	I/C	R
<b>Implementation Phase of the Small Test of Change</b>		
Prescribers refer to guidelines. Conduct the PDSA method in cycles as needed for the desired quality practice.	I	R
<b>Evaluation and Assessment Phase</b>		
Analyze and report outcomes to the medical director.	I	R
<b>Review Phase</b>		
Create lessons learned.	I	R
Make the decision to continue or terminate the initiative.	R	I
Create a project closure report and present recommendations.	I/C	R

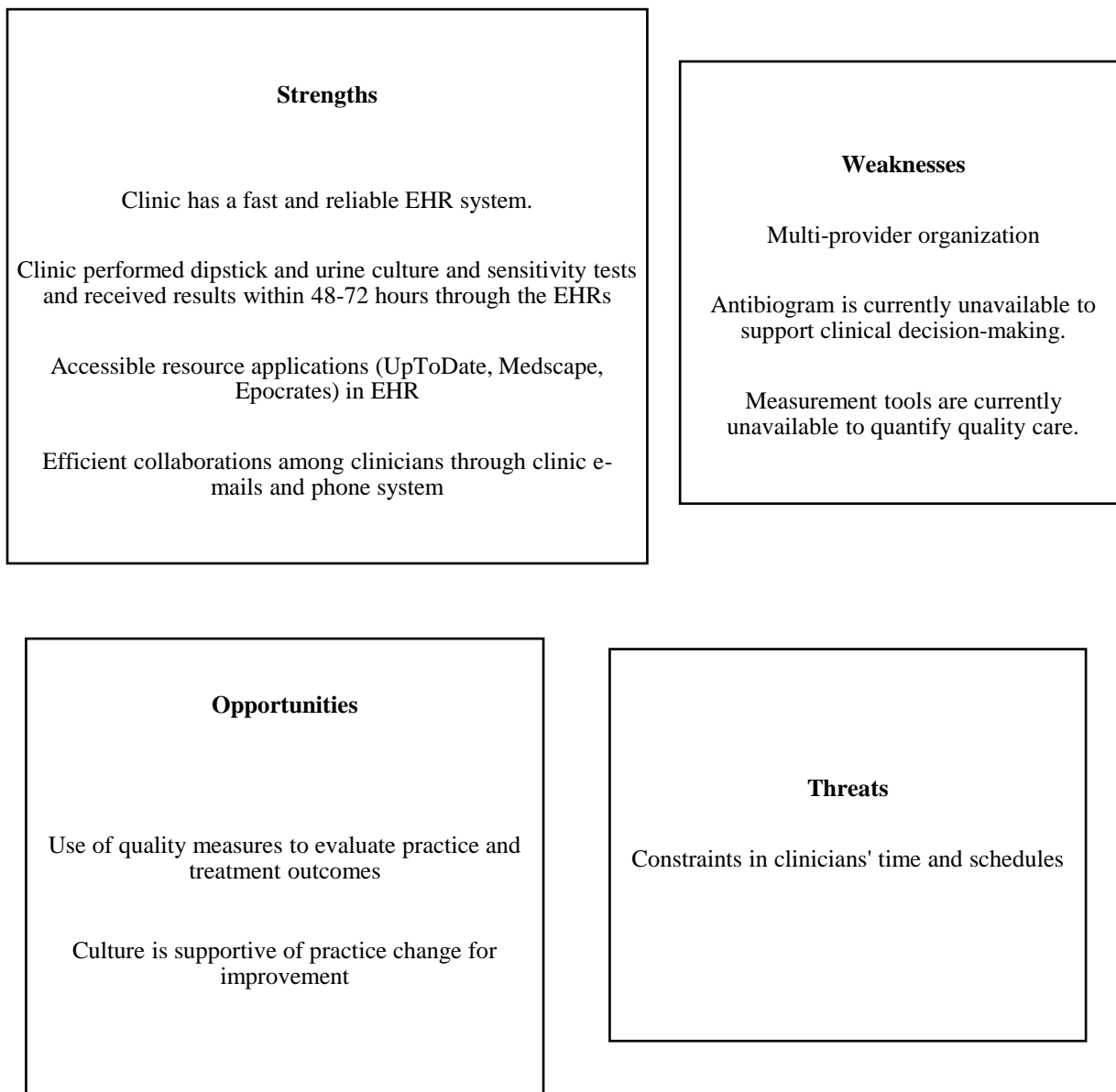


**Table 5***Responsibility/Communication Matrix*

Communication	Method	Frequency	Goal	Owner	Audience
Project Plan	Face-to-face meeting, clinic or university email	Once	Present project for approval and planning	Clinic leadership and change agents (APN, APNS)	Project leader and champions (APN, FNP student)
Review of clinic guidelines vs. evidenced-based guidelines (2011 IDSA)	Face-to-face meeting	Once at first phase of implementation, and initiation of small test of change	Present study results of the clinicians' adherence to evidence-based practice for treating uUTIs	Change agents (APN, APNS)	Project leader and champions (APN, FNP student)
Project status	Face-to-face meeting, university email	Weekly	Review project status using the PDSA method and plan next steps for small test of change	Clinic leadership and change agents (APN, APNS)	Project leader and champions (APN, FNP student)
Project review and analysis	Face-to-face meeting, university email	Monthly	Review and present outcomes and analysis of small test of change	Clinic leadership and change agents (APN, APNS)	Project leader and champions (APN, FNP student)
Project update and next steps	Face-to-face meeting and university email	After each small test of change evaluation	Present reviews, outcomes, and next small test of change until desired practice improvement	Project leader and champions (APN, APNS)	Project leader and champions (APN, FNP student)

**Figure 2**

*The Organization's Strengths, Weaknesses, Opportunities, and Threats (SWOT)*



**Table 6***Estimated Three-Year Budget*

	Breakdown	Revenue	Expenses	Expenses	Expenses
			2021	2022	2023
Training venue	Training room	Training room already available	\$0	\$0	\$0
Materials	4 copies of the clinical guidelines 4 laminated sheets of the uUTI treatment approach	\$15 (Office supplies available)	\$15	\$0	\$0
Training cost for each of the eight clinicians	15 minutes in-service for each of the three clinicians (for \$100/hour salary)	\$200 (Indirect care from education and training fund)	\$200	\$0	\$0
Training cost: Clinician leader/graduate student	8 hours collaboration with Medical Director and eight clinic providers	\$800 (Indirect care from education and training fund)	\$800	\$0	\$0
Data collection and analysis by clinician leader/graduate student	80 hours or 10 days at \$25/hour graduate student fee Retrospective chart review (remote EHRs)	\$2000 (Graduate fee fund)	\$2000	\$0	\$0
Quality measures analysis, report, and distribution by clinician leader/graduate student	40 hours or 5 days (3 months and yearly post implementation) Chart review (remote EHRs) Report presentation	\$3000 graduate fee, quality improvement and staff training fund	\$1000	\$1000	\$1000
TOTAL		\$8,015 3-year revenue for 2021, 2022, and 2023	\$6,015 Year 2021 expenses	\$1000 Year 2022 expenses	\$1000 Year 2023 expenses

## Deliverable 1

### *First Pre-implementation Clinician Survey*

#### A. Questions:

1. I use the \_\_\_\_\_ clinical practice guidelines in the treatment of uncomplicated urinary tract infections.

2008 ACOG (The American College of Obstetricians and Gynecologists)

2017 CDC (Centers for Disease Control and Prevention)

2011 IDSA (Infectious Disease Society of America)

Athena Clinical Guidelines

App-based Resources:

UpToDate

Epocrates

Medscape

Other(s): \_\_\_\_\_

2. I feel comfortable that the clinicians prescribing in my absence:
- Choose first-line agents in the treatment of uncomplicated cystitis according to the guidelines I use.
    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly disagree
  - Choose appropriate antibiotics for treating uncomplicated pyelonephritis once urine culture and sensitivity results are known and in accordance with the guidelines I use.
    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly disagree
  - Start, stop, or tailor antibiotic treatment according to urine culture results and according to guidelines I use for treating uncomplicated urinary tract infections.
    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly disagree

**Deliverable 2***Second Pre-implementation Clinician Survey*

1. I know the differences in symptoms between AUC and pyelonephritis according to the 2011 IDSA and the 2017 CDC guidelines.

Strongly agree  
Agree  
Somewhat agree  
Disagree  
Strongly disagree

2. I order urine cultures to treat AUC at the day of clinic visit, before the first dose of antibiotics.

All the time  
Often  
Half the time  
At times  
Never

3. I feel confident in prescribing first-line agents for treating AUC without performing urine cultures.

Strongly agree  
Agree  
Somewhat agree  
Disagree  
Strongly disagree

**Figure 3***PDSA Method and Data Collection Tool*