

A Multidisciplinary Approach to Antibiotic Stewardship in Long-Term Care

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Abstract

Problem & purpose: The aim of this quality improvement project was to implement and evaluate the effectiveness of the Loeb Minimum Criteria within a long-term care (LTC) unit with the goal of decreasing unnecessary testing for urinary tract infections (UTIs). In older adults, a UTI is the most common diagnosis for which antibiotics are prescribed. Prevalence of asymptomatic bacteriuria ranges from 25-50%, and many of these patients are treated with antibiotics that are not warranted. The absence of clinical education and use of evidence-based practices lead to an increase in the potential for unnecessary testing and treatment. **Methods:** Within a 30-bed LTC unit in Howard County, Maryland, UTI's are one of the most treated infections, however, there was no antibiotic stewardship program in place. A staff of 15 nurses, and 1 nurse practitioner (NP) participated in education sessions regarding the Loeb Minimum Criteria and were given the algorithm to follow. A post-test was administered to nursing staff following the education session to assess effectiveness. Change in behavior of the nursing staff when communicating symptoms to the provider was assessed by a pre/post- implementation survey completed by the NP. Pre-test results informed ongoing educational efforts. Urinalysis, culture, and sensitivity (UA C&S) orders were monitored pre-implementation and monthly to assess for the effective use of the algorithm on ordering practices. **Results:** Compared to the year prior, there was an 81% decrease in UA C&S sent during the implementation phase. Following the education session 66% of nursing staff identified greater than 50% of points outlined in the Loeb Minimum Criteria. Provider post-test indicated a 10% increase in the accuracy of reporting symptoms by the nursing staff. **Conclusion:** This project shows promise that increased education

and awareness of antibiotic stewardship programs have the potential to influence the frequency of testing LTC residents receive with the potential to reduce unnecessary prescribing of antibiotics. Internal challenges related to staffing acted as a primary barrier to participation. Critical components of successful implementation of QI projects within the long-term care setting include buy in from administration, and collaboration with clinical staff. NPs are knowledgeable about antibiotic stewardship practices but lack the time needed to implement programs.

Problem Description

Urinary tract infections (UTIs) are among the most common healthcare-associated infections, accounting for 20-30% of total infections reported across long-term care (LTC) facilities (CDC, 2021). Bacteria within the urine, referred to as bacteriuria, is commonly identified in individuals with UTIs, but is not a diagnostic factor. Among reported urinary tract infections, the prevalence of asymptomatic bacteriuria in LTC residents range from 25-50% of all UTI's, and many of these patients are treated with antibiotics that are not warranted (CDC, 2021). Prevalence of asymptomatic bacteriuria, and high rates of cognitive impairment make UTI diagnosis and treatment challenging for providers, and the absence of a universally accepted diagnostic criteria and treatment guidelines result in frequent inappropriate antimicrobial treatment among this population (Nace, Drinkan, & Cenich, 2014). This practice has been associated with increased adverse drug reactions, antibiotic resistance, increase in recurrent infection rates and has demonstrated no improvement in mortality (Lee, Phillips, & Vanstone, 2018). In addition, the cost associated with the antimicrobial treatment of UTIs for institutionalized patients continues to increase, with the most recent Medicare annual UTI-related cost estimated at \$21,444 (Sulham & Hammelman, 2021). Within a 44- bed long term

care facility in Howard County, Maryland, UTI's have been identified as one of the most treated infections, however there is currently no formal antibiotic stewardship program in place.

The current practice primarily operates with one nurse practitioner, a staff of nurses, nursing assistants, and a rehab therapy team. While the LTC setting facilitates strong patient provider relationships; staff shortages contribute to increased patient ratios, and the need for more efficient patient care. The nurse practitioner relies heavily on nursing staff to report changes in patient status, however the absence of clinical education and written algorithms for staff to follow lead to more reported subjective data and increase the potential for unnecessary testing and treatment.

Available Knowledge

The Loeb minimum criteria was developed in 2001 to support provider decision making and serve as a minimum criterion for the initiation of antibiotic use for urinary tract infections (Loeb et al. 2001). Establishing a minimum criterion of objective data that should be present before initiating antibiotics is an important strategy for optimizing antibiotic use and, when implemented into clinical practice should lead to substantial reduction in inappropriate use of antibiotics (Loeb et al. 2001). While the evidence overwhelmingly supports the implementation of antibiotic stewardship programs such as the Loeb Minimum Criteria, the synthesis of available data revealed that care providers need additional support, education, and guidance to move away from relying on clinical judgments and focus more directly on objective data (Kistler et al., 2017). A 12-month prospective study completed by Agata et al., highlighted the need for further support and guidance through monthly chart reviews at 25 nursing homes that despite provider knowledge of the Loeb Criteria most residents continued to receive antimicrobial therapy that did not meet minimum criteria. Furthermore, a review of 3829

antibiotic prescriptions showed no relationship between adherence to the Loeb Minimum Criteria and antibiotic prescriptions further identifying the need to provide additional education and support when implementing this type of practice change (Olsho et al., 2013).

For successful implementation of the Loeb criteria evidence-based solutions suggest a multifaceted, multidisciplinary approach (Loeb et al., 2005). Loeb et al., found that small group sessions, written educational information, outreach visits, and one on one interviews with providers was an effective method for implementation, while Doernberg et al., relied on multidisciplinary team involvement through direct review and recommendations from pharmacists to providers regarding their adherence to the Lobe criteria and appropriate use of antimicrobial therapy.

The purpose of this DNP project is to implement and evaluate the effectiveness of the Loeb Minimum Criteria on decreasing unnecessary testing and antimicrobial treatment for urinary tract infections within a long-term care facility. The primary process goal is a 25% increase in objective data communicated between the nurse and provider when specifically addressing a concern for UTI. The primary outcome goal is a 10% decrease in the total number of UA C&S being sent for LTC residents during the implementation phase.

Rationale

The Knowledge-to-Action theoretical framework (Graham et al., 2006) was used to guide the planning and execution of the project. Evidence supporting the need for a clinical practice change was collected through direct observation of clinical practice, and an interview with the Nurse Practitioner providing direct care to LTC residents. Upon initial observation of clinical practice, it was noted that both a UA C&S were being sent on residents for a variety of different reasons, and that the facility was not following any formal clinical guideline. The Nurse

Practitioner expressed concern that UA C&S are being over utilized by the facility and expressed interest in implementing a clinical guideline that would help address this problem. While the clinician has some foundation of knowledge regarding antibiotic stewardship and the use of clinical guidelines the current nursing staff at this facility do not.

The current structure and process relevant to the problem are knowledge regarding asymptomatic bacteriuria and the Loeb criteria, and the communication that occurs between nursing staff and the provider. Nursing staff are not currently being educated on the importance of antibiotic stewardship programs among the geriatric population, or the importance of collecting and communicating objective data points. Subjective data, often causes providers to test and treat based on clinical judgment alone due to absence of objective measures that follows evidence-based guidelines. Identification of the communication barriers that occur within this facility regarding minor change in patient status and developing an implementation plan to improve this process is necessary when working to create sustainable antibiotic stewardship program within the facility.

The current climate of nursing has changed significantly in recent years. Staff shortages, burnout, and increased patient ratios directly impact the introduction of clinical interventions. This change has limited direct access, and time available to spend with nursing staff in addition to creating resistance in conducting unit-based education sessions. Staff burnout also creates resistance as nursing staff are not open to additional education sessions, and changes to current processes. Significant effort has been made to identify multiple educational modalities to ensure that all nursing staff can participate in education dissemination regardless of staffing ratios. Diversifying educational information was considered and implemented to make the clinical practice change less overwhelming to staff experiencing burnout.

Methods

Intervention

The Loeb Minimum Criteria was implemented in a long-term care facility with the goal of reducing the amount of unnecessary antimicrobial use for treatment of asymptomatic bacteriuria. Both nursing staff and the nurse practitioner have be targeted to achieve this. During the first week of the implementation phase training materials were distributed to the primary Nurse Practitioner, and a flyer introducing the DNP student was hung at the nurse's station on the long-term care unit. During the first month the DNP student visited the facility weekly to rework the nursing education component of the implementation plan because the first version of the education plan was met with resistance and difficult for multiple nurses to attend. One large education session occurred at the September 2022 nursing meeting and during this 10-minute education session the Loeb Minimum Criteria was verbally explained with emphasis on the information that must be communicated to the provider, and the importance of antibiotic stewardship in geriatric patients. To reinforce the education provided during this session the Loeb Criteria was posted in highly visible areas where nursing staff spend time charting and where communication with providers occur. Four outreach visits were conducted every three weeks during the implementation phase to provide additional educational resources and support to nursing staff.

The nurse practitioner responsible for the care of the residents is aware of the Loeb Minimum Criteria, however, it has not been utilized at this facility. Therefore, only written education was provided prior to the implementation phase. Included in this written education

material was the Loeb Minimum Criteria with emphasis placed on specific data points that nursing staff will be communicating regarding a patient status change. Finally, the same educational handout posted on the nursing unit was provided as a resource to objectively assess the data being communicated and to aid in decision making. Education materials were distributed to the nursing staff and provider as a tactic to mitigate change burden and increase the feasibility of promoting antibiotic stewardship through a multidisciplinary approach.

Measurement

Three measures were used to assess the structure, process, and outcome goals of implementing the Loeb Minimum Criteria. The first measure looks specifically at the structure goal of nursing staff education. A 2-question survey was distributed to nursing staff by the DNP student following the formal education session to assess nursing knowledge of data points outlined in the Loeb Minimum Criteria. The process goal of improving nurse to provider communication is being measured by a pre- and posttest questionnaire instructing the provider to identify the points most frequently communicated by nursing staff. The pre-test questionnaire was distributed to the provider by the DNP student during week one of implementation, and the same posttest questionnaire will be distributed at conclusion of the implementation phase. Finally, the outcome goal of decreasing UA C&S sent was measured by chart audit.

Study of Intervention

A pretest posttest method was chosen to assess the impact of implementing the Loeb Minimum Criteria due to the methods ability to assess change following exposure to an intervention. The primary Nurse Practitioner completed testing independently however she was aware of the test question prior to administering the pretest and had knowledge of what the project was assessing. Nursing staff did not receive a pretest because it was assumed they had no prior knowledge of the Loeb Minimum Criteria. The nursing posttest was distributed following

the formal education session, and verbally read by the DNP student to ensure completeness and that staff accurately understood each question, and symptom. Data collection for obtaining an accurate number of UA C&S was completed by chart review.

Analytics

Obtaining an accurate number of UA C&S and antimicrobial treatments used over the past year have been difficult to obtain, however with persistence retrospective electronic records of laboratory data was able to be obtained, and total UA C&S were identified. The electronic data corresponded with the paper chart audit completed by the DNP student identifying the total number of UA C&S sent within a year prior to implementation and therefore it is assumed this number is accurate.

Based on results from the provider pretest and nursing posttest, ongoing nursing educational handouts highlight the data points that nurses are not currently communicating and emphasize the elimination of subjective points that nurses continued to be associated with symptomatic UTI's. Ongoing education sessions and increasing awareness among nursing staff will allow for the provider to assess the clinical problem more accurately, order appropriate testing, and limit UA C&S test sent, which will ultimately lead to achieving the practice goal of minimizing inappropriate prescribing for asymptomatic bacteriuria.

Ethical Consideration

This project received approval from University of Maryland Institutional Review Board, and specific ethical consideration has been taken to protect all patients, nursing staff, and the nurse practitioner included in the implementation of this project. All clinical reports were reviewed onsite in a private room, and data was copied on to REDCap, a HIPPA compliant, password protected program. Patient identifiers were not collected, and all written reports were

put in a shredding box following the transfer of data. Survey responses were also be entered in REDCap without identifiers and put in a shredding box onsite following the transfer of data.

Results

Following the formal education session 15 nurses completed a posttest survey. A frequency graph was used for both patients with and without a catheter to illustrate the results of nursing knowledge, and awareness of the Loeb Minimum Criteria following the formal education session. The frequency graph identifies that following education session 66% of nurses could identify more than 50% of the symptoms outlined in the Lobe Minimum Criteria (Figure 1). A pre-test survey distributed to the primary nurse practitioner indicated that pre implementation nursing staff were reporting 58% of the data points outline in the Loeb Minimum Criteria (Figure 3). Posttest data completed by the NP indicated a 10% increase in the accuracy of reporting symptoms by the nursing staff (Figure 4). Electronic and paper chart audits uncovered the total number of UA C&S sent. Data collected during the implementation phase was compared to data from the previous year. When compared to the year prior there was an 81% decrease in total number of UA C&S sent during the implementation phase September-November 2022 compared to September-November 2021 (Figure 5).

Discussion

The nursing staff demonstrated significant improvement in the identification and communication of the minimum signs and symptoms outlined in the Loeb Minimum Criteria, however many still identified altered mental status as a sign of UTI, and a data point that should be communicated to the nurse practitioner. While it has been difficult to reeducate nurses on this

symptom it is reassuring that the nursing staff are now aware that recent falls, somnolence, and poor appetite are not part of the Loeb minimum criteria and should not be associated with symptoms of a UTI. Trends were similar for patients with a catheter. New onset of delirium is a data point associated with UTIs in patients with a catheter, but agitation is not. The same number of nurses identified new onset of delirium and agitation as part of the Loeb Minimum Criteria. Nursing staff communication improved as well. Nursing staff are now identifying and reporting urinary incontinency, suprapubic pain, and CVA tenderness as minimum symptom of a symptomatic UTI. While the frequency is lower, the same trend is seen in residents with catheter, as nursing staff posttest surveys show improvement in identifying rigors and CVA tenderness as associated symptoms for patients with a catheter. Additional education is necessary to assist staff to differentiate between symptoms and to accurately communicate the correct symptom to the nurse practitioner. However, the amount of time available for education sessions during working hours is very limited due to increased workload, and mandatory staff meetings occur infrequently.

Calculating the total number of UA C&S sent was difficult to perform. Antiquated documentation methods initially impeded accurate data collection. Electronic audits of laboratory data was used to confirm accurate data collection. In addition, due to the fluctuating patient census and number of hospice residents' data from the same period the previous year was assessed as opposed to data from the months immediately prior to implementation. While this decrease cannot only be attributed to the intervention due to patient turnover, it is important to indicate that unit staff, and the primary NP has remained the same during this period.

Conclusion

Implementation of antibiotic stewardship programs can influence the frequency of UAC&S testing among long-term care residents with the potential to reduce unnecessary antimicrobial prescribing. To best achieve this, a multidisciplinary approach should be used to engage and educate long-term care staff on antibiotic stewardship. Providers are knowledgeable regarding antibiotic stewardship programs but lack the time to educate staff and conduct ongoing chart audits. Therefore, establishing relationships with leadership teams is fundamental to successful implementation of quality improvement projects including clinical practice improvements, and their involvement can be beneficial in motivating staff to participate. Future recommendations include incorporating this multimodal approach to future clinical education and quality improvement projects as it has shown to be beneficial.

Reference Page

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Olsho, L. E. W., Bertrand, R. M., Edwards, A. S., Hadden, L. S., Morefield, G. B., Hurd, D., Mitchell, C. M., Sloane, P. D., & Zimmerman, S. (2013). Does Adherence to the Loeb Minimum Criteria Reduce Antibiotic Prescribing Rates in Nursing Homes? *Journal of the American Medical Directors Association*, 14(4), 309.e1-7. <https://doi-org.proxy-hs.researchport.umd.edu/10.1016/j.jamda.2013.01.002>

Sulham, K., Hammelman, E., (2021) Medicare Spending on Urinary Tract Infections: A Retrospective Database Analysis, *Open Forum Infectious Diseases*, Volume 8, Issue Supplement_1, November 2021, Page S793, <https://doi.org/10.1093/ofid/ofab466.1608>

Table 1

Evidence Review and Synthesis

<p>Citation: Agata, E. D., Loeb, M. B., & Mitchell, S. L. (2013). Challenges in Assessing Nursing Home Residents with Advanced Dementia for Suspected Urinary Tract Infections. <i>Journal of the American Geriatrics Society</i>, 61(1), 62-66. doi:10.1111/jgs.12070</p>					<p>Level</p> <p>III B</p>
<p>Purpose/ Hypothesis</p>	<p>Type of Evidence Research Design</p>	<p>Sample- Population, Size, Setting</p>	<p>Intervention Procedures</p>	<p>Primary Outcome/ Measures</p>	<p>Results/ Conclusions</p> <p>Statistical results:</p>
<p>To describe the presentation of suspected urinary tract infections (UTI) in nursing home residents with dementia, and how the Loeb minimum criteria is used to justify antimicrobial use.</p>	<p>12-month prospective study</p>	<p>Sampling Technique: convenience sample included: 25 nursing homes with a minimum of 45 beds within 60 miles of Boston, Massachusetts.</p> <p>Eligible Participants: Nursing home residents 65 years of age or older with a diagnosis of dementia.</p> <p>Accepted: 226</p> <p>Control: No control</p> <p>Intervention: 226 resident charts</p> <p>Power Analysis/Achieved: Power analysis not performed</p> <p>Group Homogeneity: Data is not generalizable to larger population due to sampling coming from the same geographical location.</p>	<p>Intervention Protocol: monthly chart review</p> <p>Intervention Fidelity: Research nurses collected data from patient’s medical records at baselines and monthly for 12 months with regards to adhering to a minimum criterion for initiation of antimicrobial treatment. Documentation required to specifically state if residents had an infection, associated symptoms, testing order/collected, and if residents met the minimum criteria for antimicrobial therapy.</p>	<p>The primary outcome was the use of antimicrobial treatment in nursing home residents only if they had met a minimum criterion of signs and symptoms of UTI.</p>	<p>131 suspected UTI episodes, urinalyses and cultures were analyzed. Eighty of these episodes (79.2%) were positive for both tests. This percentage was not statistically significantly different between episodes that met (15/18, 83.3%) and did not meet (65/ 83, 78.3%) minimum symptoms or signs to initiate antimicrobial therapy (OR = 1.3, 95% CI = 0.3–8.2; P = .6)</p> <p>Conclusion/ Clinical significance: Most Nursing home residents who receive antimicrobial therapy do not meet the Loeb minimum criteria, therefore providers need to reconsider the diagnosis and management of UTI’s in older adults with dementia.</p>

Citation:					Level
Kistler, C. E., Zimmerman, S., Scales, K., Ward, K., Weber, D., Reed, D., Sloane, P. D. (2017). The Antibiotic Prescribing Pathway for Presumed Urinary Tract Infections in Nursing Home Residents. Journal of the American Geriatrics Society. doi:10.1111/jgs.14857					III B
Purpose/ Hypothesis	Type of Evidence Research Design	Sample – Population, Size, Setting	Intervention/Procedures	Primary Outcome/Measures	Results/Conclusions
Examine the prescribing pathway for nursing home residents with presumed urinary tract infections (UTI's) and the adherence to the Loeb minimum criteria	Retrospective case control study	<p>Sampling Technique: Random sampling</p> <p>Eligible: Residents treated with antibiotics for presumed UTI</p> <p>Accepted: 260 charts from 247 residents at 31 nursing homes.</p> <p>Control: No control</p> <p>Intervention: 260 charts reviewed</p> <p>Power analysis: Not performed</p> <p>Group Homogeneity: Information cannot be generalized to larger population as the sample size was limited to a specific geographical area.</p>	<p>Intervention: review charts to describe the pathway used to diagnose and treat UTI's among nursing home residents.</p> <p>Intervention Fidelity: Research staff examined medical charts identifying cases of UTI and antimicrobial use within the past 21 days.</p>	<p>Abstraction form was created to include multiple variables associated with the prescribing pathway. Once new cases were identified they then looked to see if (1) the Loeb minimum criteria was met, (2) whether at least one of the Loeb minimum criteria was met, (3) if cultured organism met criteria for a multi- drug resistant organism.</p> <p>Descriptive statistics were used to examine data, and data would be reviewed by two authors</p>	<p>Statistical Results: 60% of charts reviewed identified symptoms of a presenting illness. 15% met the Loeb minimum criteria. A total of 87% of residents received oral antibiotics</p> <p>Conclusion/ Clinical significance: Non-specific signs/symptoms appeared to influence prescribing more often than urinary tract specific signs/symptoms. Prescribers rarely stopped antibiotics, and a minority prescribed for overly long periods. Providers may need additional support to guide the decision-making process to reduce antibiotic overuse and antibiotic resistance</p>

Citation: Olsho, L. E. W., Bertrand, R. M., Edwards, A. S., Hadden, L. S., Morefield, G. B., Hurd, D., Mitchell, C. M., Sloane, P. D., & Zimmerman, S. (2013). Does Adherence to the Loeb Minimum Criteria Reduce Antibiotic Prescribing Rates in Nursing Homes? Journal of the American Medical Directors Association, 14(4), 309.e1-7. https://doi-org.proxy-hs.researchport.umd.edu/10.1016/j.jamda.2013.01.002					Level III B
Purpose/ Hypothesis	Type of Evidence Research Design	Sample Population, Size, Setting	Intervention Procedures	Primary Outcomes and Measures	Results/ Conclusions
Examine the relationship between nursing home prescriber adherence to the Loeb minimum criteria (LMC) and antibiotic prescribing rates for three conditions. (UTI, respiratory infection, and soft tissue infection) over a three-month period.	Research: Cross- sectional analysis of 12 nursing homes over a three-month period.	Sampling Technique: convenience sample Participants: 12 nursing homes in North Carolina. 3829 antibiotic prescriptions written for nursing home residents within a 3-month observation period Excluded: 448 prescriptions for indication not associated with Loeb criteria Accepted: 3381 prescriptions Control: No Control Intervention: Power Analysis/Achieved: Not performed Group Homogeneity: Nursing homes were homogenous, with no significant statistical differences from national	Intervention Protocol: Data collected by medical records review. Treatment Fidelity: Adherence to the Lobe minimum criteria was identified via a chart audit. Results of that audit were then identified as either adherent to the minimum criteria or non-adherent.	The primary outcome was the number of prescriptions per resident per day and the evaluation of estimated antibiotic prescriptions written that adhered to the lobe minimum criteria. Of prescriptions were adherent to the Loeb Minimum Criteria there was no significant difference in prescribing rates compared to those that did not meet minimum criteria.	Statistical results: No significant relationship was found between LMC adherence and prescription rate for UTI. (IRR 0.99, 95% CI 0.96e1.02; P ¼ .49) No evidence to suggest prescribers considered the LMC when making decisions. Conclusion/ Clinical significance: Evidence-based guidelines need to be adopted more widely in resident nursing homes for a significant change in prescribing practice to occur.
Citation:					Level

Doernberg, S. B., Dudas, V., & Trivedi, K. K. (2015). Implementation of an antimicrobial stewardship program targeting residents with urinary tract infections in three community long-term care facilities: a quasi-experimental study using time-series analysis. <i>Antimicrobial Resistance & Infection Control</i> , 4, 1–8.					II B
Purpose/ Hypothesis	Type of Evidence Research Design	Sample Population, Size, Setting	Intervention Procedures	Primary Outcomes and Measures	Results/ Conclusions
Assess the feasibility and efficacy of antimicrobial stewardship programs (ASP) targeting urinary tract infections in long-term care facilities.	Prospective quasi-experimental study	<p>Sampling Technique: convenience sample</p> <p>Eligible participants: Not reported</p> <p>Accepted: 3 Long-term care facilities in Northern California</p> <p>Facility A: 77 Subacute beds 82 Skilled nursing beds 3 Physicians</p> <p>Facility B: 478 Skilled nursing beds 5 Physicians 1 NP</p> <p>Facility C 2 system facilities analyzed as one LTCF 125 Skilled nursing beds 2 Physicians 1 NP</p> <p>control: No control group intervention: 104 prescriptions reviewed Power analysis: Not performed</p> <p>Group Homogeneity: Results cannot be generalized as they information was collected from specific nursing homes within the same geographical area</p>	<p>Intervention Protocol:</p> <p>Treatment Fidelity: pre-intervention: (7 -month) data collection of baseline antimicrobial utilization</p> <p>Intervention: (7 -month) -antibiotics prescribed were reviewed by pharmacist and physician for adherence to Loeb criteria -Recommendations were given to prescribing physician</p> <p>ASP interventions were recorded through chart review</p> <p>Recommendations were “accepted” if the suggested change/ discontinuation was made within 24 hours of ASP recommendation</p>	<p>Antibiotic use was measured by antibiotic starts per 1000 resident-days and recorded on a maintenance log which identified the start date, and indication.</p> <p>8% of the 104 prescriptions reviewed met Loeb criteria</p> <p>Recommendation for change were made in 38% of prescriptions.</p> <p>10% of recommendations were accepted by prescribers</p> <p>26% decrease in antibiotic prescriptions for UTI was observed</p>	<p>Statistical Results: after initiation of the antimicrobial stewardship program there was a 26% decrease in antimicrobial prescriptions followed by a 6% decrease in the rate of antimicrobial use per month continuing throughout the intervention period. (95 % Confidence Interval (CI: –8 to –3 %).</p> <p>Conclusion/ Clinical significance: ASP with a systematic approach has the potential to be effective in long-term care facilities.</p> <p>An educational component to ASP would allow for better institutional change.</p>

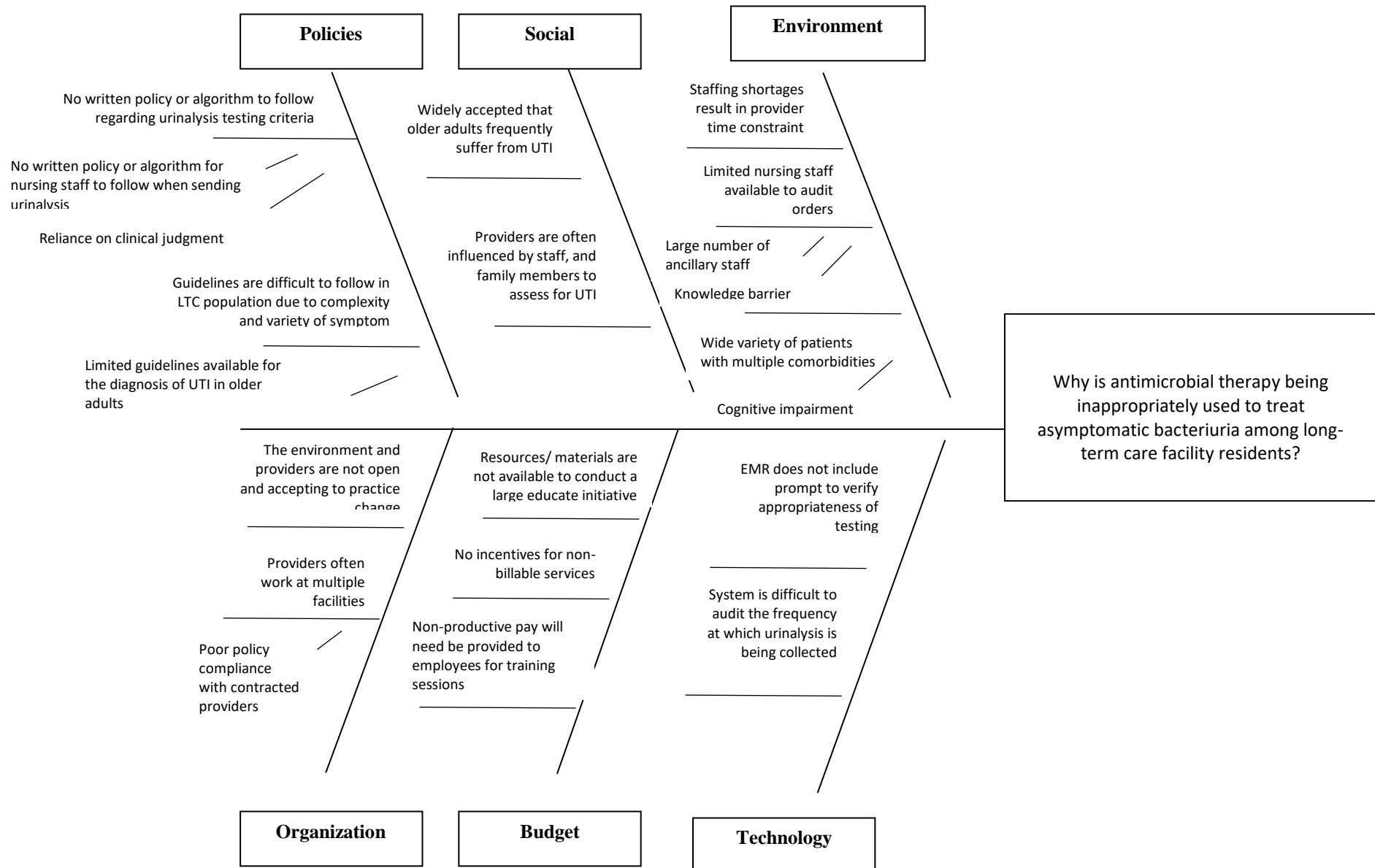
Citation: Loeb, M., Brazil, K., Lohfeld, L., McGeer, A., Simor, A., Stevenson, K., Zoutman, D., Smith, S., Liu, X., & Walter, S. D. (2005). Effect Of A Multifaceted Intervention On Number Of Antimicrobial Prescriptions For Suspected Urinary Tract Infections In Residents Of Nursing Homes: Cluster Randomised Controlled Trial. <i>BMJ: British Medical Journal</i> , 331(7518), 669–672. https://doi.org.proxy-hs.researchport.umd.edu/10.1136/bmj.38602.586343.55					Level I B
Purpose/ Hypothesis	Type of Evidence Research Design	Sample Population, Size, Setting	Intervention Procedures	Primary Outcomes and Measures	Results/ Conclusions
Assess whether a multifaceted intervention could reduce the number of antimicrobial prescriptions written for urinary tract infections in nursing homes.	Clustered randomized control trial	<p>Sampling Technique: Convenience Sampling</p> <p>Eligible Participants: nursing homes in both Canada and Idaho who agreed to refrain from using new management strategies for UTI during the 12-month study period.</p> <p>Accepted: 24 nursing homes</p> <p>Control: 12 nursing homes</p> <p>Intervention: 12 nursing homes</p> <p>Power Analysis/Achieved: Not performed</p> <p>Group Homogeneity: It would be difficult to generalize study findings as participating nursing home had less than 100 residents and were located in only 2 specific geographical locations</p>	<p>Control: Usual care per facility policy.</p> <p>Intervention: Diagnosis and treatment algorithm were implemented using a multifaceted approach including small group sessions, educational information sessions, written material, outreach visits, and one on one interviews with providers.</p> <p>Intervention fidelity: Six case scenarios were presented to small groups of registered nurses and nursing assistants, written educational material was provided to nursing homes, and the algorithm was explained and given to providers. Nursing and physician were asked to use the provided algorithm when assessing residents for suspected UTI. A 4-week training period was provided prior to data collection</p>	<p>DV: The primary outcome was the number of antimicrobials prescribed for a suspected UTI.</p> <p>Additional outcomes that were assessed included urine cultures ordered, resident hospitalizations, and mortality</p> <p>Measure: A paired T – test was used to assess the rate of antimicrobials prescribed for suspected UTI, the antimicrobial prescribed for actual UTI, the number of urine cultures obtained, and hospitalizations.</p>	<p>Statistical Results: The rate of antimicrobial use in the intervention group was significantly lower than in the control. (1.17 courses of antimicrobials per 1000 resident days prescribed 1.59 weighted mean difference - 0.49%, 95% confidence interval -0.93 to -0.06)</p> <p>Conclusions/ Clinical significance: Clinical algorithms targeted to physicians and nursing staff as well as multiple educational interventions reduce the rate of unnecessary antimicrobial use among nursing home residents.</p>

Evidence Synthesis Table

Category (Level Type)	Total Number of Sources/Level	Overall Quality Rating	Synthesis of Findings
Level 1 - Experimental study · Randomized Controlled Trial (RCT) · Systematic review of RCTs with or without meta-analysis	1 source: RCT	B	Loeb et al, found that when initiating an antimicrobial stewardship program, it is important to take a multidimension approach that includes a multidisciplinary care team. Providing educational sessions, written information, and frequent site visits assists with program compliance, while multidisciplinary care team involvement can assist in provider accountability to adherence to a new clinical management program.
Level II · Quasi-experimental studies · Systematic review of a combination of RCTs and quasi-experimental studies, or quasi-experimental studies only, with or without meta-analysis	1 source: quasi-experimental study	B	Doernberg, Dudas & Trivedi again found that use of a multidisciplinary approach to the initiation of antimicrobial stewardship programs can be beneficial.
Level III · Non-experimental study · Systematic review of a combination of RCTs, quasi-experimental, and non-experimental studies, or non-experimental studies only, with or without meta-analysis · Qualitative study or systematic review of qualitative studies with or without meta-synthesis	3 sources: chart review	B	The general finding from all three chart reviews was similar in the need for additional physician support and adherence when it comes to antimicrobial stewardship. Overall providers are not consistently following guidelines and as a result overprescribe antimicrobial therapy for long-term care residents.
Recommendations Based on Evidence Synthesis: Clinical recommendations based on the evidence reviewed is that providers need more support, education, and assistance to follow antimicrobial stewardship programs. A multidimension, multidisciplinary approach has proven to be the most beneficial in providing education, consistent follow up, and additional support to eliminate additional unnecessary			

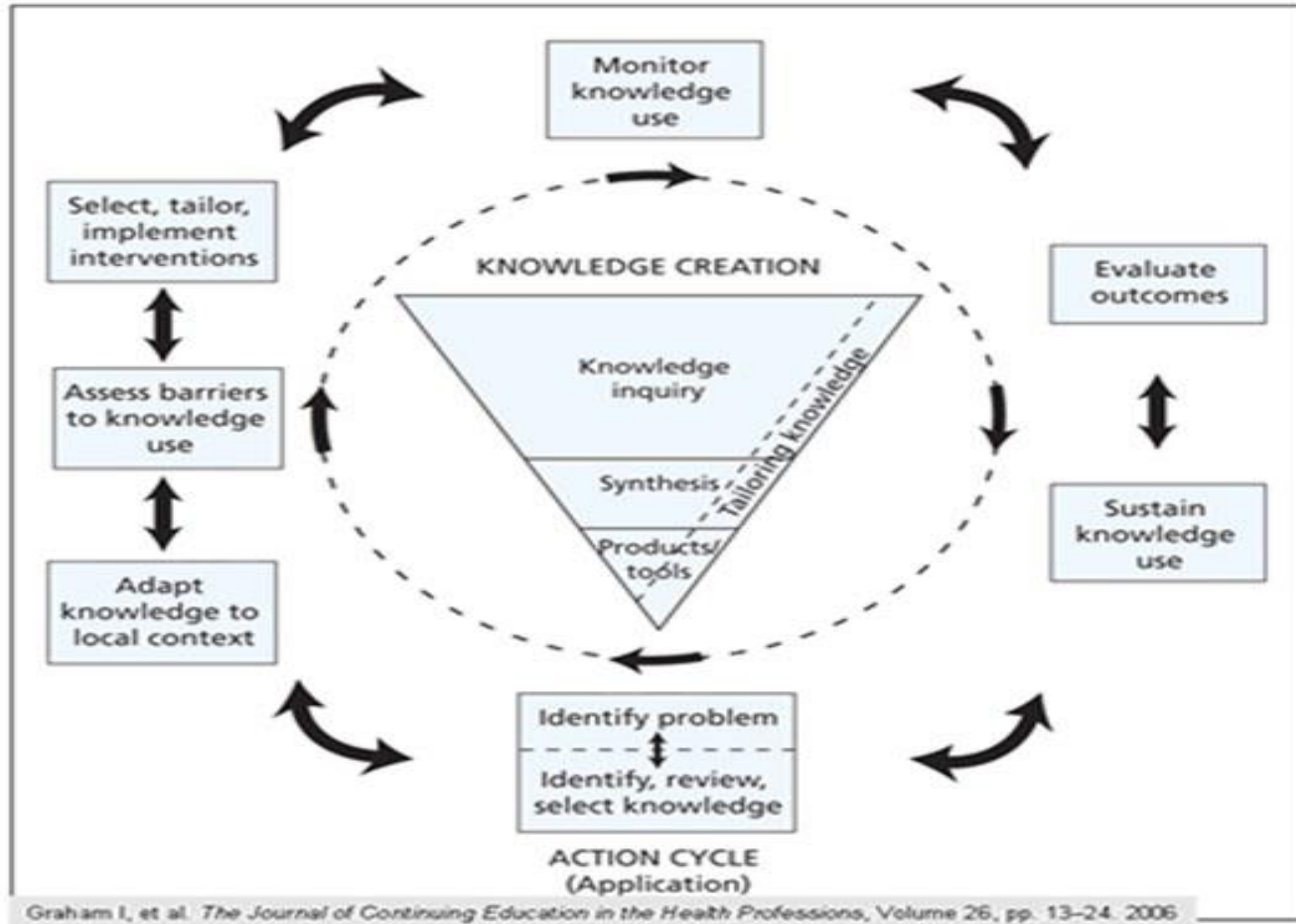
Appendix A

Root Cause Problem Analysis Fishbone Diagram



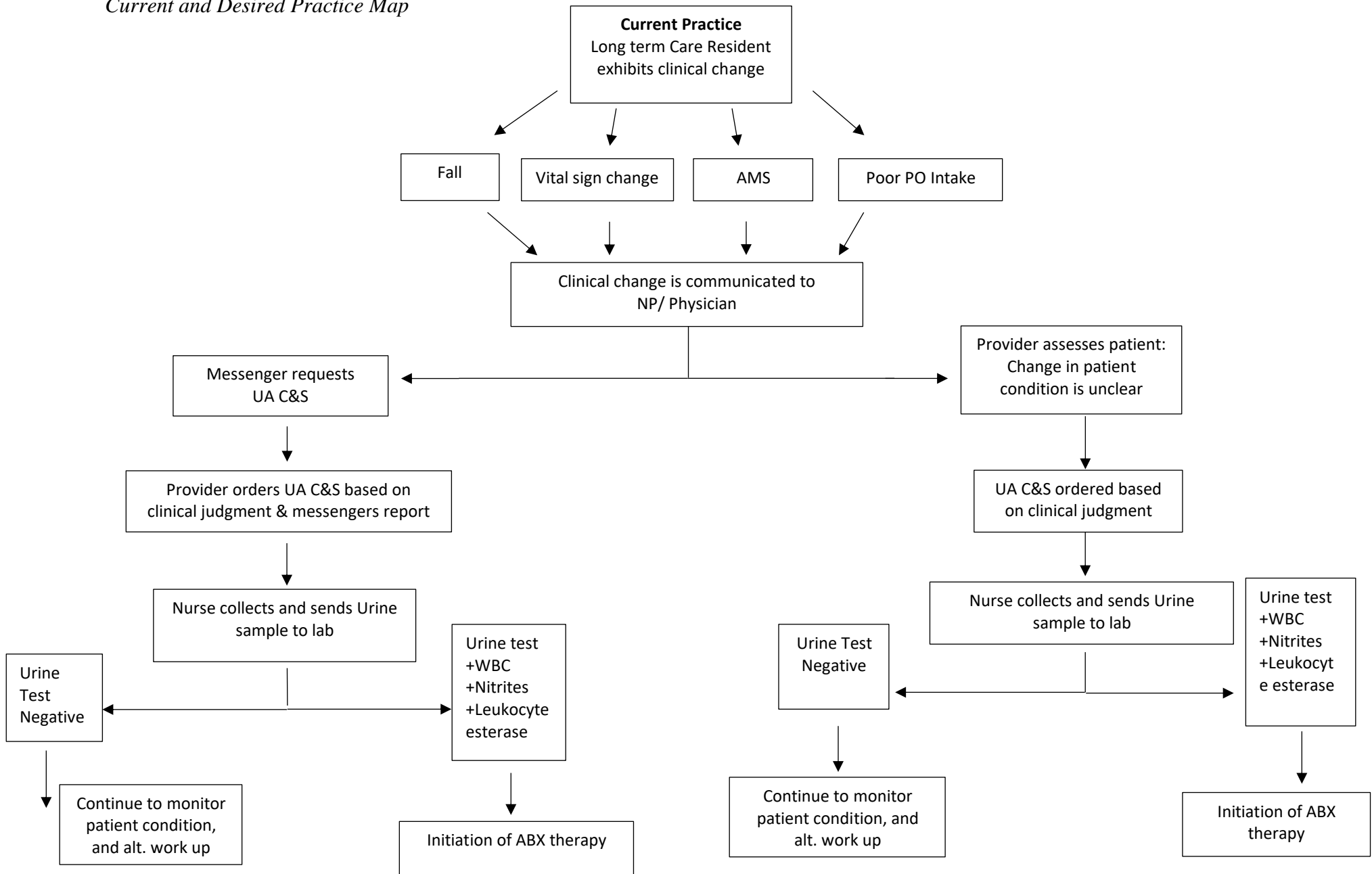
Appendix B

Knowledge to Action Framework



Appendix C

Current and Desired Practice Map



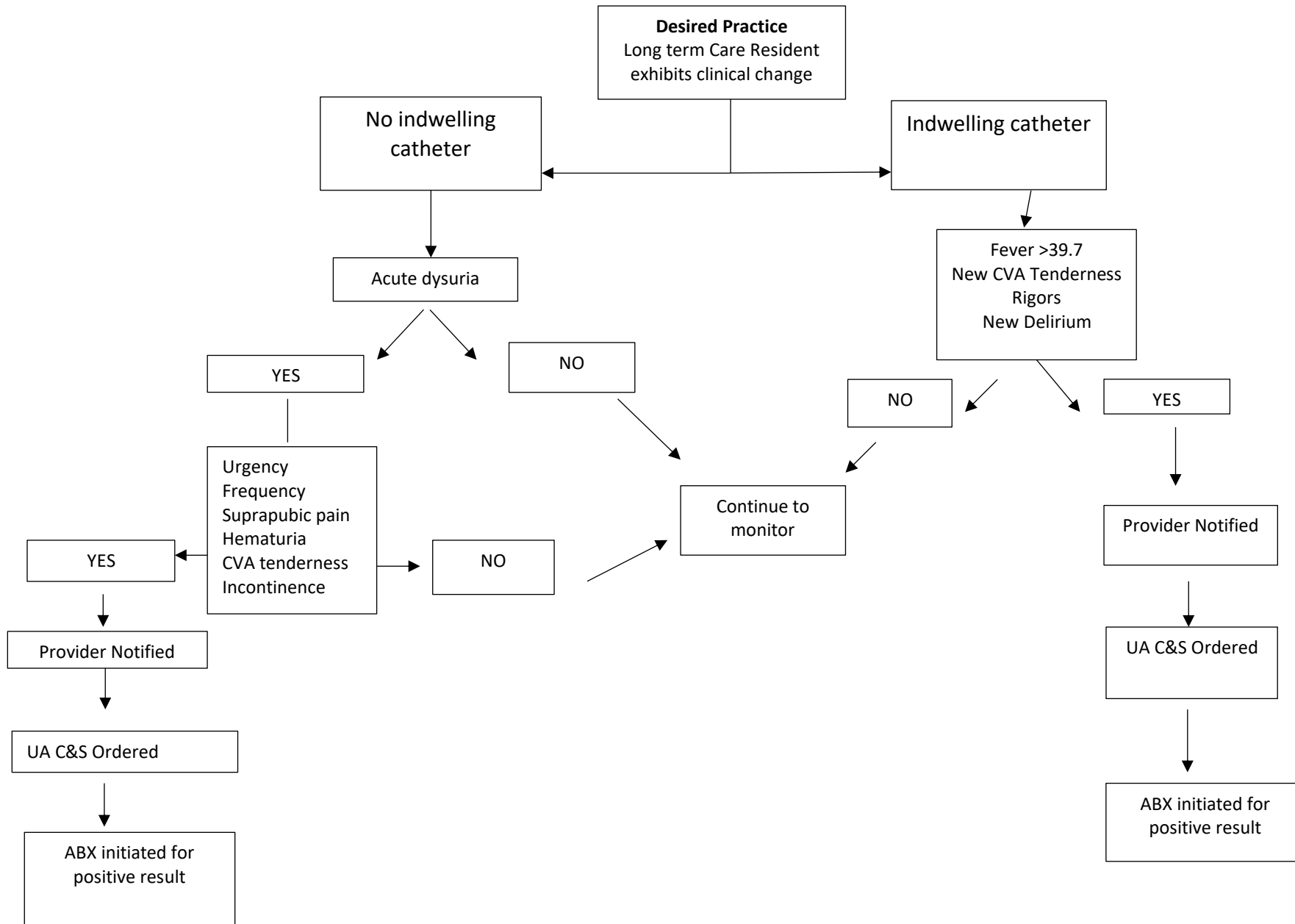


Figure 1

Frequency table nursing post-test assessment of residents without a catheter

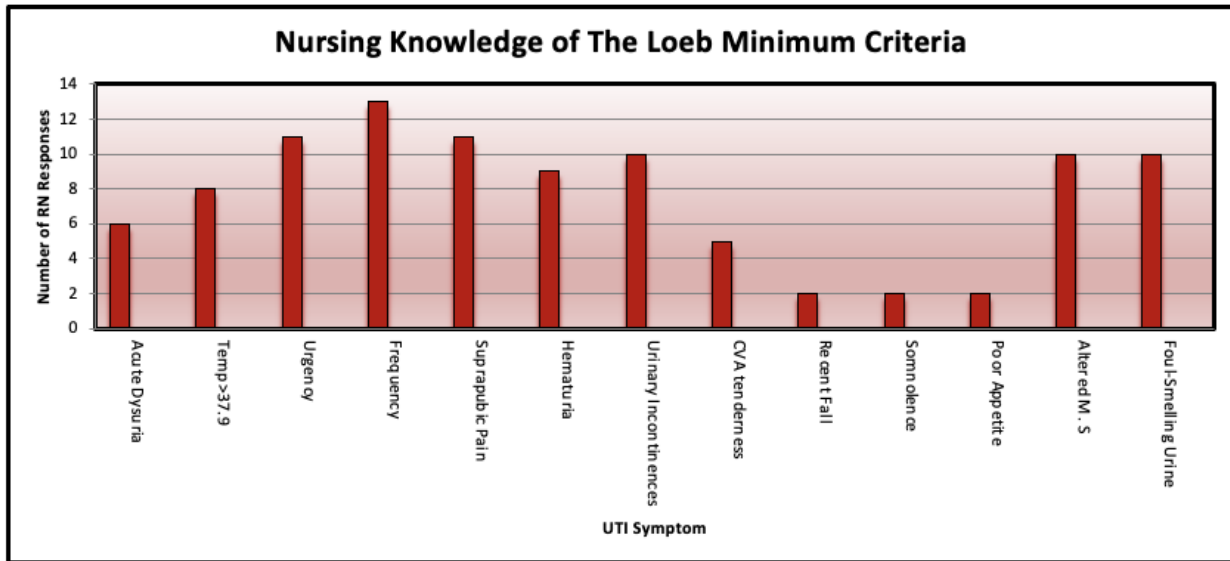


Figure 2

Frequency table nursing post-test assessment of residents without a catheter

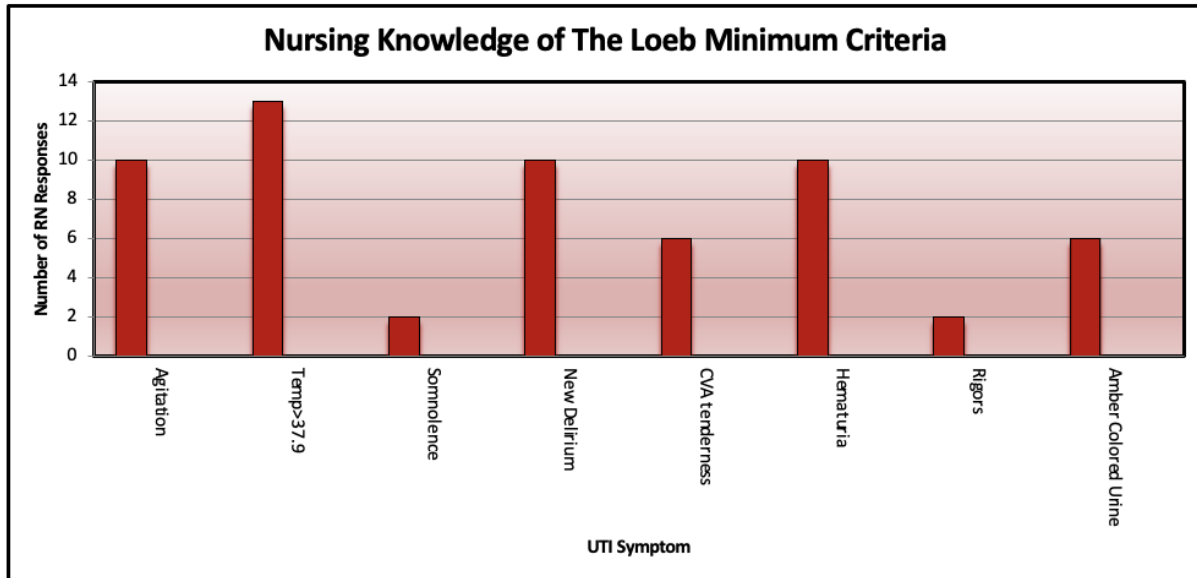


Figure 3

Frequency Table Nurse Practitioner Pre-test assessment of nursing communication

Provider pre and post intervention questionnaire

Provider pre/post test

Record ID

9/9/2022

Please enter today's date

Please check the objective data communicated to you by nursing staff when assessing a patient for a symptomatic UTI (without a catheter)

- Acute dysuria, OR
- Temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline
- Urgency
- Frequency
- Suprapubic pain
- Gross hematuria
- Urinary incontinence
- Costovertebral angle tenderness

Please check the objective data communicated to you by nursing staff when assessing a patient for a symptomatic UTI (with catheter)

- Rigors
- Temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline
- New onset delirium
- New costovertebral angle tenderness

Figure 4

Frequency Table Nurse Practitioner Pre-test assessment of nursing communication

Provider pre/post test

Record ID _____

Please enter today's date 12/2/22

Please check the objective data communicated to you by nursing staff when assessing a patient for a symptomatic UTI (without a catheter)

- Acute dysuria, OR
- Temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline
- Urgency
- Frequency
- Suprapubic pain
- Gross hematuria
- Urinary incontinence
- Costovertebral angle tenderness

Please check the objective data communicated to you by nursing staff when assessing a patient for a symptomatic UTI (with catheter)

- Rigors
- Temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline
- New onset delirium
- New costovertebral angle tenderness

Figure 5
Change in total number of UA C&S sent

