Promoting Antibiotic Stewardship in Skilled Nursing Facilities

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Purpose

- Measure the impacts of the use of an SBAR tool utilizing Loeb Criteria on nursing knowledge and urine cultures

- This was an evidence based practice project using the IOWA Model

Background

- **1.3 million residents in LTCFs** in the US (CDC, 2015) and **UTIs are the most common infection** (Haaijman et al., 2018; Healthy People 2030, 2021; Simmering et al., 2017) and **Mortality rate of UTIs in LTCFs 15%** as compared to 2.3% in the general population (CDC, 2015; Genao & Buhr, 2012)

- The occurrence of **asymptomatic bacteriuria** is higher in older adults who reside in LTCFs (Nicolle, 2016)

- The overuse of antibiotics due to UTIs in LTCFs is creating more problems
  - **Side effects of antibiotics** (CDC, 2021)
  - **Increased risks of C. Diff infections** (CDIs) (Jump et al., 2018; Yu et al., 2016; Hota et al., 2012
  - Increased **risk of multidrug resistant bacteria** (Flores-Mireles et al., 2015; Genao & Buhr, 2012)

- **Antibiotic stewardship programs that utilize a diagnostic criteria have been shown to decrease the use of antibiotics, reduce rates of CDIs and multidrug resistant bacteria, as well as reduce costs** (Jump et al., 2018; Nace et al., 2020)

DNP Essentials: I, III, VIII

Review of the Literature

- **26% reduction in antibiotics** prescribed after implementation of an **abx stewardship program** utilizing **Loeb Criteria** (Doernber et al, 2015)
  - Level II-B; prospective quasi-experiment

- **9% reduction in high risk abx**; **26% reduction in abx post-intervention** using the CDC Core recommendations for **abx stewardship program** (Felson et al., 2020)
  - Level II-A; quasi-experimental study

- Overall **abx prescribing was reduced by 17%** for UTI or possible UTI; suggesting low intensity **abx stewardship program using the Loeb Criteria** is effective in reducing abx usage (Nace et al., 2020)
  - Level V-C; quality improvement

- Consensus Statement from the AMDA- The Society of Post-Acute and Long-Term Care Settings; Recommend utilization of an **antibiotic stewardship program in LTCFs** to reduce the use of antibiotics (Ashraf et al; 2019)
  - Level IV

DNP Essentials: I, III, IV, VIII

Review of the Literature (cont.)

- **Insufficient evidence** that interventions employed to date are effective in improving abx use in LTCFs. (Raban et al.; 2020)
  - Level II-C; systematic review & meta analysis
  - 19 articles

- The effectiveness of **nurse-led interventions for reduction of UTI** and reducing abx usage is **unable to be determined** (Wu et al.; 2020)
  - Level III-C; systematic review
  - 4 articles

- Several practices often implemented together in an **antibiotic stewardship program** appear to **reduce UTI** or CAUTI in residents in LTCFs (Meddings et al.; 2017)
  - Level II-A; systemic review
  - 20 articles

DNP Essentials: I, III, IV, VIII

Methods

Project Question

What is the effect of a formal antibiotic stewardship program that utilizes the Loeb Criteria on the impact on nursing knowledge and the number of urine cultures in LTCFs?

Project Design

- A pre-test/post-test evaluation of an educational intervention on nursing knowledge, skills, and attitudes, and urine culture comparison

Setting

- 4 Skilled Nursing Facilities in Southwest, Virginia

Sample

- Convenience sample of nurses

Data collection

- Pre-test/post-test/6-week post-test
- Urine culture results

DNP Essentials: I, II, III, VI, IV, VIII

Measures

- **Demographics**
  - Nursing certification
  - Number of years in nursing
  - Number of total years working in healthcare
  - Number of years in current job
  - Typical shift worked

  - A **10-item assessment** of the knowledge, skills, and attitudes:
    - UTIs
    - Loeb Criteria
    - Urine collection for culture purposes
    - Use of the SBAR tool

DNP Essentials: I, III, IV, VIII

Procedures

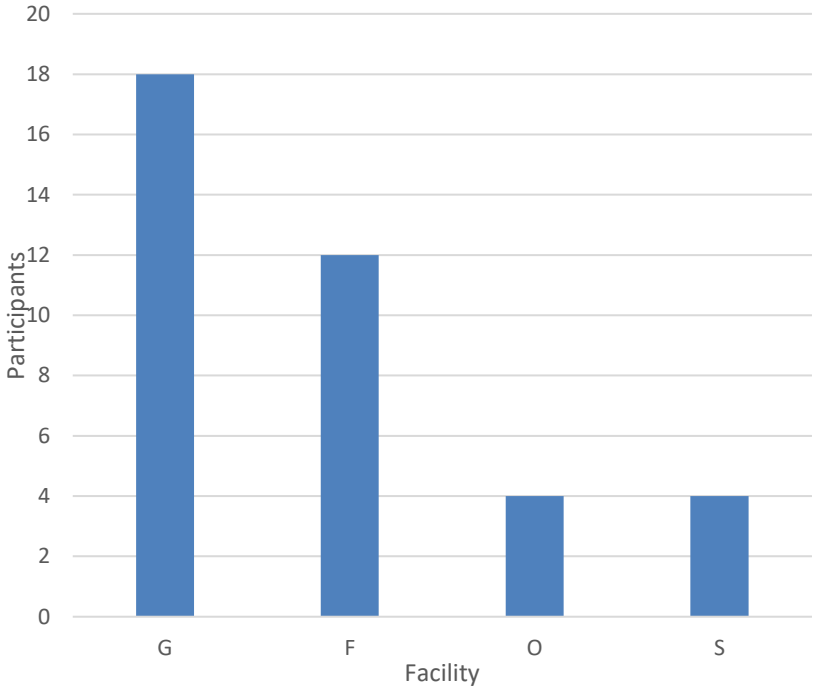
- **Recruitment**
  - Convenience Sample
  - Program was advertised via email, flyers, DON recruitment
- **Intervention**
  - In person nursing educational sessions
  - Three sessions at each facility
- The project was approved by the institutional IRB as an exempt study
  - UVA IRB Determination of UVA Agent Form
- Participation in the educational event conferred consent
- De-identification of resident & participant information
  - Protection of resident & participant information

DNP Essentials: I,II, VIII

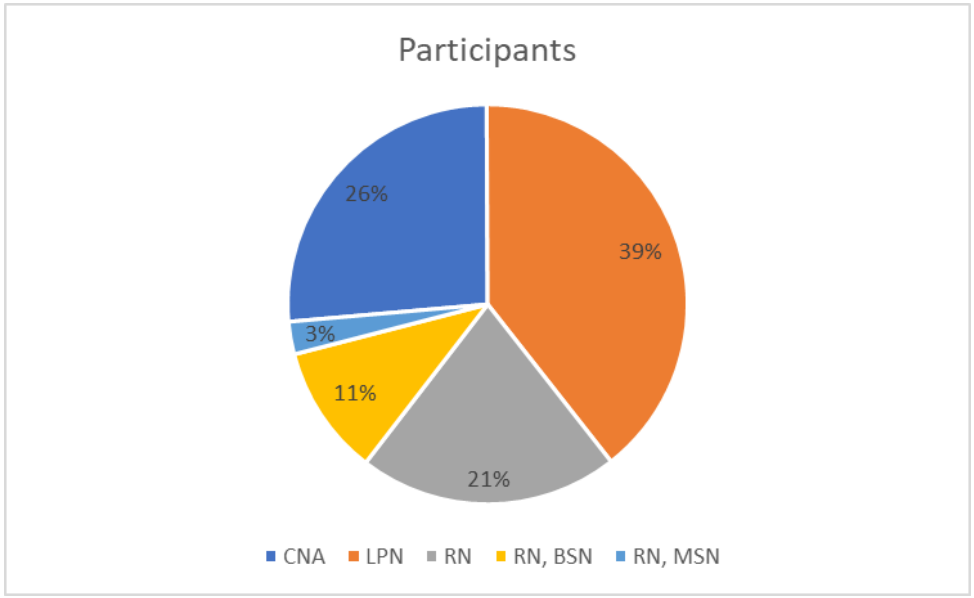
RESULTS

Description of Sample (*n* = 39)

Participants by Facility



Participants by Licensure



Description of Sample (*n* = 39)

Demographic Characteristics of Participants

Variable	*n*	%	*M* (SD)	Range
Certification				
CNA	10	23.3		
LPN	15	34.9		
RN	14	30.2		
RN, BSN	4	9.3		
RN, MSN	2	2.3		
Facility				
G	18	47.4		
F	12	31.6		
O	4	10.5		
S	4	10.5		
Hours Worked				
40 per week	24	90		
36 per week	2	5		
24 per week	1	3		
As needed	1	3		
Years in Healthcare			19.1 (10.3)	0 - 44
Years in Nursing			17.4 (10.4)	0.5 - 44
Years in Current Role			10.8 (10.1)	0.5 – 44

Knowledge improved immediately following the educational intervention

	Pre-test			Post-test					
Variable	***M***	**SD**		***M***	**SD**	***t***	***df***	***p***	**95% CI**
Score	**7.37**	**1.08**		**8.95**	**.23**	**9.7**	**37**	**<0.05**	**[1.25-1.91]**

There was a statistically significant difference in the pre-test (M = 7.37, SD = 1.08) and post-test (M = 8.95, SD = .226 scores (t =9.7, df = 37, $p < .05$). The Cohen's d was 1.58, which is large.

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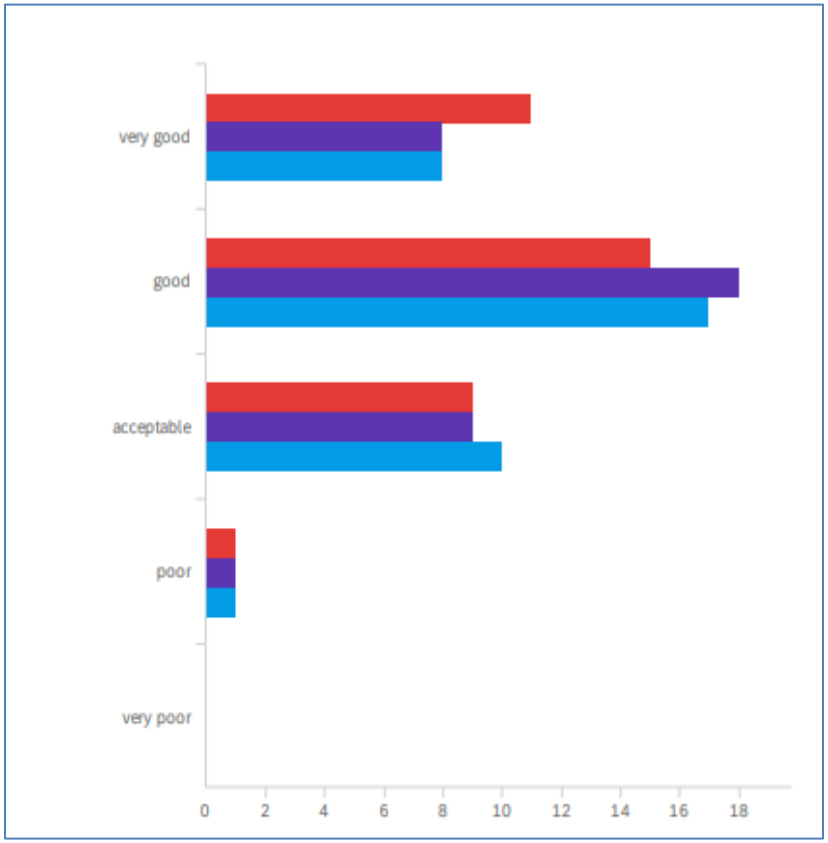
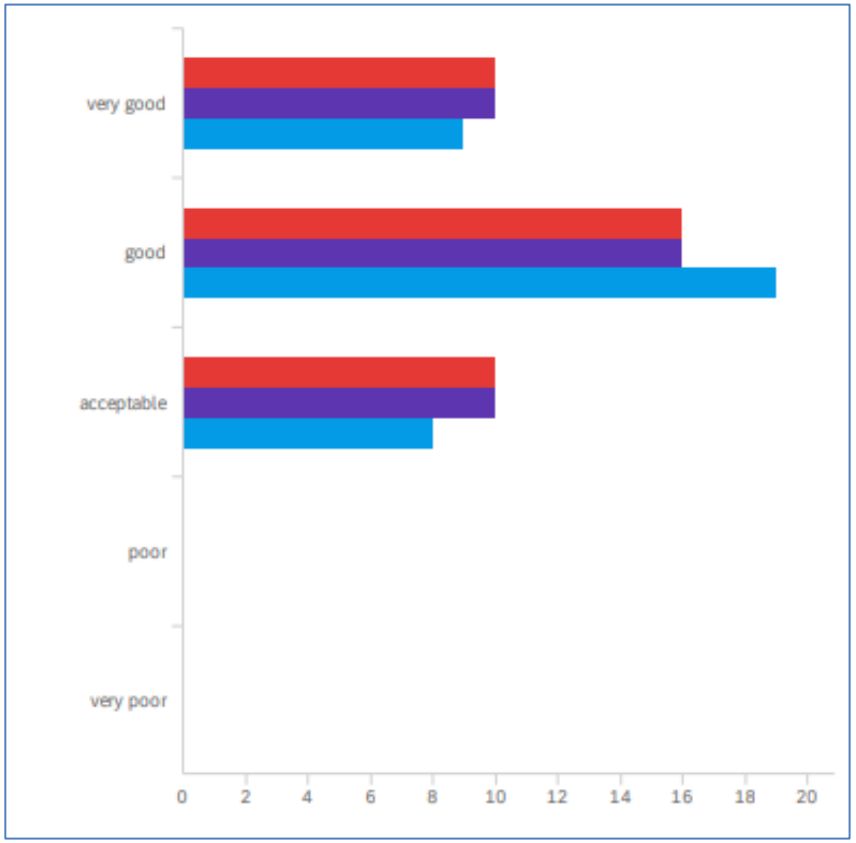
Knowledge improvement was not fully sustained at 6 weeks

	Pre-test			6 Weeks Post-test					
Variable	M	SD		M	SD	t	df	p	95% CI
Score	7.55	.93		8.00	.24	1.3	10	.106	[-0.34–1.21]

There was no statistically significant difference in the pre-test (M = 7.55, SD = .93) and 6-weeks post-test (M = 8.00, SD = 1.00) scores (t=1.34, df = 10, *p* = .106)

Overall attitudes did not change





How would you rate the ease of use of the SBAR tool?
How would you rate the accuracy of the SBAR tool in helping correctly diagn...
If using the SBAR tool, how would you rate your overall satisfaction with t...

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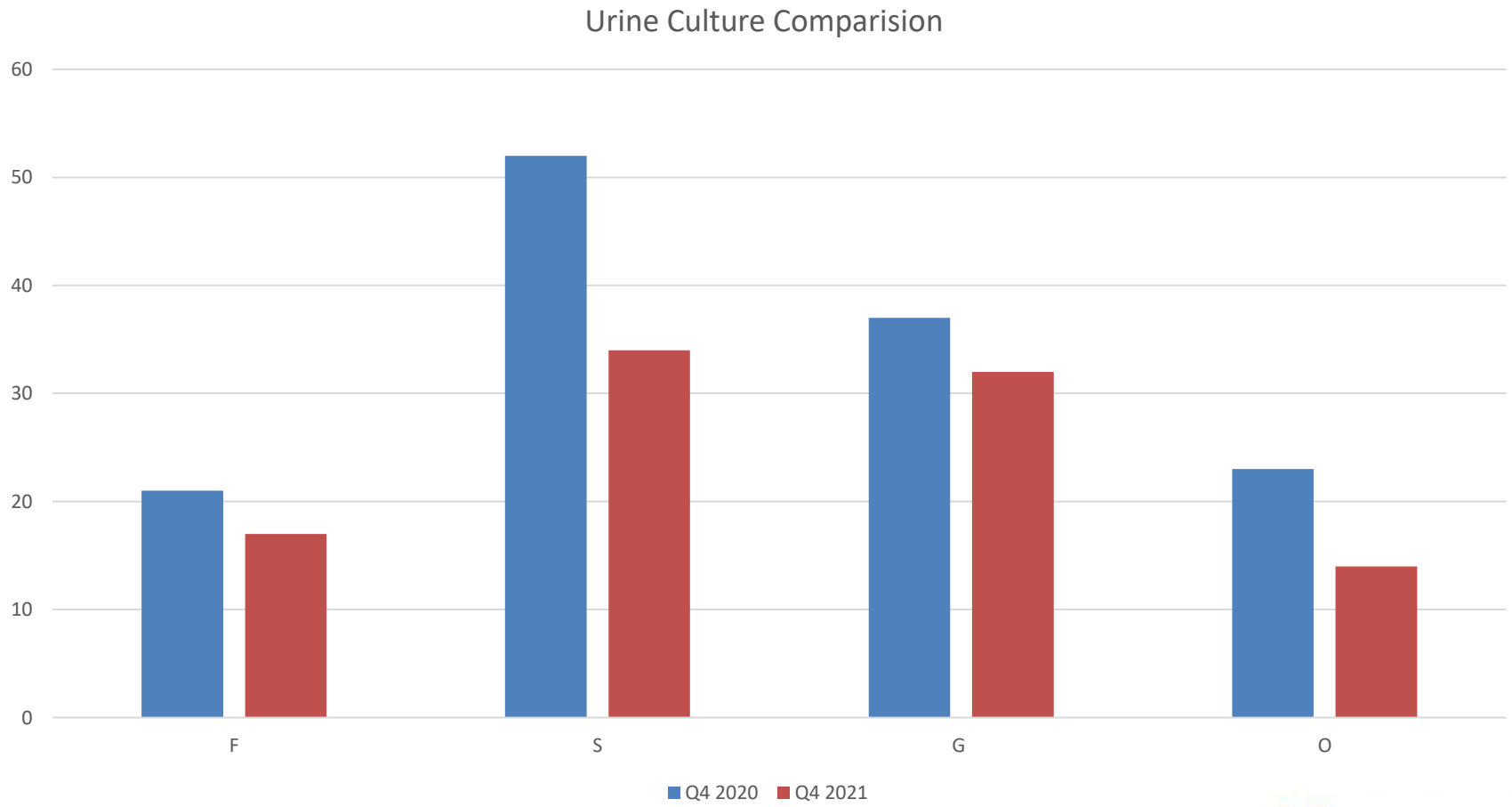
Attitudes about the SBAR tool did not change

Pre and Post Intervention	N	Pre Median (IQR)	Post Median (IQR)	*p*
How would you rate the UTI SBAR tool? - How would you rate the ease of use of the SBAR tool?	37	4 (3 - 5)	4 (3 - 5)	1.00
How would you rate the UTI SBAR tool? - How would you rate the accuracy of the SBAR tool in helping correctly diagnosis a UTI?	37	4 (3 - 4)	4 (3 - 5)	0.32
How would you rate the UTI SBAR tool? - If using the SBAR tool, how would you rate your overall satisfaction with the tool?	37	4 (3 - 4)	4 (4 - 4.5)	0.08
Pre and 6 Weeks Post Intervention	N	Pre Median (IQR)	6 Weeks Post Median (IQR)	*p*
How would you rate the UTI SBAR tool? - How would you rate the ease of use of the SBAR tool?	11	4 (4 - 5)	4 (4 - 5)	0.18
How would you rate the UTI SBAR tool? - How would you rate the accuracy of the SBAR tool in helping correctly diagnosis a UTI?	11	4 (4 - 5)	4 (4 - 5)	0.18
How would you rate the UTI SBAR tool? - If using the SBAR tool, how would you rate your overall satisfaction with the tool?	11	4 (4 - 5)	4 (4 - 5)	0.10

Urine Culture Comparison



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Urine Cultures did not significantly change

Facility	Q4 2020	Q4 2021	Case Number Decrease	Percent Decrease
F	21	17	4	19
S	52	34	18	35
G	37	32	5	14
O	23	14	9	39
Grand Total	133	97	36	27

A chi-square test of independence showed that there was no statistically significant change in total number of urine cultures between 2020 and 2021, X^2 (3, n = 230) = 1.13, p = .77.

Summary

- An evidence based diagnostic criteria was implemented
- All levels of nurses participated in the educational intervention
- Knowledge did improve after participation in the educational intervention*
- Attitudes about the SBAR tool did not change
- Number of urine cultures were reduced compared to the previous year**

*Statistically significant change in knowledge from pre-test to post-test but not from pre-test to 6 weeks post-test

**Not found to be statistically significant

Nursing Practice Implications

- Nursing
  - Implemented an evidence-based UTI criteria
  - Created a communication tool
- Clinical
  - Reduction in urine cultures
- Additional Areas of Study
    - Reduction in antibiotic prescriptions/cost
  - Provider Education
    - UTI vs. asymptomatic bacteruria
    - Patients with catheters
  - Patient/Family Education
    - UTI vs. asymptomatic bacteruria

Strengths & Limitations

- Strengths
  - Foundational theoretical framework
  - Identified by organization as a need through organization data
  - Organization has invested resources and team members into antibiotic stewardship program
- Limitations
  - Pilot study and small sample size
    - Convenience sample
  - Limited observation time on urine cultures
  - COVID-19 Pandemic
  - The facilities were sold during the project time
  - Cognitive Load Theory(Ghanbari, Haghani, Barekatain, & Jamali, 2020) – how do we maintain knowledge over time
  - High turn over rate of nursing staff/travel nurses
  - Limited generalizability beyond local facilities

Products of the Scholarly Project

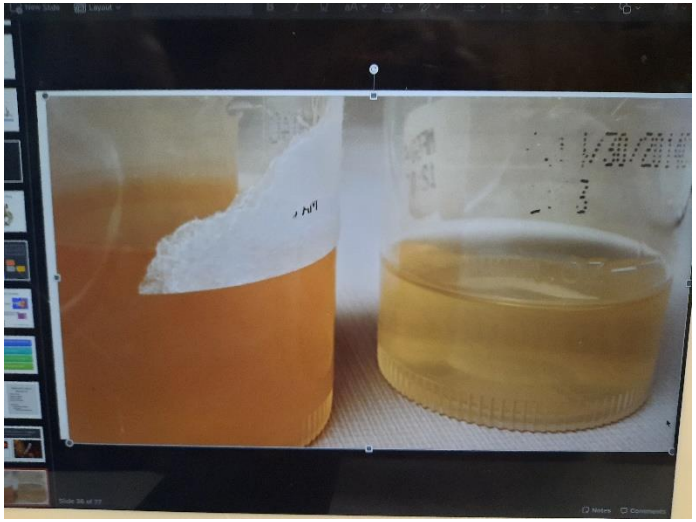
- Manuscript submissions
  - UVA Libra database
  - *Urologic Nursing* (SUNA)

- Abstract submissions
  - National SUNA Conference (Oct. 2022)

- Invited Poster Presenter
  - Virginia Council of Nurse Practitioners State Conference (March 2022) **First place poster winner**

- Standard education for nursing staff on UTIs/SBAR tool/Loeb Criteria

Thank you!



Questions?

References available on request

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Loeb's Minimum Criteria for Initiating Antibiotic Therapy

[Facility Logo]

Patient Name: _____ **MRN:** _____ **Location:** _____

Date of Infection: _____ **Date of Review:** _____ **Reviewed by:** _____

UTI: □ evaluated □ criteria met **LRTI:** □ evaluated □ criteria met **SSTI:** □ evaluated □ criteria met **FUO:** □ evaluated □ criteria met

Suspected Infection Syndrome	Minimum Criteria for Starting Antibiotic Therapy
Urinary tract infection *without catheter*	Either one of the following criteria □ Acute dysuria, OR □ Temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline, AND ≥1 of the following new or worsening symptoms □ Urgency □ Frequency □ Suprapubic pain □ Gross hematuria □ Urinary incontinence □ Costovertebral angle tenderness
with catheter	At least one of the following criteria □ Rigors □ Temp >37.9 °C (100 °F) or 1.5 °C (2.4 °F) above baseline □ New onset delirium □ New costovertebral angle tenderness
Note: *Residents with intermittent catheterization or condom catheter should be categorized as 'without catheter'* *Urine culture should be sent prior to starting antibiotics* *Antibiotics should not be started for cloudy or foul smelling urine*	
Lower respiratory tract infection	

Suspected UTI **SBAR**

Complete this form before contacting the resident's physician.

Date/Time_____

Resident Name_____ Date of Birth_____

Nurse_____ Phone_____

SITUATION

I am contacting you about a suspected UTI for the above resident.

Vital Signs BP____/_____ HR _____ Resp. rate_____ Temp. _____

BACKGROUND

Active diagnoses _____

☐ No ☐ Yes The resident has an indwelling catheter
☐ No ☐ Yes Patient is on dialysis
☐ No ☐ Yes The resident is incontinent If yes, new/worsening? ☐ No ☐ Yes
☐ No ☐ Yes Advance directives. Specify_____
☐ No ☐ Yes Medication Allergies. Specify_____
☐ No ☐ Yes The resident is on Warfarin (Coumadin®)
Does the patient have tachacardiac heart rate

ASSESSMENT

Resident WITH indwelling catheter

The criteria are met to initiate antibiotics if one of the below are selected

No Yes
☐ ☐ Fever of 100°F (38°C) or repeated temperatures of 99°F (37°C)*
☐ ☐ New back or flank pain
☐ ☐ Acute pain
☐ ☐ Rigors / shaking chills
☐ ☐ New dramatic change in mental status
☐ ☐ Hypotension (significant change from baseline BP or a systolic BP <90)

Resident WITHOUT indwelling catheter

Criteria are met if one of the three situations are met

No Yes
☐ ☐ 1. Acute dysuria alone

OR

☐ ☐ 2. Single temperature of 100°F (38°C)
and at least one new or worsening of the following:
☐ urgency ☐ suprapubic pain
☐ frequency ☐ gross hematuria
☐ back or flank pain ☐ urinary incontinence

OR

☐ ☐ 3. No fever, but two or more of the following symptoms:
☐ urgency ☐ suprapubic pain
☐ frequency ☐ gross hematuria
☐ incontinence

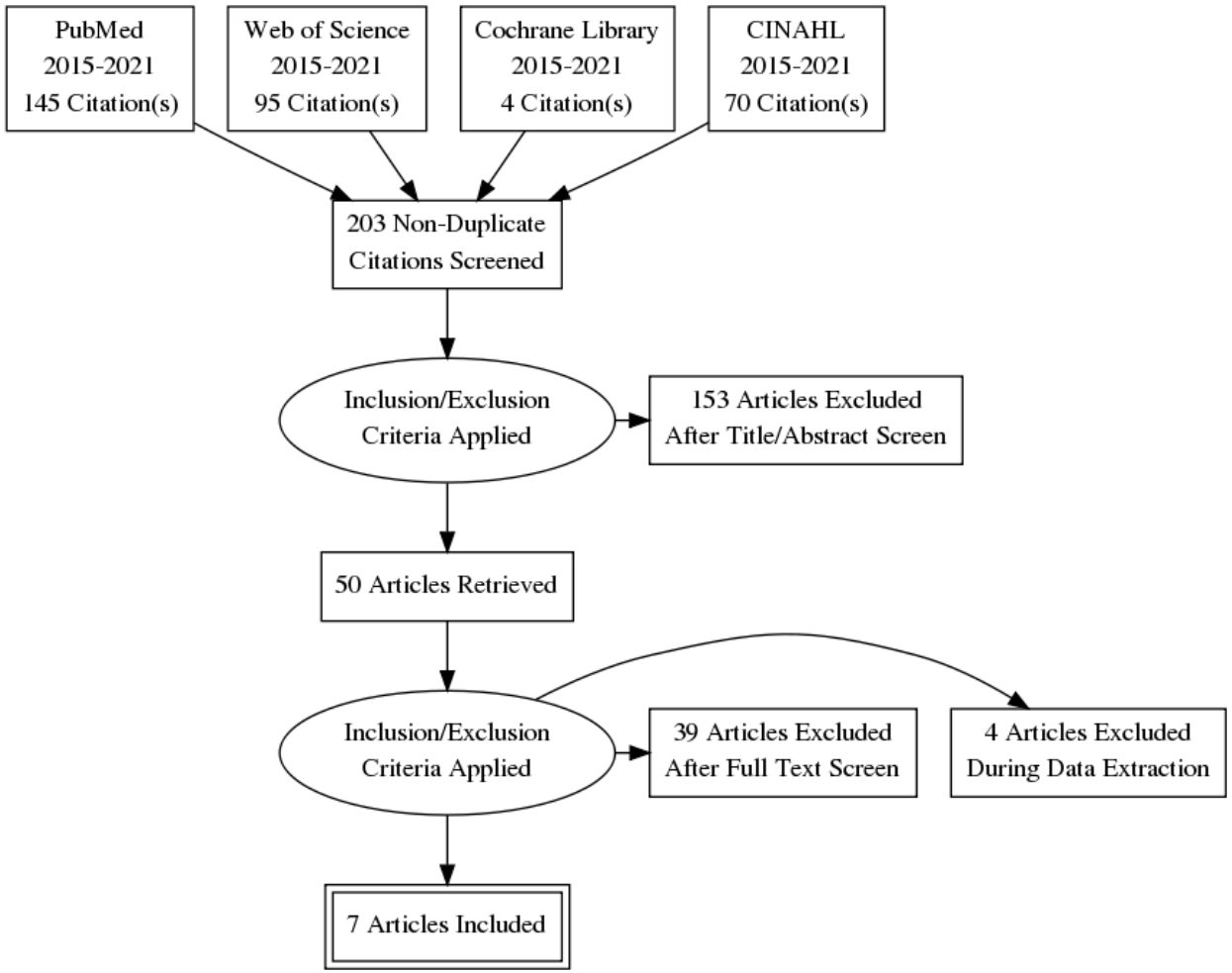
* For residents who regularly run a lower temperature, use a temperature of 2°F (1°C) above the baseline as a definition of a fever.

REQUEST FOR ORDERS

_____
_____
_____
_____

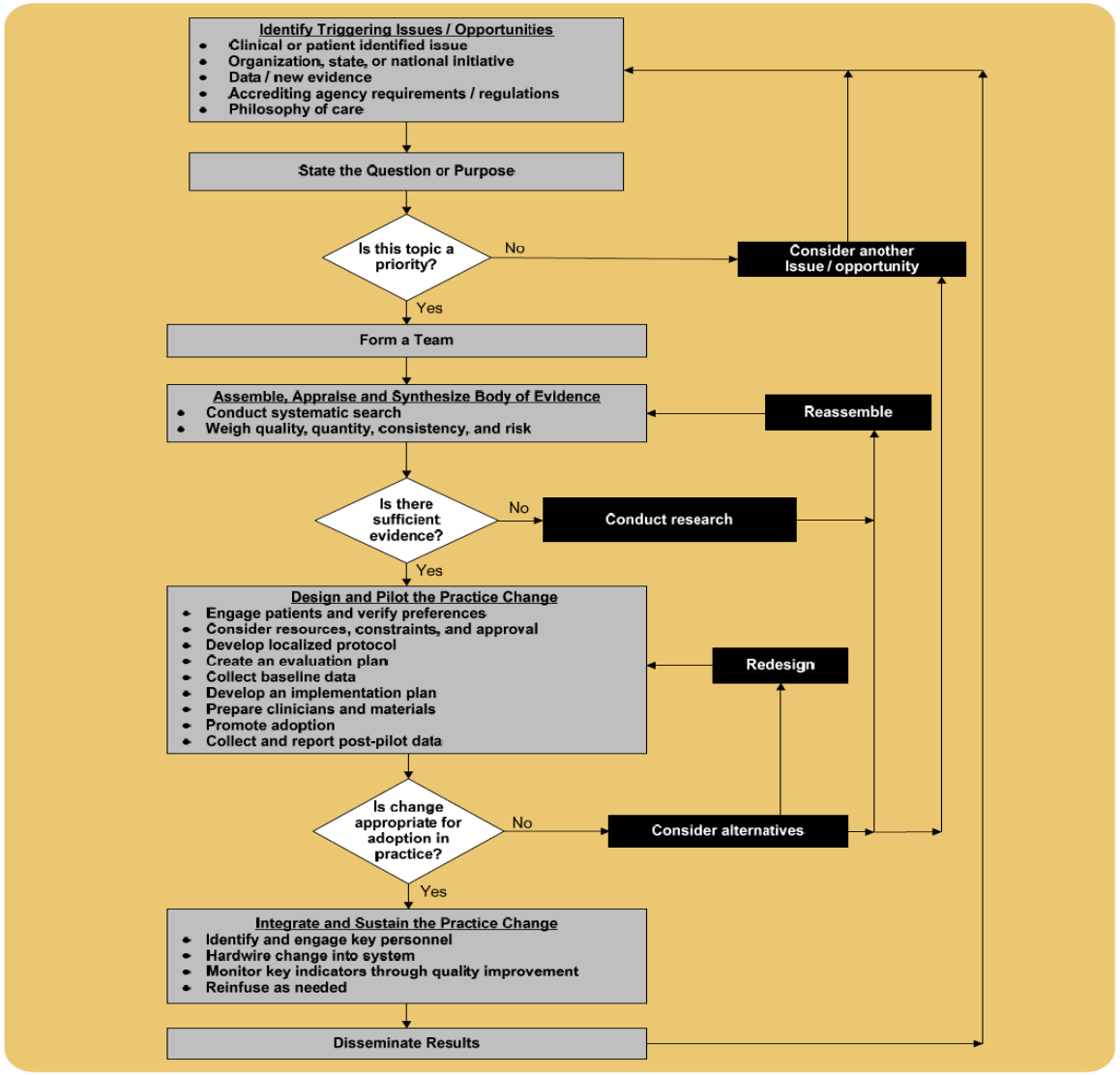
Reference – Loeb M, Brazil K, criteria Effect of a multifaceted intervention on number of antimicrobial prescriptions for suspected urinary tract infection in residents of nursing homes: cluster randomized controlled trial. BMJ. 2005: 331:669

PRISMA Table



DNP Essentials: I, III, IV

The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care



◆ = a decision point

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Setting

- Four SNFs located in Southwest Virginia
  - 500 beds total
  - 100 + nursing staff members
- Antibiotic Stewardship Team
  - Quality director
  - Clinical pharmacy
  - Infectious disease
  - Provider representation
  - DON representation
  - Project Champion

DNP Essentials: I, II, V, VII, VIII

Pre-test/Post-test

Question 1. The Loeb Criteria is used as an assessment tool to assess when nursing home residents may have a UTI. **TRUE OR FALSE**
Question 2. The Loeb Criteria has different assessments for individuals with and without indwelling foley catheters. **TRUE OR FALSE**
Question 3. The Loeb Criteria says antibiotics should be started for cloudy or malodorous urine. **TRUE OR FALSE**
Question 4. The Loeb Criteria says antibiotics should be started after a urine culture has been obtained. **TRUE OR FALSE**
Question 5. I know where and how to access the Centra Laboratory policy on urine culture collection. **TRUE OR FALSE**
Question 6. Pick 3 risks of the overuse of antibiotics. a. increased risk of C. Diff infections b. increased B12 levels c. increased risk of drug reactions d. increased risk of multi-drug resistant bacteria e. increased risk of falls f. decreased risk of falls
Question 7. What is the correct way to take a urine sample from a patient with an indwelling foley catheter? a. Take urine from urine collection bag to send for sample b. Use syringe to collect urine from tubing c. Change foley and take sample from new foley tube if catheter has been in more than 7 days
Question 8. How would you rate the ease of use of the SBAR tool currently being used? 1. Very Good 2. Good. 3. Acceptable 4. Poor 5. Very Poor
Question 9. How would you rate the accuracy of using the SBAR tool to help with correct diagnosing of UTIs? 1. Very Good 2. Good 3. Acceptable 4. Poor 5. Very Poor
Question 10. If using the SBAR tool, how would you rate your overall satisfaction with utilizing the SBAR tool? 1. Very Good 2. Good 3. Acceptable 4. Poor 5. Very Poor 6. Not applicable