Brief Report

Reduction in catheter-associated urinary tract infections following a diagnostic stewardship intervention

Olubosede Awoyomi MPH, RN, CIC [a], Yongsheng Wang MPH, CIC [a], Temilola Bakare MA [a], Alison Bradbury MSN, RN [a], Briana Episcopia MPH, RN, CIC [a,*], Patricia Castro-Auvet MD [b], Mary Fornek MBA, RN, CIC, FAPIC [c], John Quale MD [b]

[a] Department of Infection Prevention, NYC Health+Hospitals/Kings County, Brooklyn, NY
[b] Department of Infection Prevention, NYC Health+Hospitals/Central Office, New York, NY
[c] Department of Medicine, NYC Health+Hospitals/Kings County, Brooklyn, NY

Key Words:
Laboratory stewardship
Pyuria

Catheter-associated urinary tract infections (CAUTIs) are a frequent hospital-acquired infection and public health concern. In an attempt to reduce the number of CAUTIs, an intervention that emphasized the appropriate laboratory evaluation by ordering providers was implemented. This intervention supplemented ongoing standard bundle protocols. Compared to the 16 months before the intervention, there was a significant decrease in the number of CAUTIs during the 12-month intervention period.
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Catheter-associated urinary tract infections (CAUTIs) are associated with adverse clinical outcomes and financial burdens.[1] Modifiable risk factors for the development of CAUTIs include improper insertion technique, prolonged duration of catheterization, and breaks in a closed collection system.[2] Interventions have been recommended to reduce CAUTIs, including checklists to ensure proper insertion technique, daily rounds to assess the appropriateness of continued use, and documentation regarding indwelling urinary catheter (IUC) care.[2] These bundles have shown variable success in reducing CAUTI rates; interventions that emphasize proper insertion and daily reviews to decrease catheter duration have shown the greatest success.[3,4] Despite these universally accepted practices, medical centers continue to struggle with high rates of CAUTIs.

Educational interventions to reduce CAUTIs have centered around insertion techniques, maintenance, prompt removal, and alternative devices.[5] This report examines the effectiveness of an educational intervention emphasizing the proper evaluation and workup of suspected urinary tract infections, consistent with published guidelines, in patients with IUCs.[6]

METHODS

NYC Health + Hospitals/Kings County is a 639-bed academically-affiliated public hospital that includes 5 general medical wards, each consisting of ~36 beds. The hospital serves patients of low socio-economic status; in 2022, there were 18,327 admissions and 159,285 inpatient days.

In April 2022, an intervention was implemented to reduce the number of CAUTIs in the general medical service. This intervention included an educational session for hospitalists and medical residents regarding the recommended workup for patients with IUCs. The protocol included (1) replacing any IUC that had been in place for > 14 days before sending urinary studies, (2) sending a urinalysis first, and (3) sending a urine culture only if the urinalysis and clinical scenario (eg, suprapubic tenderness or flank pain) suggested a urinary tract infection. Starting in April 2022, pending urine cultures sent on patients with IUCs were reviewed 5 days a week. A mediation was performed by email, electronic chat, or in person for cultures not meeting the recommended protocol. The mediation typically consisted of a reminder of the importance of properly diagnosing CAUTIs, the specific deficiency in the protocol that was identified, and a request to re-review the need for the urine culture. Mediations were performed only on cultures that were ordered or "in process"; any culture that had a result (including preliminary) was not included.

Throughout the preintervention period (January 1, 2021, to April 30, 2022) and intervention period (May 1, 2022, to April 30, 2023), CAUTI bundle protocols remained unchanged. These protocols included assessments ensuring proper insertion technique, daily

* Address correspondence to Briana Episcopia, MPH, RN, CIC, 451 Clarkson Avenue, Brooklyn, NY 11203.
E-mail address: Briana.episcopia@nychhc.org (B. Episcopia).
Conflicts of interest: None to report.

rounds to evaluate the continued need for the IUC, and reviews of maintenance techniques.

The 95% Poisson confidence intervals (CI) were calculated for the rates of CAUTIs per 1,000 patient days.[7] The Exact Poisson method was used to determine the incidence rate ratio CI and the associated exact mid-P value.[7]

RESULTS

Preintervention Period

From January 2021 through April 2022, there were 16 CAUTIs on the medical service with 5,536 catheter days, for a rate of 3.0 (CI 1.7-4.9) infections/1,000 catheter days; Figure. Of the 16 CAUTIs, seven had the workup done on an IUC that had been in place for > 14 days. Of the remaining nine CAUTI patients, 3 did not have a urinalysis sent, and 4 had a urinalysis sent simultaneously with the culture. Only nine of the 16 patients received antibiotic therapy that covered the urinary pathogen.

Intervention period

From May 2022 to April 2023, there were four CAUTIs during 4,233 catheter days, for a rate of 0.94 (CI 0.26-2.4) infections/1,000 catheter days; P = .03 compared to the preintervention period (Fig 1).

During the intervention period, there were 38 mediations. There were 7 instances in which the IUC was in place for > 14 days, 9 instances where no urinalysis was performed, and 6 instances where the urinalysis was performed before the culture but the result and/or clinical scenario did not support a urinary tract infection. In 16 episodes the urinalysis was sent simultaneously with the culture. Of the 38 mediations, 20 resulted in the culture being discontinued. Of the remaining 18 cultures that were processed, 5 cultures were negative and 3 grew Candida spp. Ten cultures were positive,

resulting in 3 CAUTIs. For the fourth CAUTI, the recommended workup was done appropriately.

In contrast, the nonmedical services encountered 11 infections during 7,833 catheter days (rate 1.4 infections/1,000 catheter days, CI 0.7-2.5) throughout the preintervention period and 10 CAUTIs during 5,419 catheter days (rate 1.8 infections/1,000 catheter days, CI 0.89-3.4, P = .54 compared to the preintervention period) throughout the intervention period.

DISCUSSION

Despite the implementation of established protocols, hospitals may continue to struggle with high rates of CAUTIs. During our preintervention period, a substantial proportion of patients with reported CAUTIs had cultures inappropriately ordered (eg, IUCs were in for > 14 days) or had fevers attributed to another etiology (and the culture was not treated). Our intervention, aimed to encourage only appropriately ordered urine cultures as part of a "fever work up", was successful in decreasing the number of reported CAUTIs.

One unresolved issue recognized in our intervention is what constitutes "significant pyuria" in patients with IUCs. Guidelines state while the absence of pyuria strongly argues against a urine infection in patients with IUCs, the mere presence of pyuria does not confirm the presence of infection.[6] Traditional definitions of pyuria (5-10 white blood cells (WBCs)/high power field (HPF)) have been recently questioned and are likely not applicable to patients with IUCs.[8,9] In our intervention, we considered < 20 WBCs/HPF not to be supportive of an infection, and > 50 WBCs/HPF to be significant pyuria. Interpretation of urinalyses with 20 to 50 WBCs/HPF was left to the discretion of the treating providers. Order sets of "urinalysis with reflex to culture" have successfully reduced the number of urine cultures being ordered and offer the potential to reduce the number of CAUTIs. However, until a consistent definition of
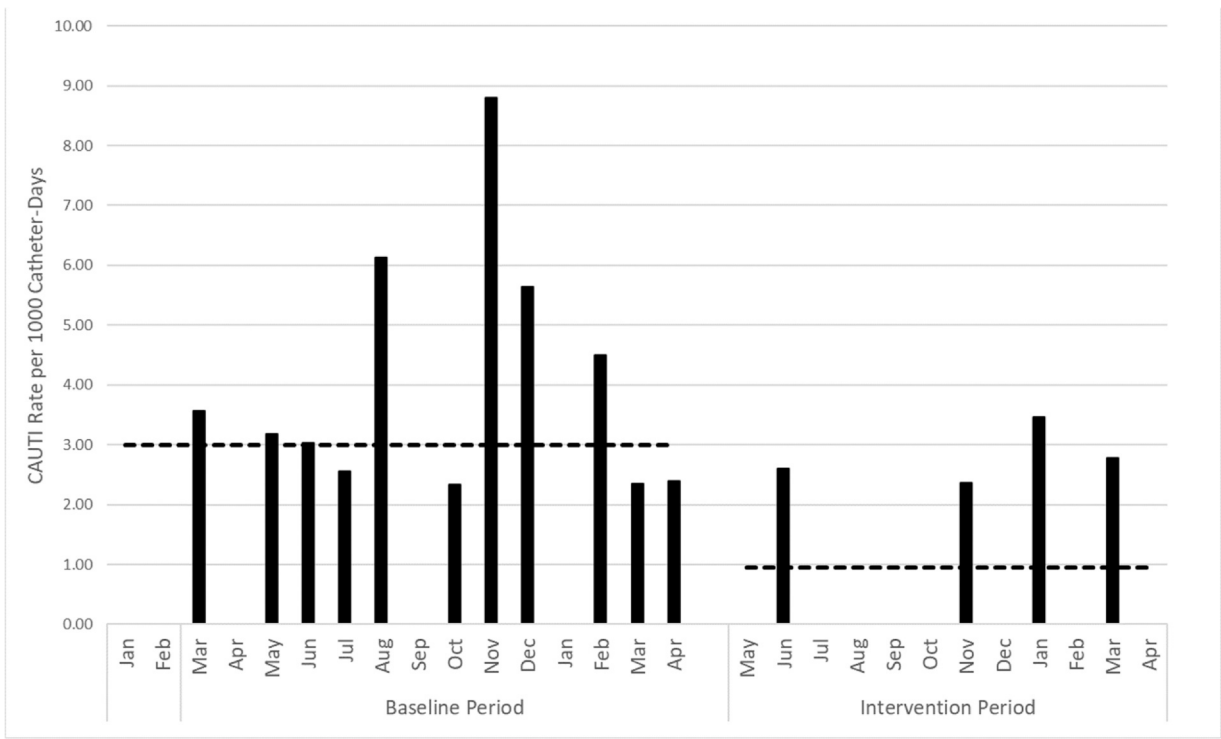

Fig. . 1. Monthly CAUTI rates of infection on the medical service during the baseline (Jan 2021-April 2022) and intervention (May 2022-April 2023) periods.

significant pyuria is established for patients with IUCs, caution should be exercised in using such order sets for patients with IUCs.
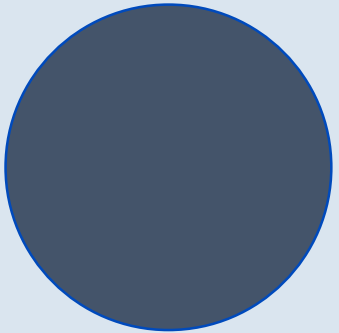
CONCLUSIONS

In summary, an educational intervention emphasizing the appropriate evaluation of patients with IUCs was effective in reducing the rates of CAUTIs in our medical center.

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Dissecting Journal Articles

Staci S. Reynolds, PhD, RN, ACNS-BC, CPHQ, FAAN

Clinical Associate Professor
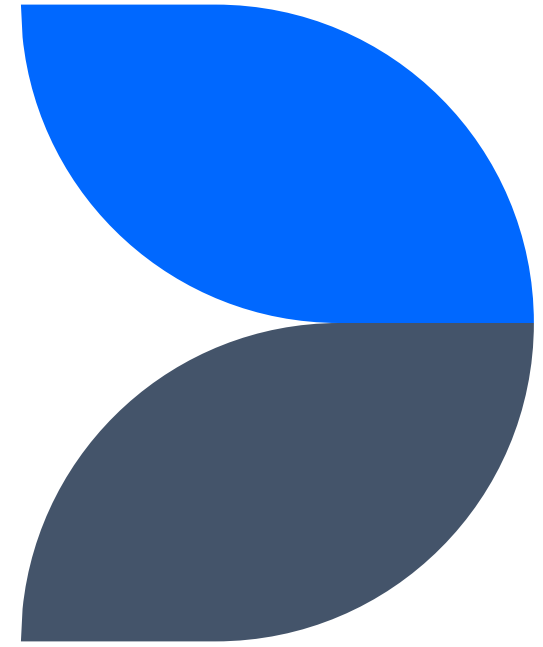
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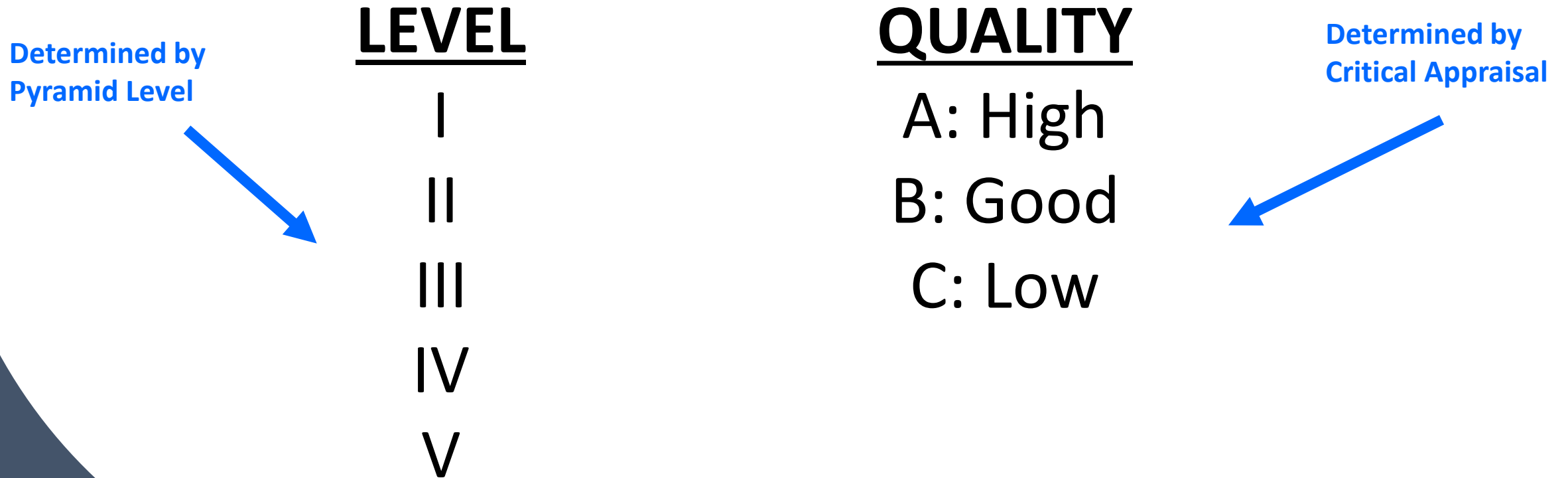
No disclosures

Objectives

1. Review different types of evidence

2. Discuss components of an evidence appraisal

3. Demonstrate the steps to conduct an evidence appraisal

Evidence Appraisal Overview
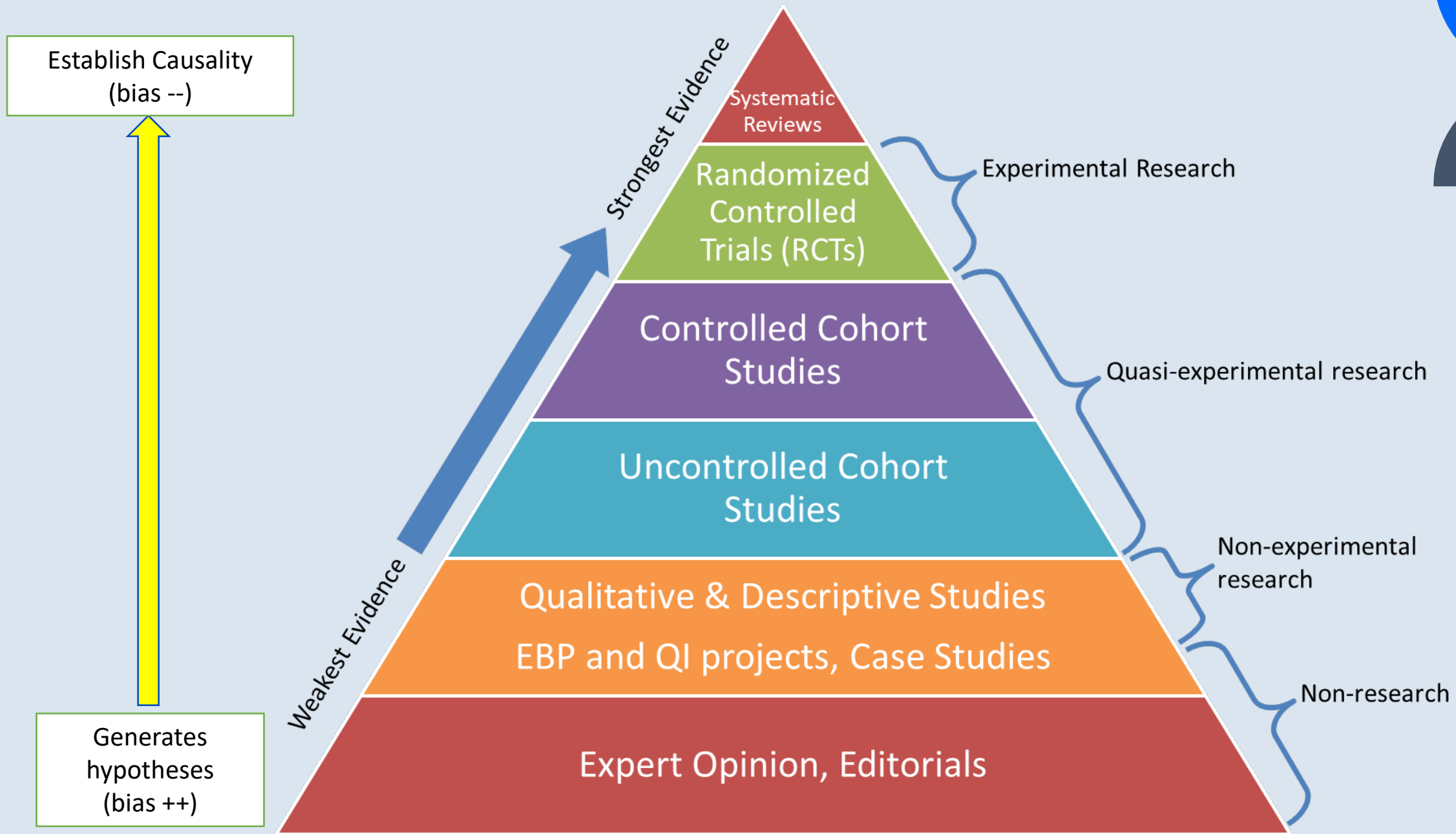
Evidence Appraisal

Two components of an appraisal:

LEVEL

Determined by
Pyramid Level

I

II

III

IV

V

QUALITY

A: High

B: Good

C: Low

Determined by
Critical Appraisal

(Ex. IA level of evidence is stronger than IIB or IVA)

5

		QUANTITATIVE (numbers)	QUALITATIVE (words)	LEVEL
RESEARCH	Experimental	• Intervention • Randomization • Control	N/A	I
	Quasi-Experimental	• Intervention • NO randomization and/or control	N/A	II
	Non-Experimental	• NO intervention, randomization, or control • Example: Descriptive Research	• Phenomenological • Ethnographic • Grounded Theory	III
NON-RESEARCH		• Clinical Practice Guidelines		IV
		• EBP projects • QI Projects • Case studies • Expert Opinion • Editorials • Literature Reviews • Position statements		V

Evidence Quality

Quality Rating	Description
A: High Quality	Clear objectives, expertise is clearly evidence, provides scientific rationale, definitive conclusions, consistent recommendations
B: Good Quality	Consistent results in a single setting, reasonably consistent recommendations, expertise appears to be credible, reasonably thorough
C: Low quality or major flaws	Expertise is not discernable, conclusions cannot be drawn, unclear objectives, inconsistent results, poorly defined methods, insufficient evidence

Tools used for Critical Appraisal

JBI CRITICAL APPRAISAL CHECKLIST FOR QUASI-EXPERIMENTAL STUDIES

Reviewer_____Date_____

Author_____Year_____ Record Number_____

	Yes	No	Unclear	Not applicable
1. Is it clear in the study what is the cause and what is the 'effect' (i.e. there is no confusion about which variable comes first)?	☐	☐	☐	☐
2. Were the participants included in any comparisons similar?	☐	☐	☐	☐
3. Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	☐	☐	☐	☐
4. Was there a control group?	☐	☐	☐	☐
5. Were there multiple measurements of the outcome both pre and post the intervention/exposure?	☐	☐	☐	☐
6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed?	☐	☐	☐	☐

Rapid Critical Appraisal Checklist for Randomized Clinical Trials

1. Are the Results of the Study Valid?

A. Were the subjects randomly assigned to the experimental and control groups?	Yes	No	Unknown
B. Was random assignment concealed from the individuals who were first enrolling subjects into the study?	Yes	No	Unknown
C. Were the subjects and providers blind to the study group?	Yes	No	Unknown
D. Were reasons given to explain why subjects did not complete the study?	Yes	No	Unknown
E. Were the follow-up assessments conducted long enough to fully study the effects of the intervention?	Yes	No	Unknown
F. Were the subjects analyzed in the group to which they were randomly assigned?	Yes	No	Unknown
G. Was the control group appropriate?	Yes	No	Unknown
H. Were the instruments used to measure the outcomes valid and reliable?	Yes	No	Unknown
I. Were the subjects in each of the groups similar on demographic and baseline clinical variables?	Yes	No	Unknown

2. What Are the Results?

A. How large is the intervention or treatment effect (NNT, NNH, effect size, level of significance)? _____

B. How precise is the intervention or treatment (CI)? _____

3. Will the Results Help Me in Caring for My Patients?

A. Were all clinically important outcomes measured?	Yes	No	Unknown
B. What are the risks and benefits of the treatment?			
C. Is the treatment feasible in my clinical setting?	Yes	No	Unknown
D. What are my patients/family's values and expectations for the outcome that is trying to be prevented and the treatment itself?			

Section I: QuaNtitative Appraisal

A Is this a report of a single research study?

☐ Yes → Continue to decision tree
☐ No → Go to Section I: B

Level

Was there manipulation of an independent variable

- Yes →
- No → Level III (Nonexperimental)

Was there a control group

- Yes →
- No → Level II (Quasi-experimental)

Were study participants randomly assigned to the intervention and control groups?

- Yes → Level I (Randomized Control Trial; RCT)
- No → Level II (Quasi-experimental)

Level I studies include randomized control trials (RCTs) or experimental studies

Level II studies have some degree of investigator control and some manipulation of an independent variable but lack random assignment to groups and may not have a control group

Level III studies lack manipulation of an independent variable; can be descriptive, comparative, or correlational; and often use secondary data

After determining the level of evidence, determine the quality of evidence using the considerations below:

Does the researcher identify what is known and not known about the problem?	☐ Yes	☐ No	
Does the researcher identify how the study will address any gaps in knowledge?	☐ Yes	☐ No	
Was the purpose of the study clearly presented?	☐ Yes	☐ No	
Was the literature review current (most sources within the past five years or a seminal study)?	☐ Yes	☐ No	
Was the sample size sufficient based on the study design and rationale?	☐ Yes	☐ No	
If there is a control group: • Were the characteristics and/or demographics similar in both the control and intervention groups?	☐ Yes ☐ Yes	☐ No ☐ No	☐ N/A ☐ N/A

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8515 GEORGIA AVENUE, SUITE 400
SILVER SPRING, MARYLAND 20910-3492
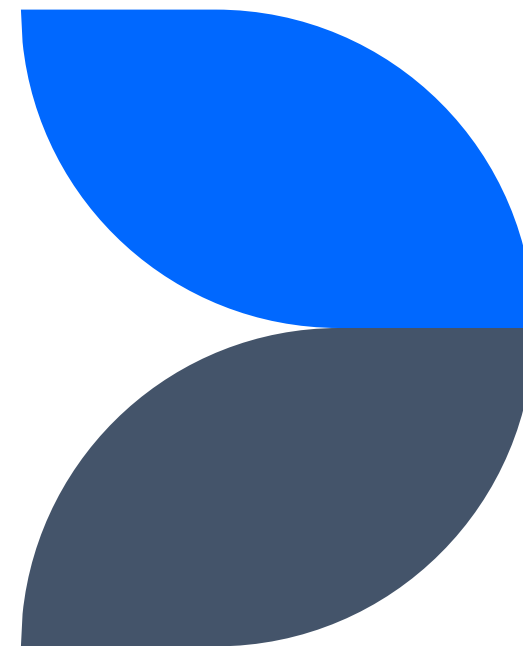301 628-5000 • FAX 301 628-5001
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KAREN A. DALEY, PhD, MPH, RN, FAAN
PRESIDENT

MARLA J. WESTON, PhD, RN
CHIEF EXECUTIVE OFFICER

Framework for How to Read and Critique a Research Study

1. Critiquing the research article
   a. Title – Does it accurately describe the article?
   b. Abstract – Is it representative of the article?
   c. Introduction – Does it make the purpose of the article clear?
   d. Statement of the problem – Is the problem properly introduced?
   e. Purpose of the study – Has the reason for conducting the research been explained?
   f. Research question(s) – Is/are the research question(s) clearly defined and if not, should they be?
   g. Theoretical framework – Is the theoretical framework described? If there is not a theoretical framework, should there be?
   h. Literature review – Is the literature review relevant to the study, comprehensive, and include recent research? Does the literature review support the need for the study?
   i. Methods – Is the design appropriate for the study? Does the sample fit with the research design and is the size sufficient? Was a data collection instrument needed? How were data collected? Were reliability and validity accounted for?

Let's Practice!

Brief Report

Reduction in catheter-associated urinary tract infections following a diagnostic stewardship intervention

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[b] Department of Infection Prevention, NYC Health+Hospitals/Central Office, New York, NY
[c] Department of Medicine, NYC Health+Hospitals/Kings County, Brooklyn, NY

IMRaD Format

Introduction

- Introduction
- Statement of the problem
- Purpose of the study
- Research question(s)
- Theoretical Framework
- Literature Review

Methods

- Methods/design
- Analysis

Results

- Research results

Discussion

- Explanation of results
- Limitations
- Conclusions

Title

PRESENT

Does the title accurately describe the article? **Yes**

Reduction in catheter-associated urinary tract infections following a diagnostic stewardship intervention

Abstract

Is the abstract representative of the article?　　**Yes**

Abstracts of brief reports are limited to 50-75 words

Catheter-associated urinary tract infections (CAUTIs) are a frequent hospital-acquired infection and public health concern. In an attempt to reduce the number of CAUTIs, an intervention that emphasized the appropriate laboratory evaluation by ordering providers was implemented. This intervention supplemented ongoing standard bundle protocols. Compared to the 16 months before the intervention, there was a significant decrease in the number of CAUTIs during the 12-month intervention period.

Introduction

Introduction – does it make the purpose of the article clear?

Statement of the problem – Is the problem properly introduced?

Purpose of the study – Has the reason for conducting the research been explained?

Research question(s) – Is/are the research question(s) clearly defined and if not, should they be?

Theoretical framework – Is the theoretical framework described? If there is not a theoretical framework, should there be?

Literature review – Is the literature review relevant to the study, comprehensive, and include recent research? Does the literature review support the need for the study?

Introduction

Catheter-associated urinary tract infections (CAUTIs) are associated with adverse clinical outcomes and financial burdens.[1] Modifiable risk factors for the development of CAUTIs include improper insertion technique, prolonged duration of catheterization, and breaks in a closed collection system.[2] Interventions have been recommended to reduce CAUTIs, including checklists to ensure proper insertion technique, daily rounds to assess the appropriateness of continued use, and documentation regarding indwelling urinary catheter (IUC) care.[2] These bundles have shown variable success in reducing CAUTI rates; interventions that emphasize proper insertion and daily reviews to decrease catheter duration have shown the greatest success.[3,4] Despite these universally accepted practices, medical centers continue to struggle with high rates of CAUTIs.

Educational interventions to reduce CAUTIs have centered around insertion techniques, maintenance, prompt removal, and alternative devices.[5] This report examines the effectiveness of an educational intervention emphasizing the proper evaluation and workup of suspected urinary tract infections, consistent with published guidelines, in patients with IUCs.[6]

Problem statement

Literature review

Purpose of the article

20

Introduction

PRESENT

Does the introduction make the purpose of the article clear?

Yes: The purpose of the article is to examine the effectiveness of an educational intervention emphasizing the proper evaluation and workup of suspected UTIs.

Statement of the Problem

PRESENT

Is the problem properly introduced?

Yes: The problem is that CAUTIs are associated with adverse clinical outcomes and financial burdens.

*Further information on the problem related to **proper evaluation and workup of UTIs** would have been helpful, but may have been omitted due to word limitations.

Purpose of the Study

PRESENT

Has the reason for conducting the research been explained?

Yes: The purpose of the article is to examine the effectiveness of an educational intervention emphasizing the proper evaluation and workup of suspected UTIs.

Research Question(s)

N/A

Is/are the research question(s) clearly defined and if not, should they be?

A formal research question is not presented, but may not be needed as a purpose statement is included.

Theoretical Framework

N/A

Is the theoretical framework described? If there is not a theoretical framework, should there be?

A theoretical framework is not presented, but may not be needed.

Literature Review

Partial

Is the literature review relevant to the study, comprehensive, and include recent research? Does the literature review support the need for the study?

Partially; the literature review provides information on previous interventions to prevent CAUTI, but does not address the importance of **proper evaluation and workup of UTI.**

Four articles are cited from: 2009, 2014, 2023 (2)

Methods

Methods

- Is the design appropriate for the study?

- Does the sample fit with the research design and is the size sufficient?

- Was a data collection instrument needed?

- How were data collected?

- Were reliability and validity accounted for?

Analysis – Is the analytical approach consistent with the study questions and research design?

METHODS

NYC Health + Hospitals/Kings County is a 639-bed academically-affiliated public hospital that includes 5 general medical wards, each consisting of ~36 beds. The hospital serves patients of low socio-economic status; in 2022, there were 18,327 admissions and 159,285 inpatient days.

In April 2022, an intervention was implemented to reduce the number of CAUTIs in the general medical service. This intervention included an educational session for hospitalists and medical residents regarding the recommended workup for patients with IUCs. The protocol included (1) replacing any IUC that had been in place for > 14 days before sending urinary studies, (2) sending a urinalysis first, and (3) sending a urine culture only if the urinalysis and clinical scenario (eg, suprapubic tenderness or flank pain) suggested a urinary tract infection. Starting in April 2022, pending urine cultures sent on patients with IUCs were reviewed 5 days a week. A mediation was performed by email, electronic chat, or in person for cultures not meeting the recommended protocol. The mediation typically consisted of a reminder of the importance of properly diagnosing CAUTIs, the specific deficiency in the protocol that was identified, and a request to re-review the need for the urine culture. Mediations were performed only on cultures that were ordered or "in process"; any culture that had a result (including preliminary) was not included.

Setting

Intervention

28

Throughout the preintervention period (January 1, 2021, to April 30, 2022) and intervention period (May 1, 2022, to April 30, 2023), CAUTI bundle protocols remained unchanged. These protocols included assessments ensuring proper insertion technique, daily rounds to evaluate the continued need for the IUC, and reviews of maintenance techniques.

The 95% Poisson confidence intervals (CI) were calculated for the rates of CAUTIs per 1,000 patient days.[7] The Exact Poisson method was used to determine the incidence rate ratio CI and the associated exact mid-P value.[7]

Design

Analysis

Methods

ABSENT

Is the design appropriate for the study?   **Yes**

Does the sample fit with the research design and is the size sufficient?   **Unclear**

Was a data collection instrument needed?   **Unclear**

How were data collected?   **Unclear**

Were reliability and validity accounted for?   **N/A**

Analysis

Partial

Is the analytical approach consistent with the study questions and research design?

Partially; an analysis plan is present, but details are not provided

Results

Results – Are the results presented clearly in the text, tables and figures? Are the statistics clearly explained?

RESULTS

Preintervention Period

From January 2021 through April 2022, there were 16 CAUTIs on the medical service with 5,536 catheter days, for a rate of 3.0 (CI 1.7-4.9) infections/1,000 catheter days; Figure. Of the 16 CAUTIs, seven had the workup done on an IUC that had been in place for > 14 days. Of the remaining nine CAUTI patients, 3 did not have a urinalysis sent, and 4 had a urinalysis sent simultaneously with the culture. Only nine of the 16 patients received antibiotic therapy that covered the urinary pathogen.

Intervention period

From May 2022 to April 2023, there were four CAUTIs during 4,233 catheter days, for a rate of 0.94 (CI 0.26-2.4) infections/1,000 catheter days; $P = .03$ compared to the preintervention period (Fig 1).

During the intervention period, there were 38 mediations. There were 7 instances in which the IUC was in place for > 14 days, 9 instances where no urinalysis was performed, and 6 instances where the urinalysis was performed before the culture but the result and/or clinical scenario did not support a urinary tract infection. In 16 episodes the urinalysis was sent simultaneously with the culture. Of the 38 mediations, 20 resulted in the culture being discontinued. Of the remaining 18 cultures that were processed, 5 cultures were negative and 3 grew Candida spp. Ten cultures were positive, resulting in 3 CAUTIs. For the fourth CAUTI, the recommended workup was done appropriately.

In contrast, the nonmedical services encountered 11 infections during 7,833 catheter days (rate 1.4 infections/1,000 catheter days, CI 0.7-2.5) throughout the preintervention period and 10 CAUTIs during 5,419 catheter days (rate 1.8 infections/1,000 catheter days, CI 0.89-3.4, $P = .54$ compared to the preintervention period) throughout the intervention period.

Main outcome finding

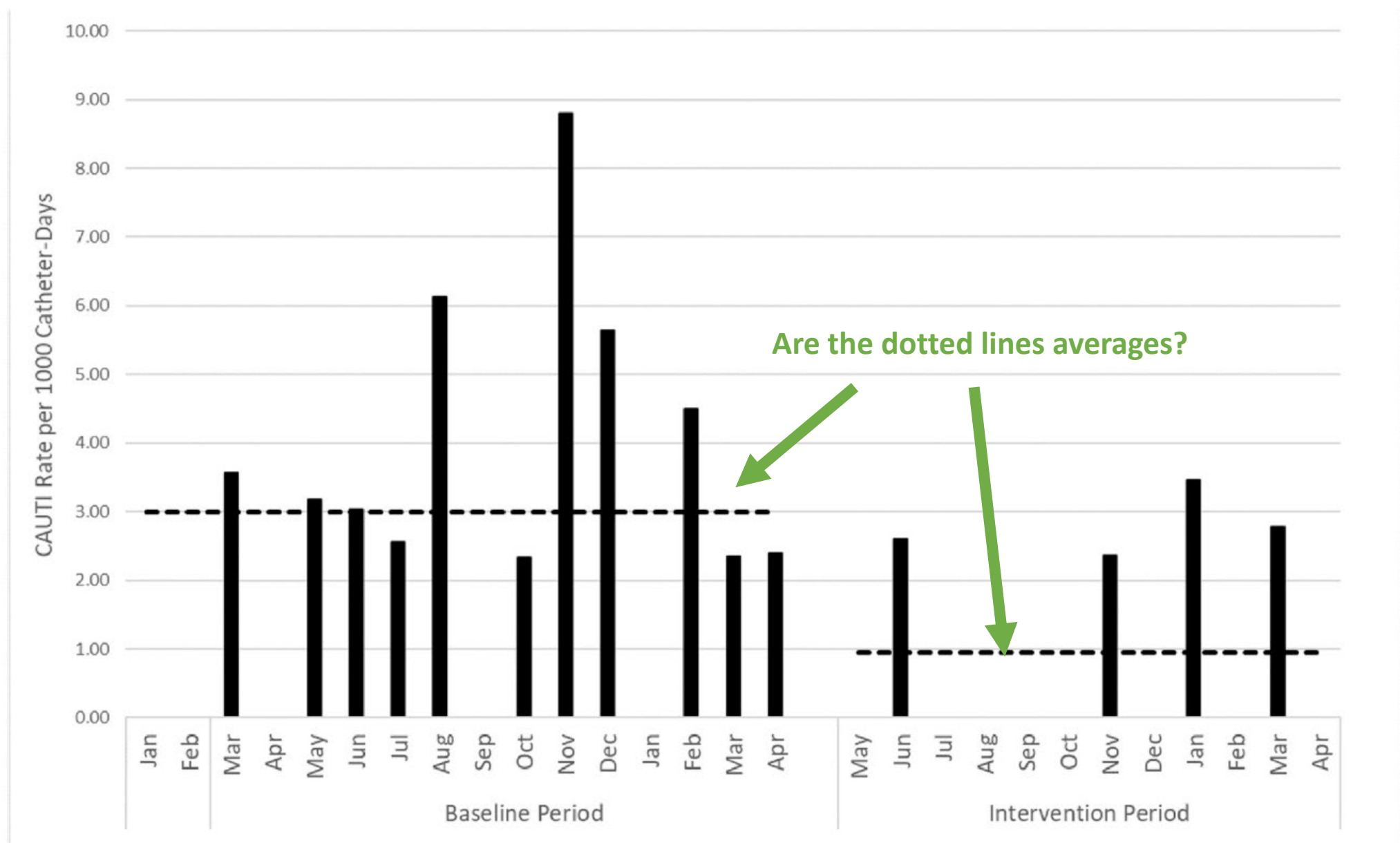**Process finding**

Control group?

34

Fig. . 1. Monthly CAUTI rates of infection on the medical service during the baseline (Jan 2021-April 2022) and intervention (May 2022-April 2023) periods.

35

Results

PRESENT

Are the results presented clearly in the text, tables, and figures?   **Yes**

Are the statistics clearly explained?   **Yes**

Discussion

Discussion

Are the results explained in relationship to the theoretical framework, research questions, and the significance to nursing?

Limitations

Are the limitations presented and their implications discussed?

Conclusion

Are there recommendations for nursing practice, future research, and policymakers?

DISCUSSION

Despite the implementation of established protocols, hospitals may continue to struggle with high rates of CAUTIs. During our preintervention period, a substantial proportion of patients with reported CAUTIs had cultures inappropriately ordered (eg, IUCs were in for > 14 days) or had fevers attributed to another etiology (and the culture was not treated). Our intervention, aimed to encourage only appropriately ordered urine cultures as part of a "fever work up", was successful in decreasing the number of reported CAUTIs.

Broad overview of findings

One unresolved issue recognized in our intervention is what constitutes "significant pyuria" in patients with IUCs. Guidelines state while the absence of pyuria strongly argues against a urine infection in patients with IUCs, the mere presence of pyuria does not confirm the presence of infection.[6] Traditional definitions of pyuria (5-10 white blood cells (WBCs)/high power field (HPF)) have been recently questioned and are likely not applicable to patients with IUCs.[8,9] In our intervention, we considered < 20 WBCs/HPF not to be supportive of an infection, and > 50 WBCs/HPF to be significant pyuria. Interpretation of urinalyses with 20 to 50 WBCs/HPF was left to the discretion of the treating providers. Order sets of "urinalysis with reflex to culture" have successfully reduced the number of urine cultures being ordered and offer the potential to reduce the number of CAUTIs. However, until a consistent definition of significant pyuria is established for patients with IUCs, caution should be exercised in using such order sets for patients with IUCs.

CONCLUSIONS

In summary, an educational intervention emphasizing the appropriate evaluation of patients with IUCs was effective in reducing the rates of CAUTIs in our medical center.

Challenges with defining pyuria

Recommendations for practice

39

Discussion

PRESENT

Are the results explained in relationship to the theoretical framework, research questions, and the significance to nursing? **Yes**

Limitations

Partial

Are the limitations presented and their implications discussed?

Partially

Conclusion

PRESENT

Are there recommendations for nursing practice, future research, and policy makers?

Yes

Overview

Strengths

Intervention clearly described

Figure provided visualization of the data

Weaknesses

Methods and data collection not detailed

Literature review and analysis could have been stronger
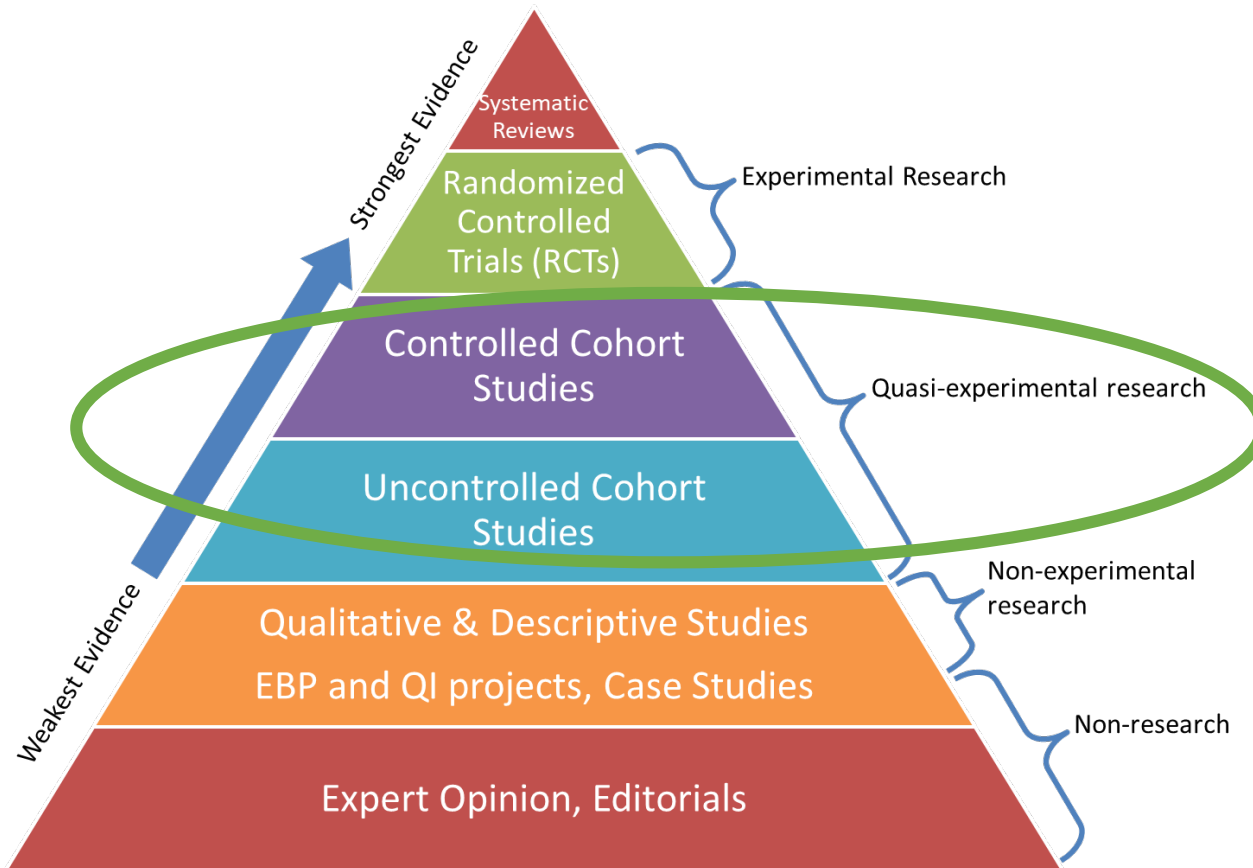
Limitations of methods not provided

Overview

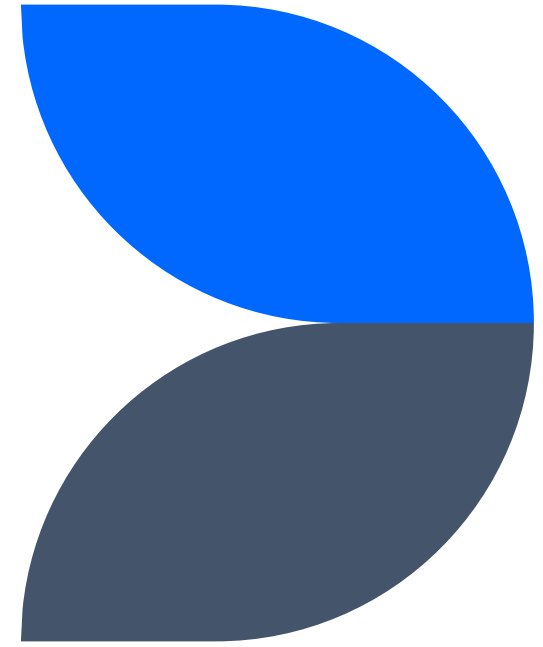| Question	Present	Partially Present	Absent	N/A
Title	X			
Abstract	X			
Introduction	X			
Problem Statement	X			
Purpose	X			
Research question(s)				X
Theoretical framework				X
Literature review		X		
Methods			X	
Analysis		X		
Results	X			
Discussion	X			
Limitations		X		
Conclusion	X			

Level

2 - (quasi-experimental, pre/post study)

Quality

B - Overall good paper, but missing some key components

Can you use the results and recommendations in your practice?

Matrix Summary

Author, Title, Year	Setting	Intervention	Findings	Lvl/Quality
Awoyomi et al., Reduction in catheter-associated urinary tract infections following a diagnostic stewardship intervention, 2024	NYC Health + Hospitals/ Kings county; academically affiliated hospital 5 general medical wards	Protocol implemented: (1) IUC replaced before sending urinary studies if in >14 days (2) sending a UA first (3) sending culture only if UA and clinical scenario suggested a UTI Pending cultures reviewed 5d/wk with mediation	Pre:16mo; Post: 12mo CAUTIs decreased from rate of 3.0 to 0.94, p=.03 38 mediations; 20 resulted in culture being discontinued	2B
Reynolds et al., Sustained reduction in CAUTIs using multi-faceted strategies led by champions: A quality improvement initiative, 2021	Quaternary academic teaching hospital in US Southeast	Champions, cognitive aids, printed education materials, educational outreach visits, real-time feedback	Pre: 24mo; Post: 48mo CAUTI decreased, p=.16 Culture rates decreased, p<.01 ICU utilization decreased, p<.01	2A

Thank you

Staci S. Reynolds

Staci.Reynolds@duke.edu

References

Awoyomi, O., Wang, Y., Bakare, T., Bardbury, A., Episcopia, B., Castro-Auvet, P., Fornek, M., & Quale, J. (2024). Reduction in catheter-associated urinary tract infections following a diagnostic stewardship intervention. *American Journal of Infection Control, 52*(2024), 255-257. https://doi.org/10.1016/j.ajic.2023.09.020

Melnyk, B.M. & Fineout-Overholt, E. (2023). Evidence-based practice in nursing and healthcare: a guide to best practice (5th ed.). Philadelphia, PA: Wolters Kluwer Health.

8515 GEORGIA AVENUE, SUITE 400
SILVER SPRING, MARYLAND 20910-3492
301 628-5000 • FAX 301 628-5001
www.NursingWorld.org

KAREN A. DALEY, PhD, MPH, RN, FAAN
PRESIDENT

MARLA J. WESTON, PhD, RN
CHIEF EXECUTIVE OFFICER

Framework for How to Read and Critique a Research Study

1. Critiquing the research article
   a. Title – Does it accurately describe the article?
   b. Abstract – Is it representative of the article?
   c. Introduction – Does it make the purpose of the article clear?
   d. Statement of the problem – Is the problem properly introduced?
   e. Purpose of the study – Has the reason for conducting the research been explained?
   f. Research question(s) – Is/are the research question(s) clearly defined and if not, should they be?
   g. Theoretical framework – Is the theoretical framework described? If there is not a theoretical framework, should there be?
   h. Literature review – Is the literature review relevant to the study, comprehensive, and include recent research? Does the literature review support the need for the study?
   i. Methods – Is the design appropriate for the study? Does the sample fit with the research design and is the size sufficient? Was a data collection instrument needed? How were data collected? Were reliability and validity accounted for?
   j. Analysis – Is the analytical approach consistent with the study questions and research design?
   k. Results – Are the results presented clearly in the text, tables and figures? Are the statistics clearly explained?
   l. Discussion - Are the results explained in relationship to the theoretical framework, research questions, and the significance to nursing?
   m. Limitations – Are the limitations presented and their implications discussed?
   n. Conclusion – Are there recommendations for nursing practice, future research, and policymakers?
2. Determine the level and quality of the evidence using a scale (several can be found in ANA's Research Toolkit www.nursingworld.org/Research-Toolkit/Appraising-the-Evidence)
3. Decide if the study is applicable to your practice
   a. *Can you use the results and recommendations in your practice?*

Prepared by Louise Kaplan, PhD, ARNP, FNP-BC, FAANP
Senior Policy Fellow, Department of Nursing Practice and Policy
Louise.kaplan@ana.org