Prepare for the New Hospital-Onset Bacteremia and Fungemia (HOB) Measure!

Step 1: Reduce CAUTIs

Tim Kelly, MS, MBA
Senior Director Health Economics and Outcomes Research
BD Urology and Critical Care, Atlanta, Georgia

APIC - Grand Canyon Chapter Meeting
March 28, 2025

BD-133830

Relevant Financial Disclosures

- Tim Kelly is an employee and shareholder of Becton Dickinson and Company (BD)

Key Research Covered This Evening

Infection Control & Hospital Epidemiology (2023), 1–7
doi:10.1017/ice.2023.132

SHEA

Original Article

Characteristics, costs, and outcomes associated with central-line–associated bloodstream infection and hospital-onset bacteremia and fungemia in US hospitals

Kalvin C. Yu MD, Molly Jung PhD and ChinEn Ai MPH
Becton, Dickinson and Company, Franklin Lakes, New Jersey

Abstract

Objectives: To compare characteristics and outcomes associated with central-line–associated bloodstream infections (CLABSIs) and electronic health record–determined hospital-onset bacteremia and fungemia (HOB) cases in hospitalized US adults.

Methods: We conducted a retrospective observational study of patients in 41 acute-care hospitals. CLABSI cases were defined as those reported to the National Healthcare Safety Network (NHSN). HOB was defined as a positive blood culture with an eligible bloodstream organism collected during the hospital-onset period (ie, on or after day 4). We evaluated patient characteristics, other positive cultures (urine, respiratory, or skin and soft-tissue), and microorganisms in a cross-sectional analysis cohort. We explored adjusted patient outcomes [length of stay (LOS), hospital cost, and mortality] in a 1:5 case-matched cohort.

Results: The cross-sectional analysis included 403 patients with NHSN-reportable CLABSIs and 1,574 with non-CLABSI HOB. A positive non-bloodstream culture with the same microorganism as in the bloodstream was reported in 9.2% of CLABSI patients and 32.0% of non-CLABSI HOB patients, most commonly urine or respiratory cultures. Coagulase-negative staphylococci and Enterobacteriaceae were the most common microorganisms in CLABSI and non-CLABSI HOB cases, respectively. In case-matched analyses, CLABSIs and non-CLABSI HOB, separately or combined, were associated with significantly longer LOS [difference, 12.1–17.4 days depending on intensive care unit (ICU) status], higher costs (by $25,207–$55,001 per admission), and a >3.5-fold increased risk of mortality in patients with an ICU encounter.

Conclusions: CLABSI and non-CLABSI HOB cases are associated with significant increases in morbidity, mortality, and cost. Our data may help inform prevention and management of bloodstream infections.

(Received 6 April 2023; accepted 23 May 2023)

Hospital-onset bloodstream infections (BSIs) can compromise patient health and increase the burden on healthcare systems.[1,2] Improvement in rates of central-line–associated BSIs (CLABSIs) reportable to the National Healthcare Safety Network (NHSN) of the Centers for Disease Control and Prevention (CDC) has inspired reporting to move beyond infections with a central line and a positive culture for an eligible BSI pathogen not related to an infection at another site.[3] More importantly, concerns about the reliability of CLABSI designations and recognition that CLABSIs account for only a small proportion of hospital-onset BSIs have led to the proposed hospital-onset bacteremia and fungemia (HOB) quality metric.[4–6] This suggestion passed the National Quality Forum (NQF) Patient Safety Committee review in early 2023 and is being considered by the Centers for Medicare & Medicaid Services (CMS) as a reportable metric.[7] In addition to providing a more inclusive measure of hospital BSI sources, an HOB metric could be standardized and risk-adjusted using the electronic health record (EHR), thereby eliminating the subjectivity associated with central-line attributions.[8]

Although some studies have explored costs associated with CLABSIs,[2,9] less is known about the impact of non-CLABSI HOB on hospital outcomes. In this study, we analyzed characteristics, related positive non-blood-culture sites, costs, and patient outcomes associated with CLABSI, non-CLABSI HOB, and all HOB in US hospitals.

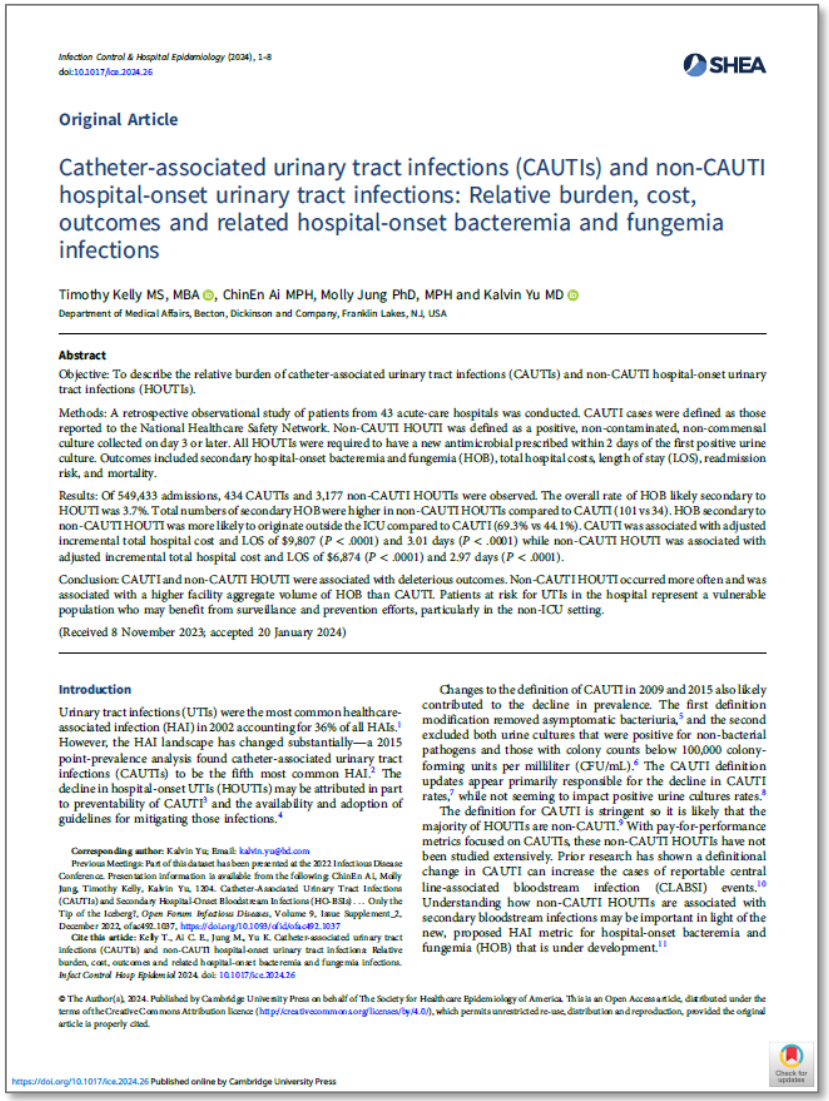
Methods

Study design and population

We conducted a retrospective observational study of patients in 41 acute-care hospitals in the BD Insights Research and Database (Becton, Dickinson and Company, Franklin Lakes, NJ), which contains electronically captured data encompassing pharmacy, laboratory, administrative data, patient demographics, and admission, discharge, and transfer data feeds.[8,10–12] The distribution of hospitals in this database is similar to the hospital distribution in the United States as a whole.[12] Included patients were aged ≥18 years and had been admitted between October 2015

Corresponding author: Kalvin C. Yu; Email: Kalvin.Yu@bd.com
Cite this article: Yu KC, Jung M, Ai CE. Characteristics, costs, and outcomes associated with central-line–associated bloodstream infection and hospital-onset bacteremia and fungemia in US hospitals. *Infect Control Hosp Epidemiol* 2023. doi: 10.1017/ice.2023.132

https://doi.org/10.1017/ice.2023.132 Published online by Cambridge University Press



Infection Control & Hospital Epidemiology (2024), 1–8
doi:10.1017/ice.2024.26

SHEA

Original Article

Catheter-associated urinary tract infections (CAUTIs) and non-CAUTI hospital-onset urinary tract infections: Relative burden, cost, outcomes and related hospital-onset bacteremia and fungemia infections

Timothy Kelly MS, MBA, ChinEn Ai MPH, Molly Jung PhD, MPH and Kalvin Yu MD
Department of Medical Affairs, Becton, Dickinson and Company, Franklin Lakes, NJ, USA

Abstract

Objective: To describe the relative burden of catheter-associated urinary tract infections (CAUTIs) and non-CAUTI hospital-onset urinary tract infections (HOUTIs).

Methods: A retrospective observational study of patients from 43 acute-care hospitals was conducted. CAUTI cases were defined as those reported to the National Healthcare Safety Network. Non-CAUTI HOUTI was defined as a positive, non-contaminated, non-commensal culture collected on day 3 or later. All HOUTIs were required to have a new antimicrobial prescribed within 2 days of the first positive urine culture. Outcomes included secondary hospital-onset bacteremia and fungemia (HOB), total hospital costs, length of stay (LOS), readmission risk, and mortality.

Results: Of 549,433 admissions, 434 CAUTIs and 3,177 non-CAUTI HOUTIs were observed. The overall rate of HOB likely secondary to HOUTI was 3.7%. Total numbers of secondary HOB were higher in non-CAUTI HOUTIs compared to CAUTI (101 vs 34). HOB secondary to non-CAUTI HOUTI was more likely to originate outside the ICU compared to CAUTI (69.3% vs 44.1%). CAUTI was associated with adjusted incremental total hospital cost and LOS of $9,807 ($P < .0001$) and 3.01 days ($P < .0001$) while non-CAUTI HOUTI was associated with adjusted incremental total hospital cost and LOS of $6,874 ($P < .0001$) and 2.97 days ($P < .0001$).

Conclusion: CAUTI and non-CAUTI HOUTI were associated with deleterious outcomes. Non-CAUTI HOUTI occurred more often and was associated with a higher facility aggregate volume of HOB than CAUTI. Patients at risk for UTIs in the hospital represent a vulnerable population who may benefit from surveillance and prevention efforts, particularly in the non-ICU setting.

(Received 8 November 2023; accepted 20 January 2024)

Introduction

Urinary tract infections (UTIs) were the most common healthcare-associated infection (HAI) in 2002 accounting for 36% of all HAIs.[1] However, the HAI landscape has changed substantially—a 2015 point-prevalence analysis found catheter-associated urinary tract infections (CAUTIs) to be the fifth most common HAI.[4] The decline in hospital-onset UTIs (HOUTIs) may be attributed in part to preventability of CAUTI[5] and the availability and adoption of guidelines for mitigating those infections.[4]

Changes to the definition of CAUTI in 2009 and 2015 also likely contributed to the decline in prevalence. The first definition modification removed asymptomatic bacteriuria,[6] and the second excluded both urine cultures that were positive for non-bacterial pathogens and those with colony counts below 100,000 colony-forming units per milliliter (CFU/mL).[6] The CAUTI definition updates appear primarily responsible for the decline in CAUTI rates,[7] while not seeming to impact positive urine cultures rates.[8]

The definition for CAUTI is stringent so it is likely that the majority of HOUTIs are non-CAUTI.[9] With pay-for-performance metrics focused on CAUTIs, these non-CAUTI HOUTIs have not been studied extensively. Prior research has shown a definitional change in CAUTI can increase the cases of reportable central line-associated bloodstream infection (CLABSI) events.[10] Understanding how non-CAUTI HOUTIs are associated with secondary bloodstream infections may be important in light of the new, proposed HAI metric for hospital-onset bacteremia and fungemia (HOB) that is under development.[11]

Corresponding author: Kalvin Yu; Email: kalvin.yu@bd.com
Previous Meetings: Part of this dataset has been presented at the 2022 Infectious Disease Conference. Presentation information is available from the following: ChinEn Ai, Molly Jung, Timothy Kelly, Kalvin Yu, 1204. Catheter-Associated Urinary Tract Infections (CAUTIs) and Secondary Hospital-Onset Bloodstream Infections (HO-BSIs) … Only the Tip of the Iceberg?, *Open Forum Infectious Diseases*, Volume 9, Issue Supplement_2, December 2022, ofac492.1037, https://doi.org/10.1093/ofid/ofac492.1037

Cite this article: Kelly T., Ai C. E., Jung M., Yu K. Catheter-associated urinary tract infections (CAUTIs) and non-CAUTI hospital-onset urinary tract infections: Relative burden, cost, outcomes and related hospital-onset bacteremia and fungemia infections. *Infect Control Hosp Epidemiol* 2024. doi: 10.1017/ice.2024.26

https://doi.org/10.1017/ice.2024.26 Published online by Cambridge University Press

[1]Yu KC, Jung M, Ai C. *Infect Control Hosp Epidemiol*. 2023;44(12): 1920-1926.

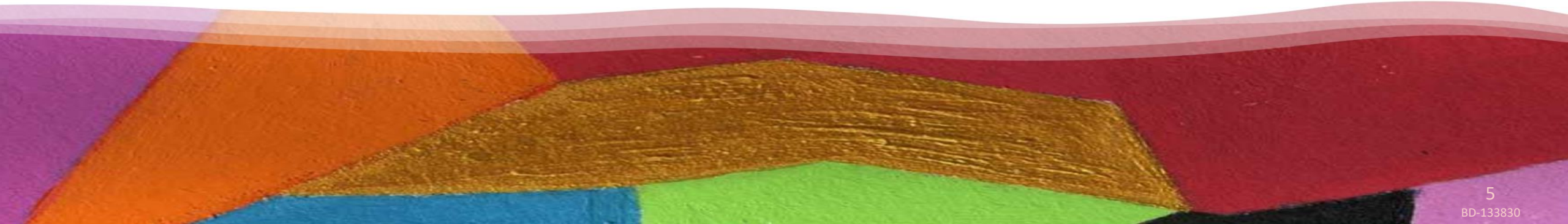
[2]Kelly T, Ai C, Jung M, Yu K. *Infect Control Hosp Epidemiol*. Published online February 20, 2024.

Learning Objectives

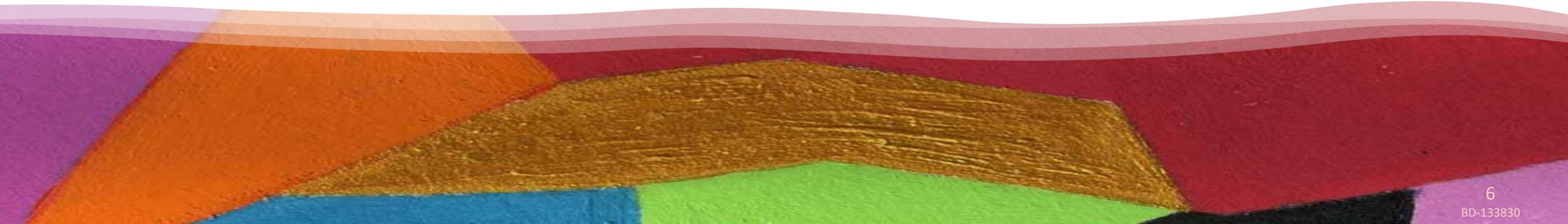
- Evaluate the relative contribution of both catheter-associated urinary tract infections (CAUTIs) and non-CAUTI hospital-onset UTIs (non-CAUTI HOUTIs) to hospital-onset bacteremia & fungemia (HOB)
- Identify current guidance for CAUTI and non-CAUTI HOUTI prevention
- Describe background of the emerging digital quality measure (dQM)* for HOB

*Also defined as an electronic clinical quality measure (eCQM)

Any processes or interventions that have been particularly unique or impactful toward reducing CAUTIs in your organization?



Have you heard about a new Digital Quality Measure (dQM) for HOB?

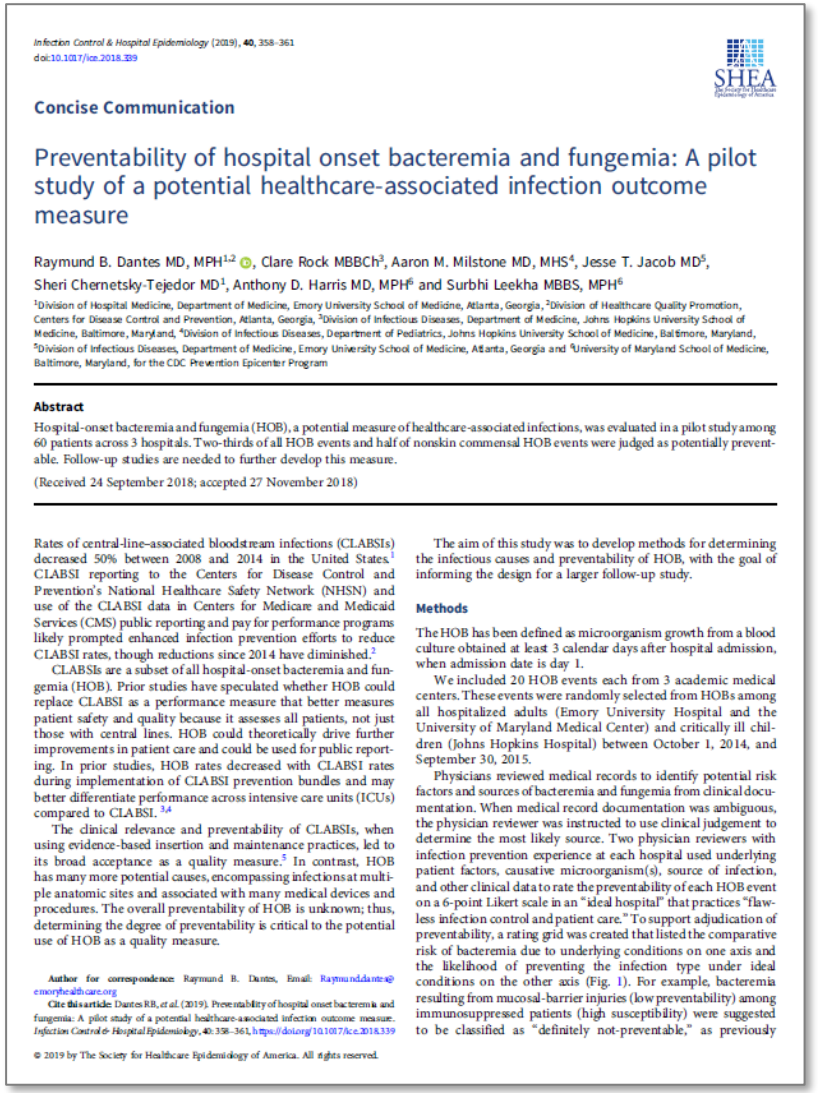


There is a Plan to Measure HOB

- This measure has been under development for a while.
  - A small study in 3 hospitals in 2014 and 2015 judged approximately two-thirds of all HOB events to be potentially preventable. (Dantes. 2019)[3]

"Prior studies have speculated whether HOB could replace CLABSI as a performance measure that better measures patient safety and quality because it assesses all patients, not just those with central lines."

(Dantes. 2019)[3]



Infection Control & Hospital Epidemiology (2019), **40**, 358–361
doi:10.1017/ice.2018.339

SHEA

Concise Communication

Preventability of hospital onset bacteremia and fungemia: A pilot study of a potential healthcare-associated infection outcome measure

Raymund B. Dantes MD, MPH[1,2], Clare Rock MBBCh[3], Aaron M. Milstone MD, MHS[4], Jesse T. Jacob MD[5], Sheri Chernetsky-Tejedor MD[1], Anthony D. Harris MD, MPH[6] and Surbhi Leekha MBBS, MPH[6]

[1]Division of Hospital Medicine, Department of Medicine, Emory University School of Medicine, Atlanta, Georgia, [2]Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, Georgia, [3]Division of Infectious Diseases, Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, Maryland, [4]Division of Infectious Diseases, Department of Pediatrics, Johns Hopkins University School of Medicine, Baltimore, Maryland, [5]Division of Infectious Diseases, Department of Medicine, Emory University School of Medicine, Atlanta, Georgia and [6]University of Maryland School of Medicine, Baltimore, Maryland, for the CDC Prevention Epicenter Program

Abstract

Hospital-onset bacteremia and fungemia (HOB), a potential measure of healthcare-associated infections, was evaluated in a pilot study among 60 patients across 3 hospitals. Two-thirds of all HOB events and half of nonskin commensal HOB events were judged as potentially preventable. Follow-up studies are needed to further develop this measure.

(Received 24 September 2018; accepted 27 November 2018)

Rates of central-line–associated bloodstream infections (CLABSIs) decreased 50% between 2008 and 2014 in the United States.[1] CLABSI reporting to the Centers for Disease Control and Prevention's National Healthcare Safety Network (NHSN) and use of the CLABSI data in Centers for Medicare and Medicaid Services (CMS) public reporting and pay for performance programs likely prompted enhanced infection prevention efforts to reduce CLABSI rates, though reductions since 2014 have diminished.[2]

CLABSIs are a subset of all hospital-onset bacteremia and fungemia (HOB). Prior studies have speculated whether HOB could replace CLABSI as a performance measure that better measures patient safety and quality because it assesses all patients, not just those with central lines. HOB could theoretically drive further improvements in patient care and could be used for public reporting. In prior studies, HOB rates decreased with CLABSI rates during implementation of CLABSI prevention bundles and may better differentiate performance across intensive care units (ICUs) compared to CLABSI.[3,4]

The clinical relevance and preventability of CLABSIs, when using evidence-based insertion and maintenance practices, led to its broad acceptance as a quality measure.[5] In contrast, HOB has many more potential causes, encompassing infections at multiple anatomic sites and associated with many medical devices and procedures. The overall preventability of HOB is unknown; thus, determining the degree of preventability is critical to the potential use of HOB as a quality measure.

The aim of this study was to develop methods for determining the infectious causes and preventability of HOB, with the goal of informing the design for a larger follow-up study.

Methods

The HOB has been defined as microorganism growth from a blood culture obtained at least 3 calendar days after hospital admission, when admission date is day 1.

We included 20 HOB events each from 3 academic medical centers. These events were randomly selected from HOBs among all hospitalized adults (Emory University Hospital and the University of Maryland Medical Center) and critically ill children (Johns Hopkins Hospital) between October 1, 2014, and September 30, 2015.

Physicians reviewed medical records to identify potential risk factors and sources of bacteremia and fungemia from clinical documentation. When medical record documentation was ambiguous, the physician reviewer was instructed to use clinical judgement to determine the most likely source. Two physician reviewers with infection prevention experience at each hospital used underlying patient factors, causative microorganism(s), source of infection, and other clinical data to rate the preventability of each HOB event on a 6-point Likert scale in an "ideal hospital" that practices "flawless infection control and patient care." To support adjudication of preventability, a rating grid was created that listed the comparative risk of bacteremia due to underlying conditions on one axis and the likelihood of preventing the infection type under ideal conditions on the other axis (Fig. 1). For example, bacteremia resulting from mucosal-barrier injuries (low preventability) among immunosuppressed patients (high susceptibility) were suggested to be classified as "definitely not-preventable," as previously

Author for correspondence: Raymund B. Dantes, Email: Raymund.dantes@emoryhealthcare.org

Cite this article: Dantes RB, *et al.* (2019). Preventability of hospital onset bacteremia and fungemia: A pilot study of a potential healthcare-associated infection outcome measure. *Infection Control & Hospital Epidemiology*, 40: 358–361, https://doi.org/10.1017/ice.2018.339

Implications

- "We seek to adopt patient safety focused electronic clinical quality measures (eCQMs) to strengthen the growing portfolio of eCQMs and promote further alignment across quality reporting and value-based purchasing programs. Adoption of eCQMs in the HAC Reduction Program...

  …In the FY 2023 IPPS/LTCH PPS final rule (87 FR 49136), we described the Request for Comment (RFC) on the potential future adoption of the digital NHSN Hospital-Onset Bacteremia & Fungemia Outcome measure." (Federal Register. 2023)[4]

- "By focusing on a broader metric of severe infections in the hospital, HOB can capture multiple disease processes with the potential to have a greater impact on overall patient care." (Howard-Anderson. 2024)[5]

Annals of Internal Medicine

IDEAS AND OPINIONS

Moving Beyond Central Line–Associated Bloodstream Infections

Jessica Howard-Anderson, MD, MSc; and Daniel J. Morgan, MD, MS

Central line–associated bloodstream infection (CLABSI) has been a quality metric since 1990 (1). It was among the first metrics to be publicly reported and tied to hospital reimbursement (1, 2). As a quality metric, CLABSI surveillance has been successful and CLABSI rates in the United States decreased nearly 50% between 2008 and 2018 (3).

However, CLABSI surveillance is a notoriously laborious process, requiring up to 17 hours per week of infection preventionist time reviewing charts (4). Other problems include that rates of CLABSI in many health care facilities are now too low to distinguish quality of care between facilities (4) and CLABSI and other current publicly reported health care–associated infection metrics are seen as being frequently manipulated and poorly understood by the general public (5).

Because of these limitations, a new but similar metric has been developed with broad implications for how we use and report hospital quality metrics. The Centers for Disease Control and Prevention (CDC) will add a health care–associated infection metric called HOB, for "hospital-onset bacteremia and fungemia" (2). This measure was endorsed by the National Quality Forum in July 2023, is included in CDC's National Healthcare Safety Networks 2024 training (www.cdc.gov/nhsn/pdfs/training/nhsn-training-agenda-508.pdf), and will likely be added to voluntary reporting later in 2024. The CDC will not require hospital-onset bacteremia to be publicly reported or linked to reimbursement, although this could be implemented by regulatory agencies in the future. The new hospital-onset bacteremia measure is expected to be more objective, being defined as any blood culture growing pathogenic bacteria or fungi collected after 3 days in the hospital. Patients who are at high risk for nonpreventable hospital-onset bacteremia will likely be excluded (such as those with a hematologic malignancy receiving chemotherapy, in whom bacteremia is most often due to gut translocation). Importantly, this measure does not require manual chart review by clinicians, which will minimize manipulation and may increase confidence in this measure for both health care workers and the public. While we are optimistic that eliminating manual chart review will reduce the burden of data collection, challenges remain. Infection prevention staff will now need to develop processes for reviewing these automated data, including determining which bloodstream infections represent preventable harm and which interventions are likely to be effective.

Because of its simplicity, this metric will be among the first metrics collected exclusively by automated data transfer from hospitals to the CDC. Fully automated data transfer is a paradigm shift that could transform reporting of health care–associated infections and other metrics. Data to calculate hospital-onset bacteremia will be automatically transferred from individual facilities to the CDC using Fast Health Interoperable Resource (FHIR). A FHIR database can rapidly and securely transfer large amounts of data from any electronic health record (2). However, questions remain about the ability of all U.S. hospitals to provide these data, raising issues around hospital equity. Centers for Medicare & Medicaid Services has emphasized the importance of FHIR and is also prioritizing a transition to fully digital quality metrics using electronic data (2).

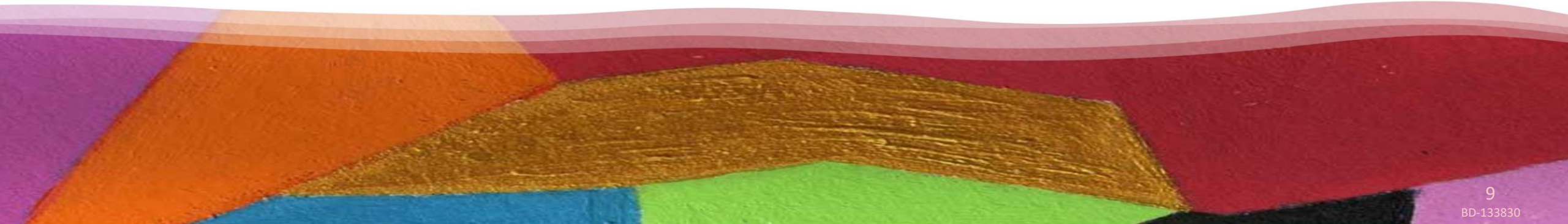
Monitoring all hospital-onset bacteremia may be a more meaningful measure of severe infections. In the largest study of hospital-onset bacteremia to date, infectious disease clinicians reviewed 1780 cases of hospital-onset bacteremia and identified a wide range of sources for the bacteremia, many that were not associated with indwelling medical devices (and would therefore not be identified with current metrics) (6). Patients who develop bacteremia in the hospital die 15% to 30% of the time, regardless of whether the bacteremia comes from a medical device (7). Hospital-onset bacteremia can also better discriminate between health care facilities. In 2016, Rock and colleagues (4) demonstrated that hospital-onset bacteremia occurred more frequently than CLABSI in intensive care units and that measuring hospital-onset bacteremia allowed for better identification of high-performing units.

A focus on all hospital-onset bacteremia also raises the question of risk adjustment to ensure that hospitals are being compared equally. Direct data transfer from electronic health record to CDC will allow for patient-level risk adjustment, which previously could only be performed at the facility level (for example, number of beds per facility). Data on individual patient risk factors including comorbid conditions (for example, diabetes) could then be used to adjust an individual's risk for developing bacteremia, which would be an advancement in risk adjustment for quality metrics.

The new hospital-onset bacteremia metric has the potential to replace other health care–associated infection metrics. Within a few years, hospital-onset bacteremia will likely replace the methicillin-resistant *Staphylococcus aureus* bacteremia metric, as this would become a subset of all hospital-onset bacteremia. With experience reporting hospital-onset bacteremia and comparing it with other health care–associated infection metrics, we believe it could potentially replace CLABSI and other metrics, including catheter-associated urinary tract infections, surgical site infections, and infection-related ventilator-

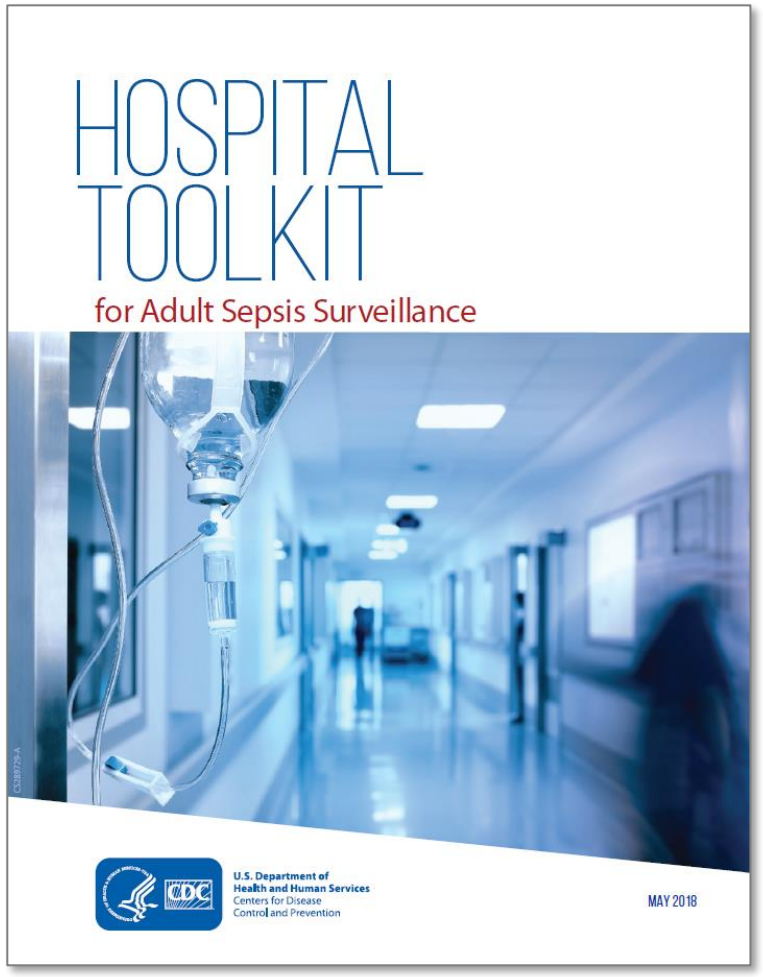
This article was published at Annals.org on 21 May 2024.

What is the connection between HOB and CAUTI?



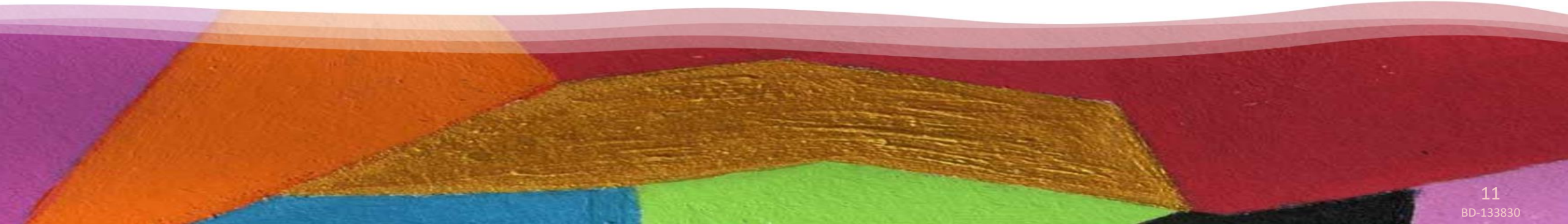
Bloodstream Infections

- **17%** of hospital-acquired bacteremias are from a urinary source (CDC. 2015)[6]
  - Associated mortality is approximately **10%** (CDC. 2015)[6]
- **20%-30%** of sepsis cases originate from the urogenital tract (Wagenlehner. 2007)[7]
  - Associated mortality is **20%-40%** (Ryan. 2021)[8]

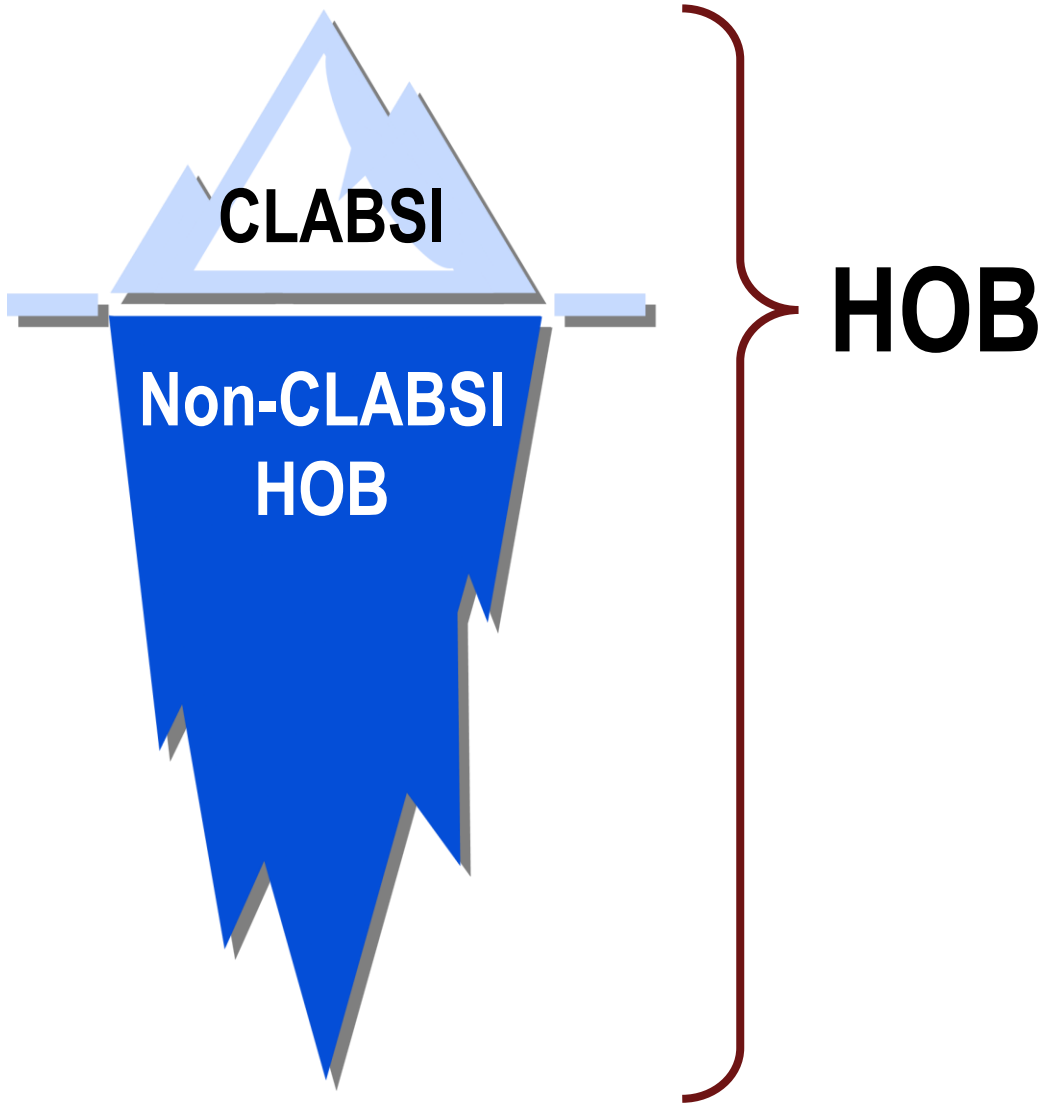


Hospital Toolkit for Adult Sepsis Surveillance. Centers for Disease Control and Prevention. Updated May 2018. Accessed Jan. 14, 2025. https://www.cdc.gov/sepsis/pdfs/sepsis-surveillance-toolkit-mar-2018_508.pdf

Measure vs. the Problem Conundrum with HOB



HAC Measure – CLABSI



HAC: Hospital-Acquired Condition

CLABSI: Central Line-Associated Bloodstream Infection

HOB: Hospital-onset Bacteremia and Fungemia

HAC Measure – CLABSI

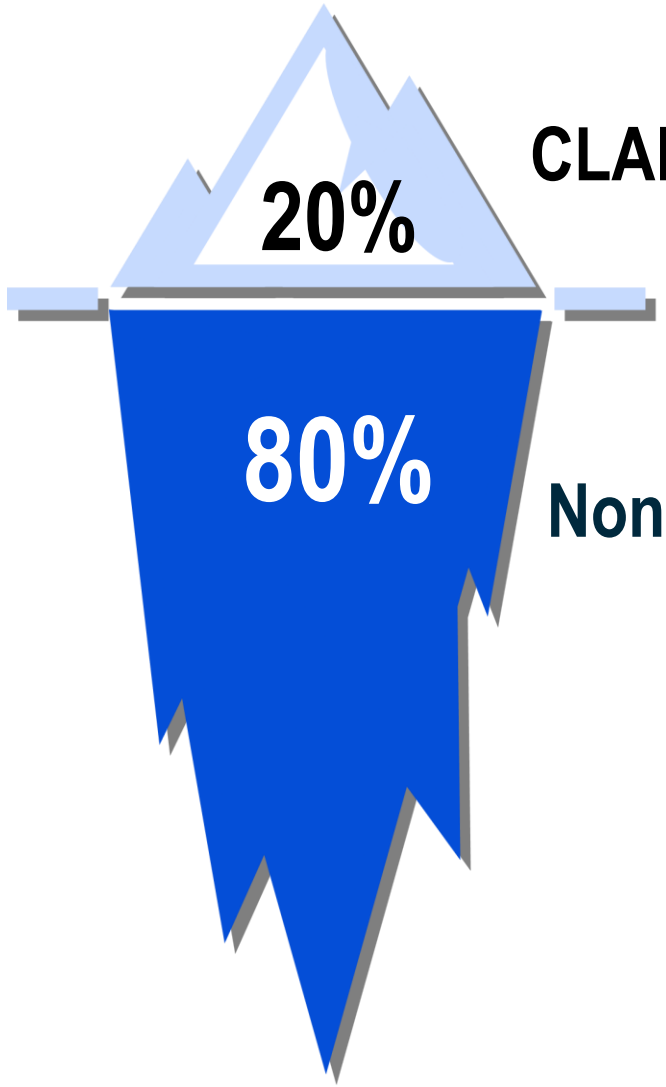
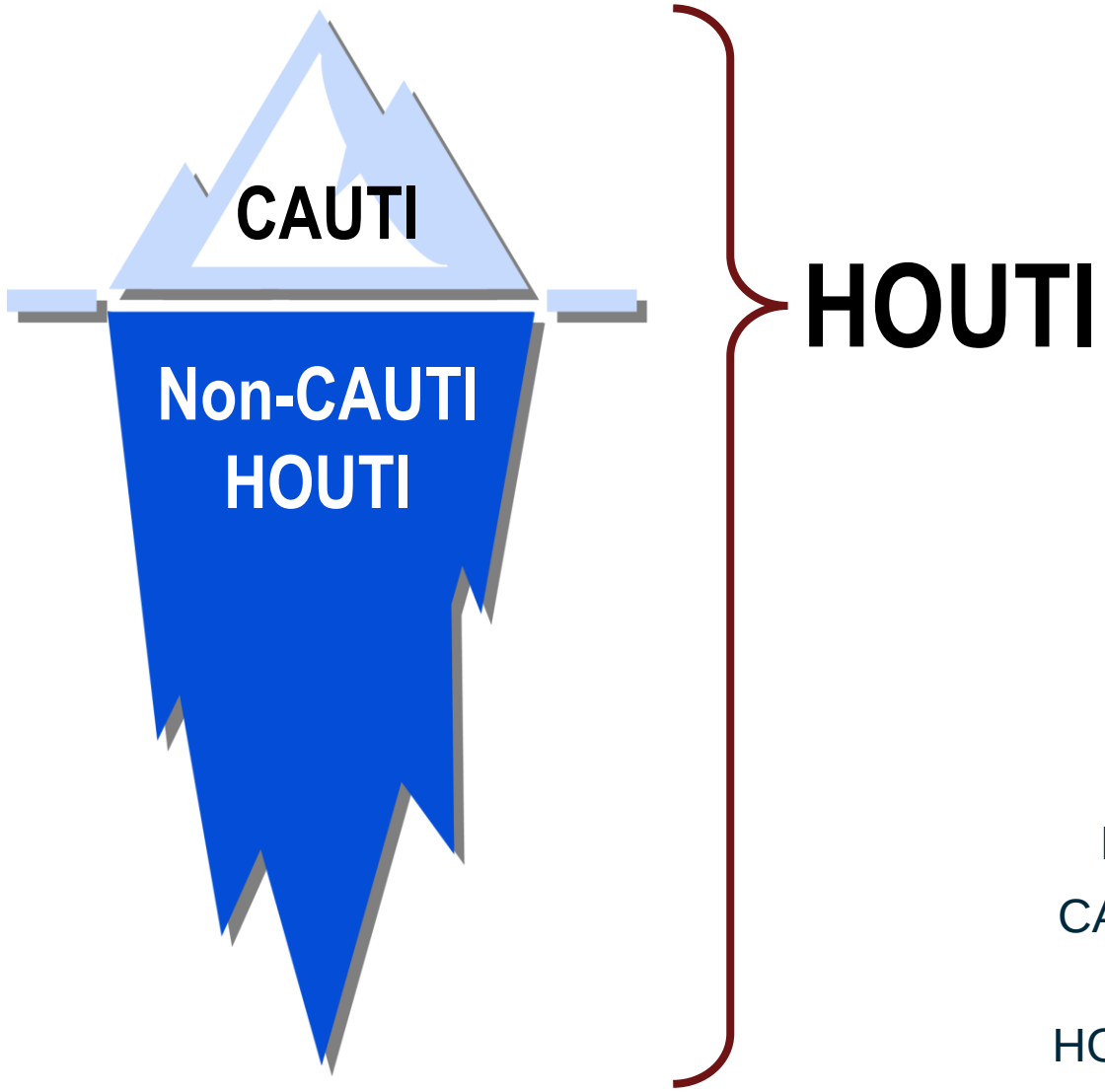


Table 2. Association of HOB With Other Positive Cultures From Specified Sites as Determined by Identification of the Same Microorganism From Both Sources

Culture Site	CLABSI (N=403), No. (%)	Non-CLABSI HOB (N=1,574), No. (%)	All HOB including CLABSI (N=1,977), No. (%)
None of the below	366 (90.8)	1,070 (68.0)	1,436 (72.6)
Urine only	19 (4.7)	200 (12.7)	219 (11.1)
Respiratory only	11 (2.7)	163 (10.4)	174 (8.8)
Skin/soft tissue only	5 (1.2)	93 (5.9)	98 (5.0)
Urine and respiratory	0	19 (1.2)	19 (1.0)
Skin/soft tissue and respiratory	0	15 (1.0)	15 (0.8)
Urine and skin/soft tissue	2 (0.5)	10 (0.6)	12 (0.6)
Urine, skin/soft tissue, and respiratory	0	4 (0.3)	4 (0.2)

(Yu. 2023)[1]

HAC Measure – CAUTI

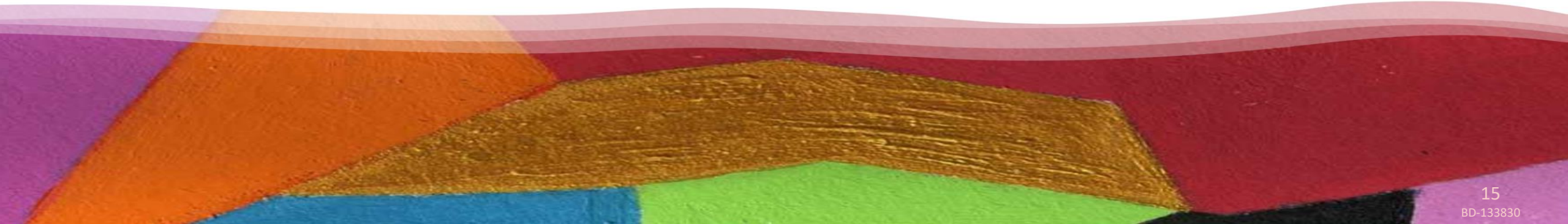


HAC: Hospital-Acquired Condition

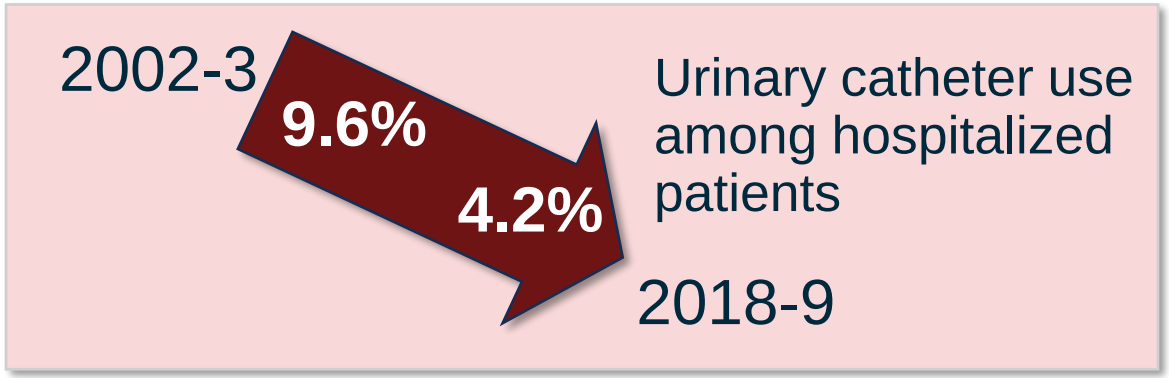
CAUTI: Catheter-Associated Urinary Tract Infection

HOUTI: Hospital-onset Urinary Tract Infection

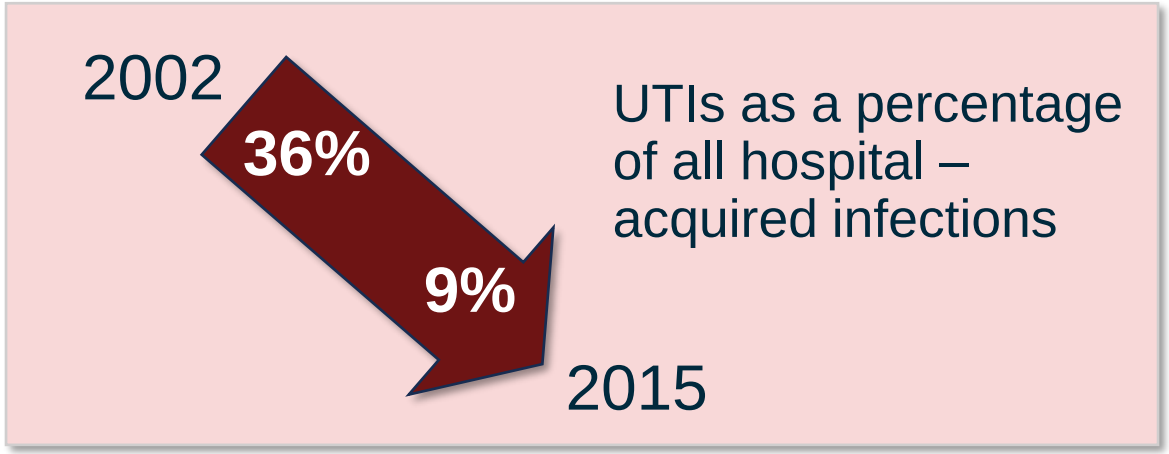
What is a Non-CAUTI HOUTI and why should we care about them and HOB?



- A lot more patients got a catheter (Dickerson Mayes. 2022)[9]

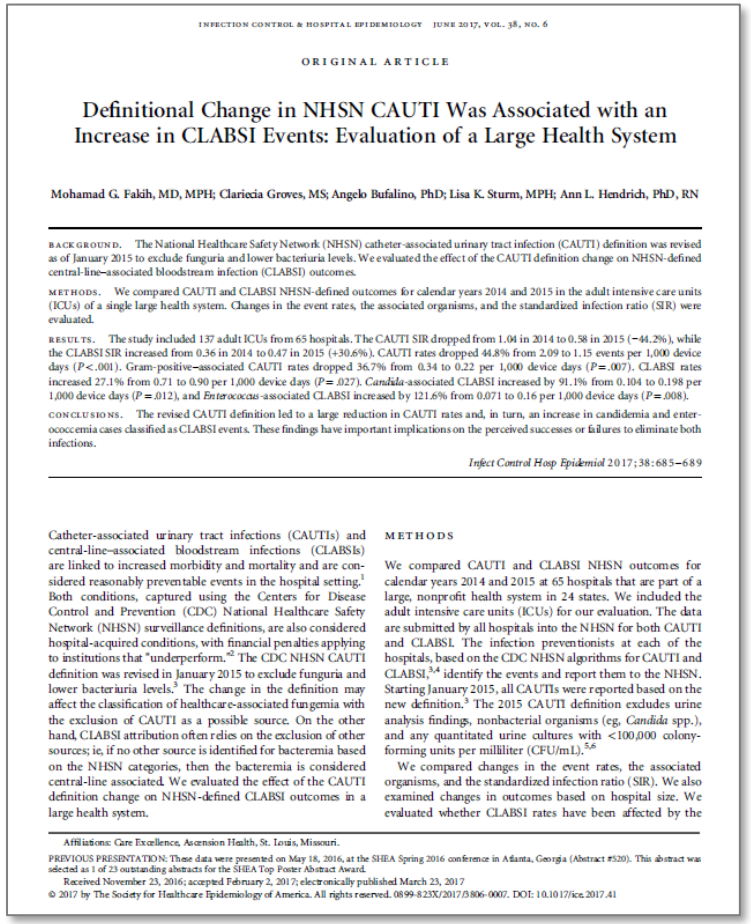


- A lot more patients got a CAUTI (Klevens. 2002)[10] (Magill. 2018)[11]



CAUTI and CLABSI – Experience of a Large Nonprofit Health System

- 65 hospitals
- Compared CAUTI and CLABSI rates before and after the revised National Healthcare Safety Network (NHSN) CAUTI definition in 2015. The revised definition:
  - Excluded nonbacterial pathogens
  - Excluded cultures with colony counts below 10^4 CFU/ml



INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY JUNE 2017, VOL. 38, NO. 6

ORIGINAL ARTICLE

Definitional Change in NHSN CAUTI Was Associated with an Increase in CLABSI Events: Evaluation of a Large Health System

Mohamad G. Fakih, MD, MPH; Clariecia Groves, MS; Angelo Bufalino, PhD; Lisa K. Sturm, MPH; Ann L. Hendrich, PhD, RN

BACKGROUND. The National Healthcare Safety Network (NHSN) catheter-associated urinary tract infection (CAUTI) definition was revised as of January 2015 to exclude funguria and lower bacteriuria levels. We evaluated the effect of the CAUTI definition change on NHSN-defined central-line–associated bloodstream infection (CLABSI) outcomes.

METHODS. We compared CAUTI and CLABSI NHSN-defined outcomes for calendar years 2014 and 2015 in the adult intensive care units (ICUs) of a single large health system. Changes in the event rates, the associated organisms, and the standardized infection ratio (SIR) were evaluated.

RESULTS. The study included 137 adult ICUs from 65 hospitals. The CAUTI SIR dropped from 1.04 in 2014 to 0.58 in 2015 (−44.2%), while the CLABSI SIR increased from 0.36 in 2014 to 0.47 in 2015 (+30.6%). CAUTI rates dropped 44.8% from 2.09 to 1.15 events per 1,000 device days ($P<.001$). Gram-positive–associated CAUTI rates dropped 36.7% from 0.34 to 0.22 per 1,000 device days ($P=.007$). CLABSI rates increased 27.1% from 0.71 to 0.90 per 1,000 device days ($P=.027$). *Candida*-associated CLABSI increased by 91.1% from 0.104 to 0.198 per 1,000 device days ($P=.012$), and *Enterococcus*-associated CLABSI increased by 121.6% from 0.071 to 0.16 per 1,000 device days ($P=.008$).

CONCLUSIONS. The revised CAUTI definition led to a large reduction in CAUTI rates and, in turn, an increase in candidemia and enterococcemia cases classified as CLABSI events. These findings have important implications on the perceived successes or failures to eliminate both infections.

Infect Control Hosp Epidemiol 2017;38:685–689

Catheter-associated urinary tract infections (CAUTIs) and central-line–associated bloodstream infections (CLABSIs) are linked to increased morbidity and mortality and are considered reasonably preventable events in the hospital setting.[1] Both conditions, captured using the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) surveillance definitions, are also considered hospital-acquired conditions, with financial penalties applying to institutions that "underperform."[2] The CDC NHSN CAUTI definition was revised in January 2015 to exclude funguria and lower bacteriuria levels.[3] The change in the definition may affect the classification of healthcare-associated fungemia with the exclusion of CAUTI as a possible source. On the other hand, CLABSI attribution often relies on the exclusion of other sources; ie, if no other source is identified for bacteremia based on the NHSN categories, then the bacteremia is considered central-line associated. We evaluated the effect of the CAUTI definition change on NHSN-defined CLABSI outcomes in a large health system.

METHODS

We compared CAUTI and CLABSI NHSN outcomes for calendar years 2014 and 2015 at 65 hospitals that are part of a large, nonprofit health system in 24 states. We included the adult intensive care units (ICUs) for our evaluation. The data are submitted by all hospitals into the NHSN for both CAUTI and CLABSI. The infection preventionists at each of the hospitals, based on the CDC NHSN algorithms for CAUTI and CLABSI,[3,4] identify the events and report them to the NHSN. Starting January 2015, all CAUTIs were reported based on the new definition.[5] The 2015 CAUTI definition excludes urine analysis findings, nonbacterial organisms (eg, *Candida* spp.), and any quantitated urine cultures with <100,000 colony-forming units per milliliter (CFU/mL).[5,6]

We compared changes in the event rates, the associated organisms, and the standardized infection ratio (SIR). We also examined changes in outcomes based on hospital size. We evaluated whether CLABSI rates have been affected by the

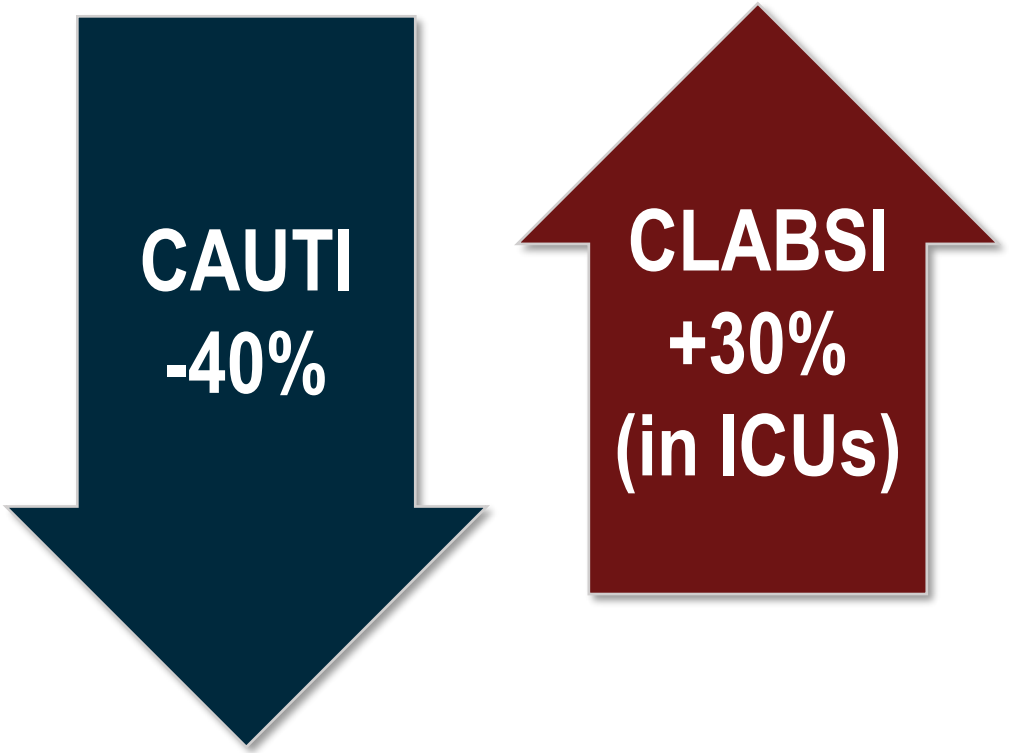
Affiliations: Care Excellence, Ascension Health, St. Louis, Missouri.

PREVIOUS PRESENTATION: These data were presented on May 18, 2016, at the SHEA Spring 2016 conference in Atlanta, Georgia (Abstract #520). This abstract was selected as 1 of 23 outstanding abstracts for the SHEA Top Poster Abstract Award.
Received November 23, 2016; accepted February 2, 2017; electronically published March 23, 2017
 0899-823X/2017/3806-0007. DOI: 10.1017/ice.2017.41

(Fakih. 2017)[12]

Results[12]

- The revised 2015 CAUTI definition led to the reduction in CAUTI
- Observed an increase in candidemia and enterococcemia classified as CLABSI



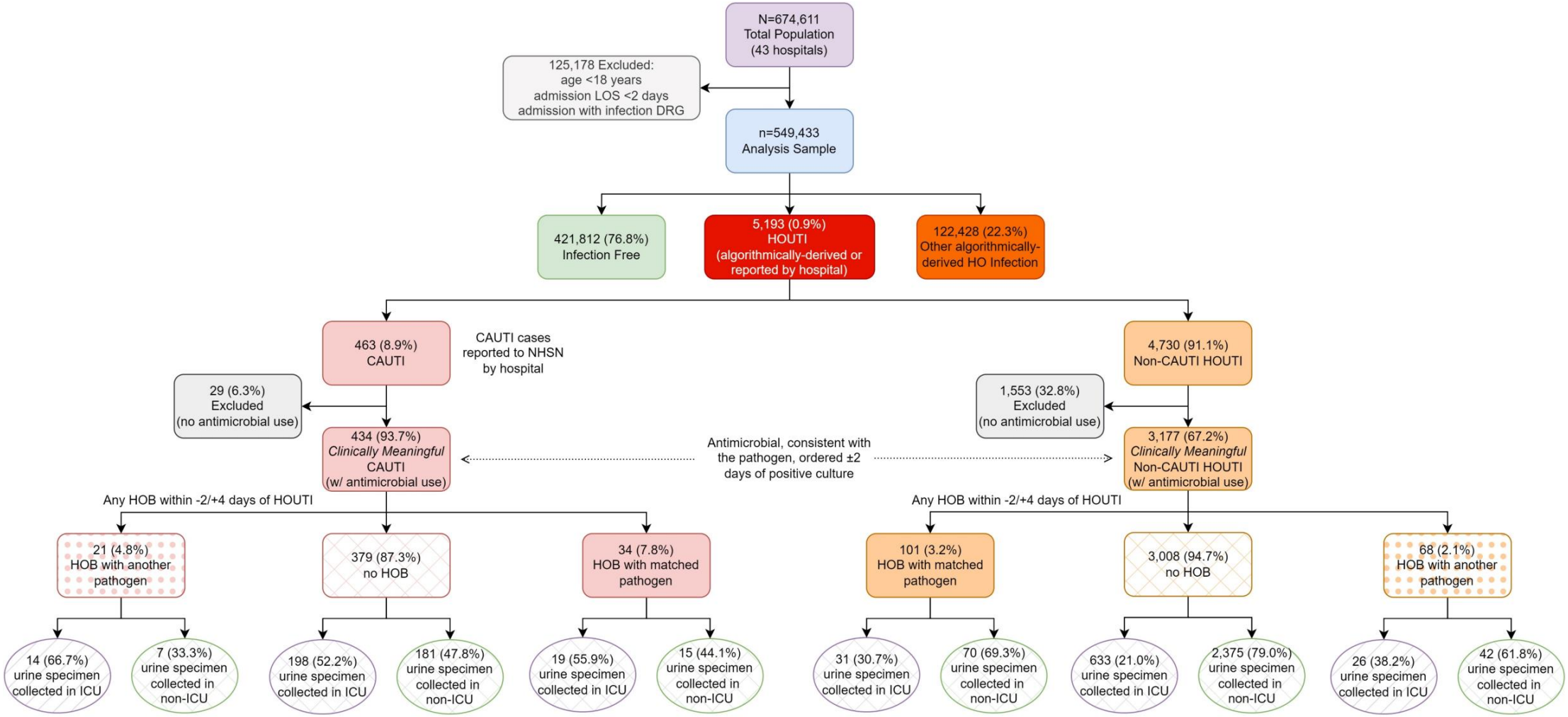
(Fakih. 2017)[12]

Can we characterize and quantify the volume of infections not covered by the CAUTI definition?

Methods[2]

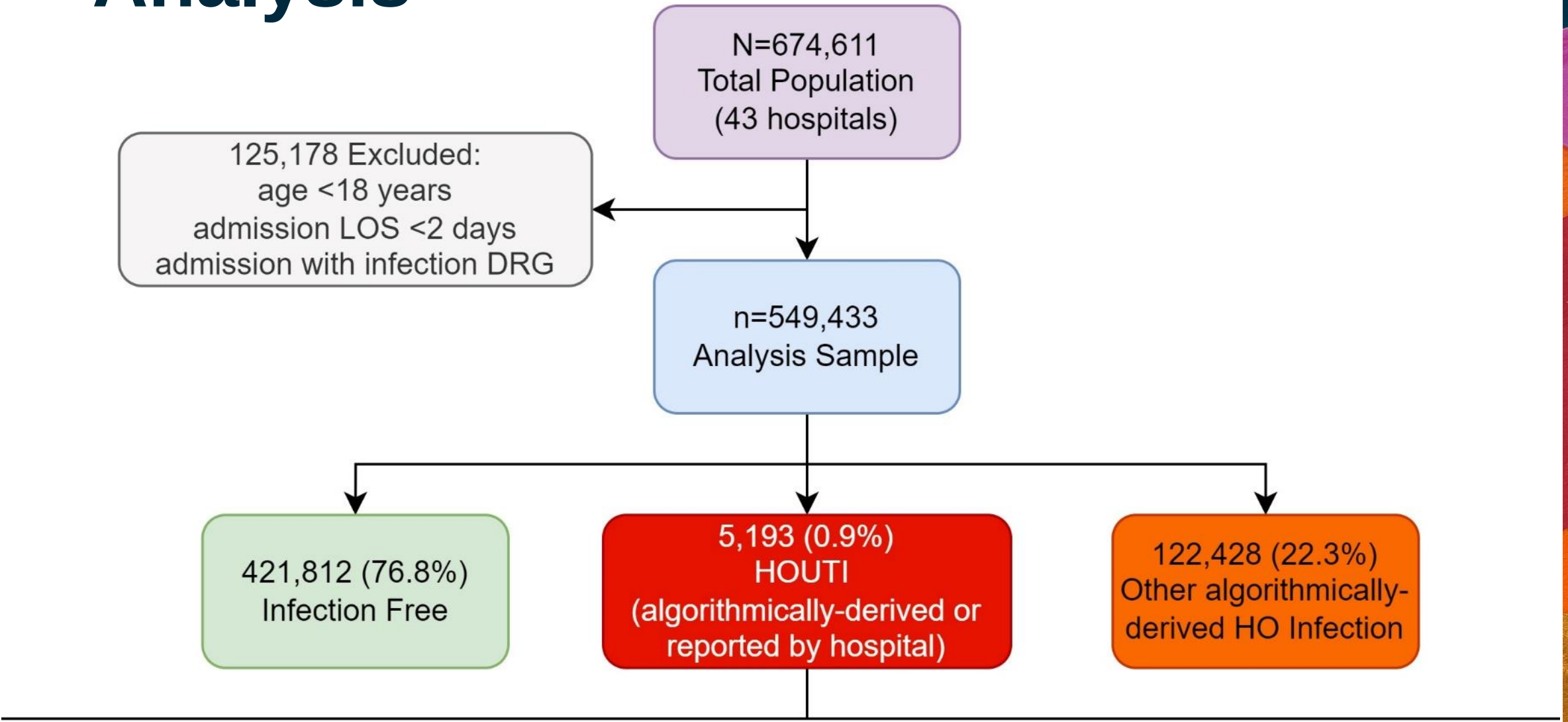
- Real-world data analysis utilizing data from the BD Insights Research Database
- 43 US hospitals
- October 2015 to June 2019
- Electronically captured lab, pharmacy, patient demographic, admission, discharge, and transfer data
- Complete methodology described elsewhere (Kelly. 2024)[2]

Analysis



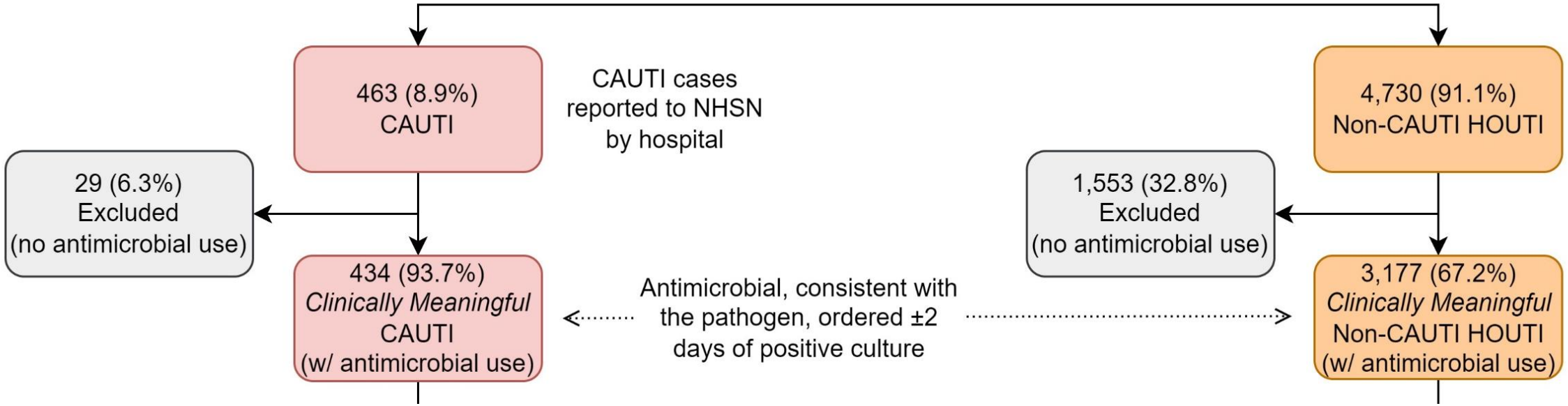
Source: (Kelly. 2024)[2] and (Ai. 2022)[13]

Analysis



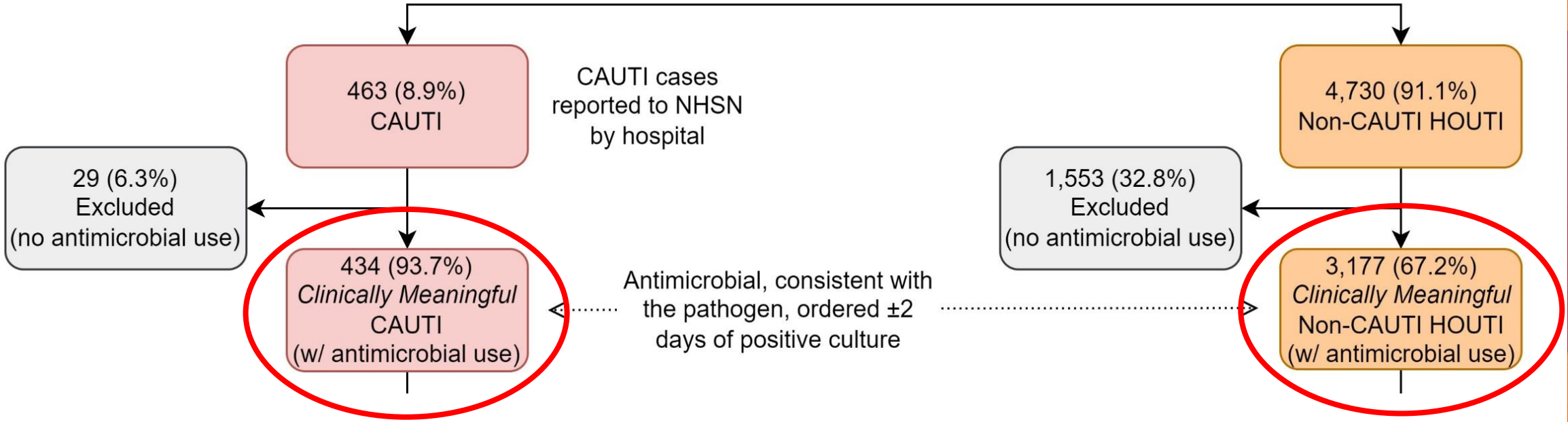
Source: (Kelly. 2024)[2] and (Ai. 2022)[13]

Analysis



Source: (Kelly. 2024)[2] and (Ai. 2022)[13]

Analysis



Source: (Kelly. 2024)[2] and (Ai. 2022)[13]

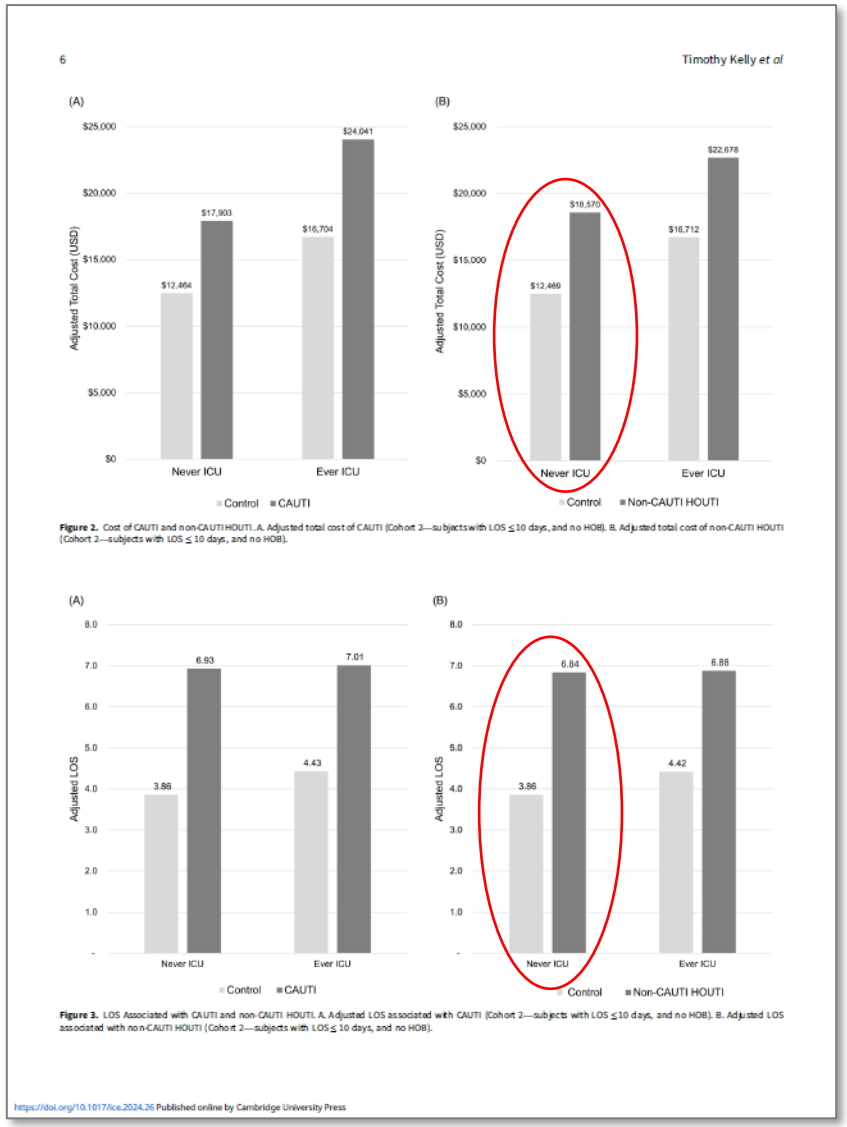
For every reportable CAUTI… there are 7 non-CAUTI HOUTIs

Analysis

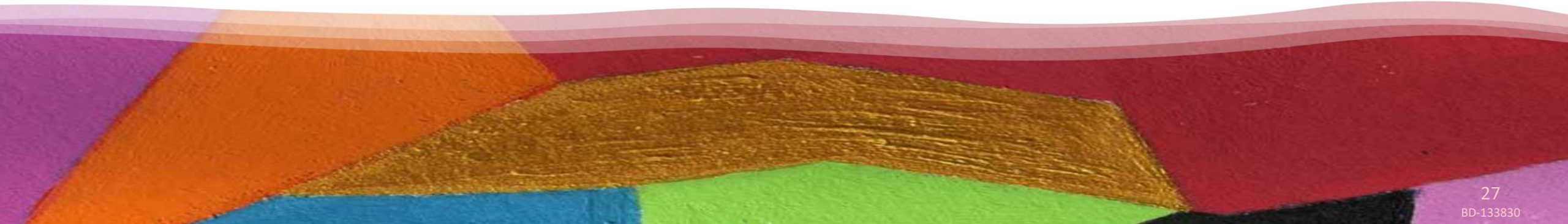
Source: (Kelly. 2024)[2] and (Ai. 2022)[13]

Economic Burden of Non-CAUTI HOUTI

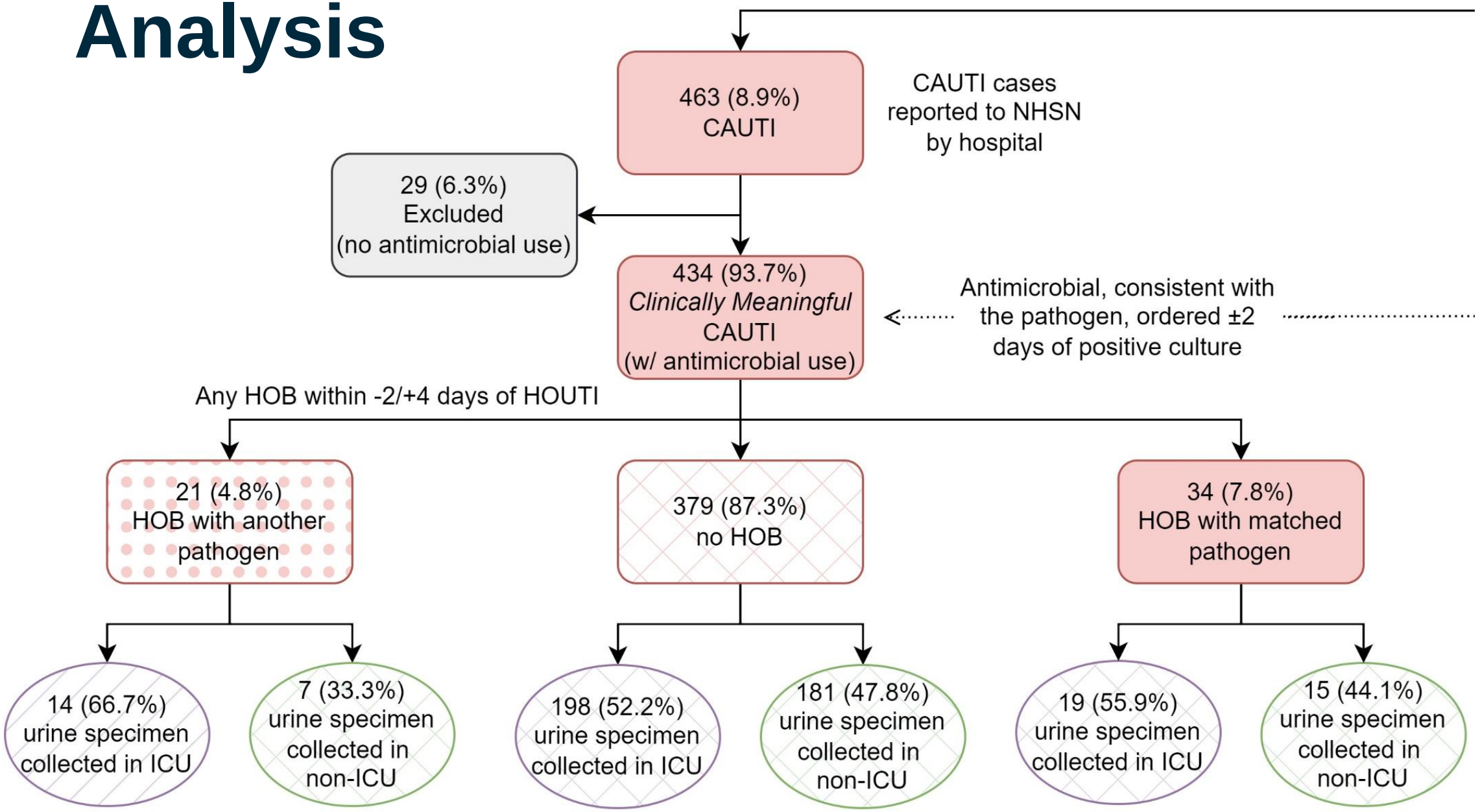
- Patients with LOS ≤10 days and no ICU stay and no secondary HOB (Kelly. 2024)[2]
  - **$6,101** in incremental cost to the hospital
  - **2.98** additional days LOS



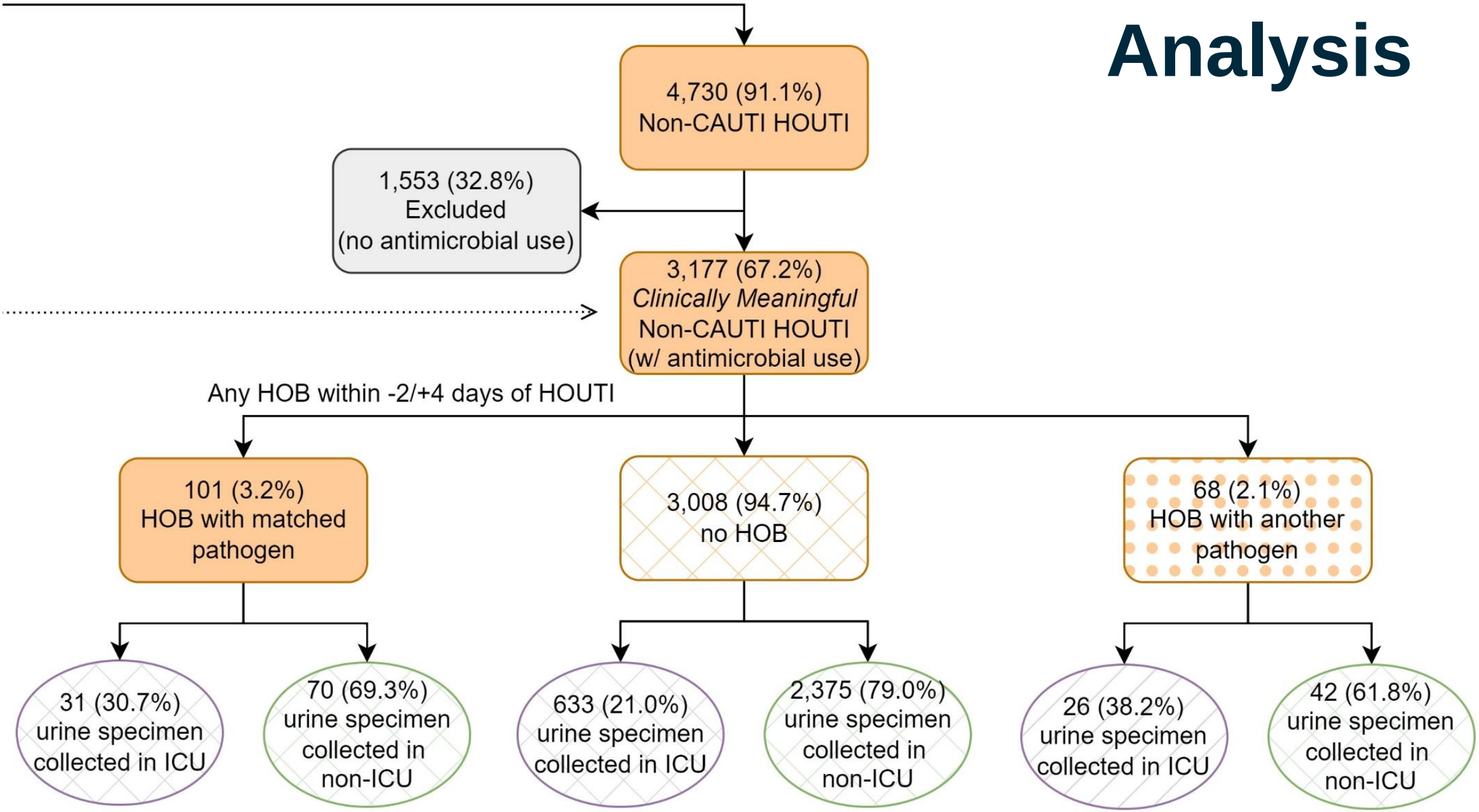
What about secondary HOB?



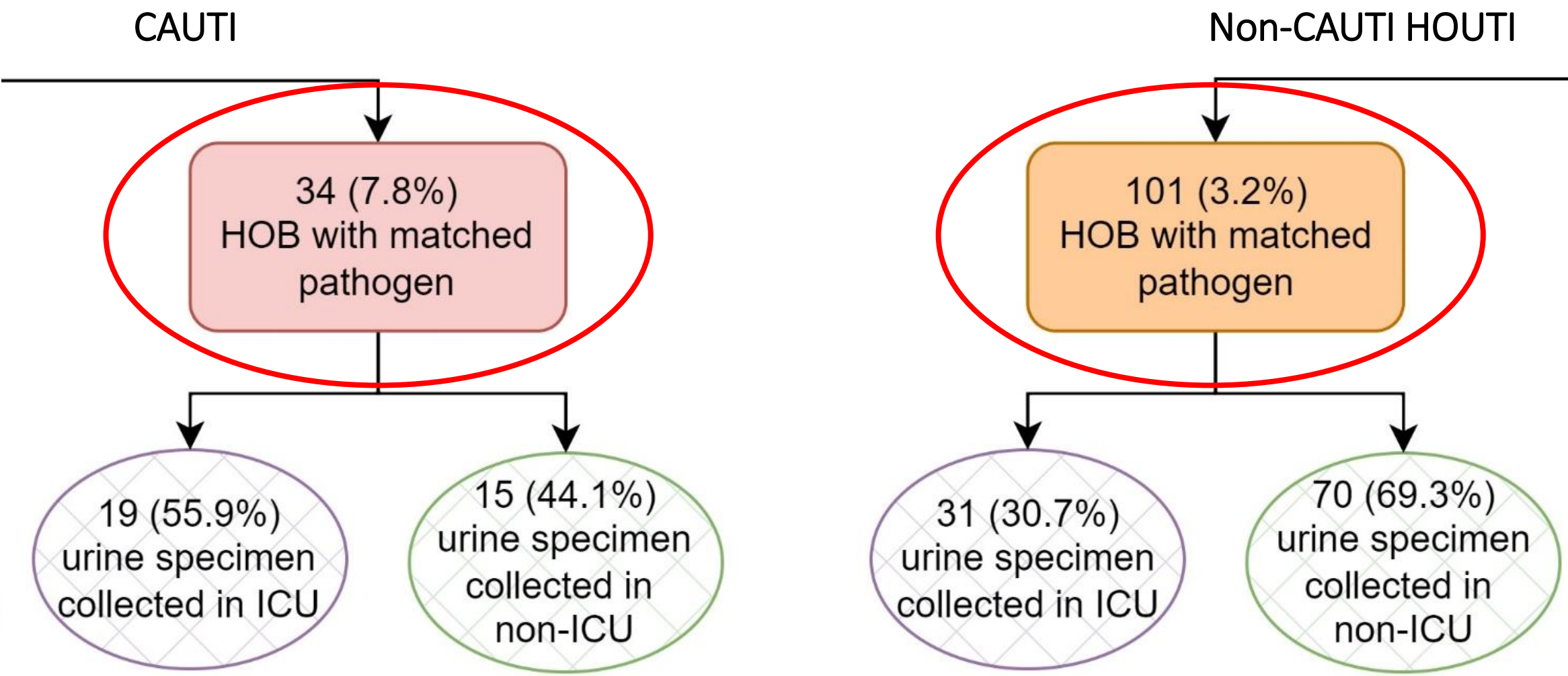
Analysis


463 (8.9%)
CAUTI
CAUTI cases reported to NHSN by hospital
29 (6.3%)
Excluded
(no antimicrobial use)
434 (93.7%)
Clinically Meaningful
CAUTI
(w/ antimicrobial use)
Antimicrobial, consistent with the pathogen, ordered ±2 days of positive culture
Any HOB within -2/+4 days of HOUTI
21 (4.8%)
HOB with another pathogen
379 (87.3%)
no HOB
34 (7.8%)
HOB with matched pathogen
14 (66.7%)
urine specimen collected in ICU
7 (33.3%)
urine specimen collected in non-ICU
198 (52.2%)
urine specimen collected in ICU
181 (47.8%)
urine specimen collected in non-ICU
19 (55.9%)
urine specimen collected in ICU
15 (44.1%)
urine specimen collected in non-ICU

Analysis


4,730 (91.1%)
Non-CAUTI HOUTI
1,553 (32.8%)
Excluded
(no antimicrobial use)
3,177 (67.2%)
Clinically Meaningful
Non-CAUTI HOUTI
(w/ antimicrobial use)
Any HOB within -2/+4 days of HOUTI
101 (3.2%)
HOB with matched
pathogen
3,008 (94.7%)
no HOB
68 (2.1%)
HOB with another
pathogen
31 (30.7%)
urine specimen
collected in ICU
70 (69.3%)
urine specimen
collected in
non-ICU
633 (21.0%)
urine specimen
collected in ICU
2,375 (79.0%)
urine specimen
collected in
non-ICU
26 (38.2%)
urine specimen
collected in ICU
42 (61.8%)
urine specimen
collected in
non-ICU

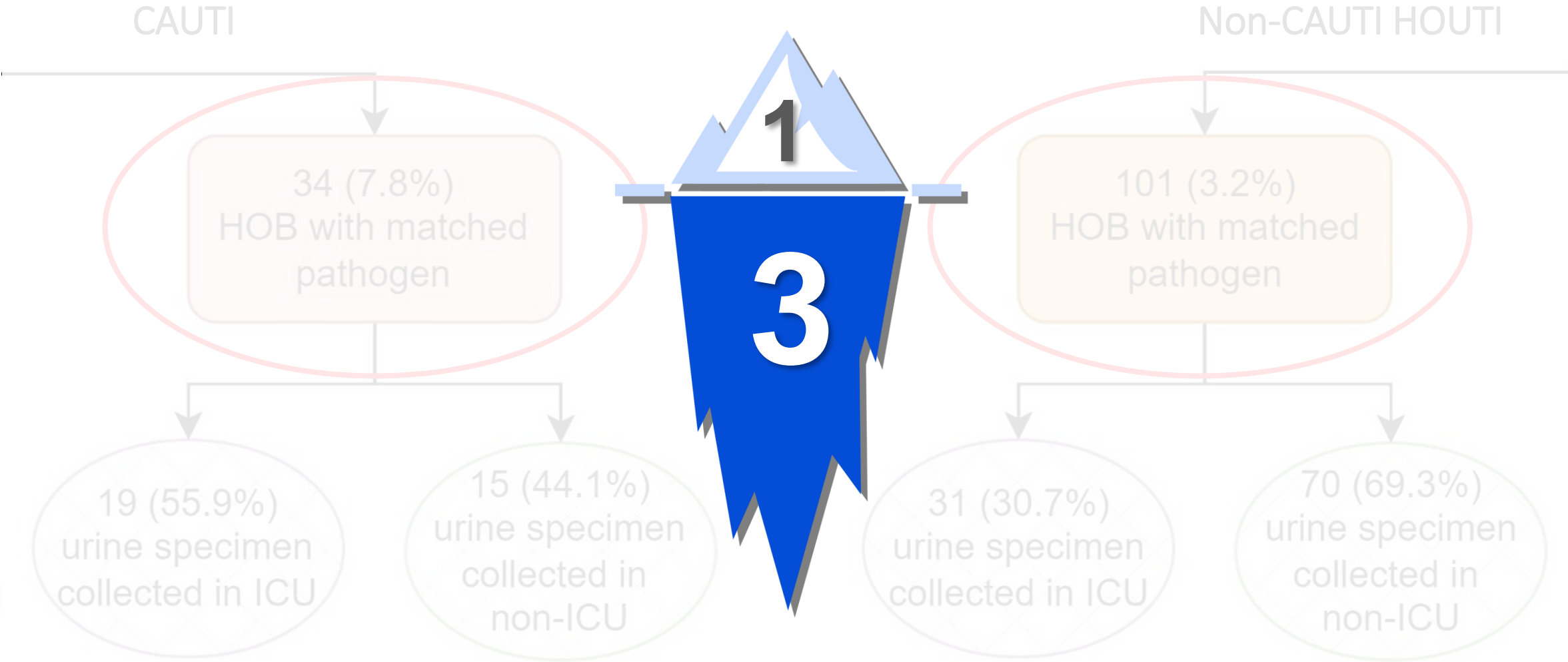
Analysis



Source: (Kelly. 2024)[2] and (Ai. 2022)[13]

For every case of HOB secondary to CAUTI… there are 3 cases of HOB secondary to non-CAUTI HOUTIs

Analysis



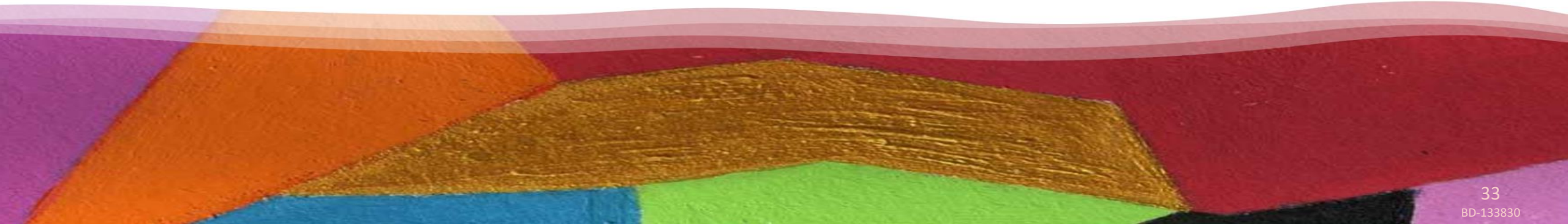
Source: (Kelly. 2024)[2] and (Ai. 2022)[13]

Economic Burden of Non-CLABSI HOB

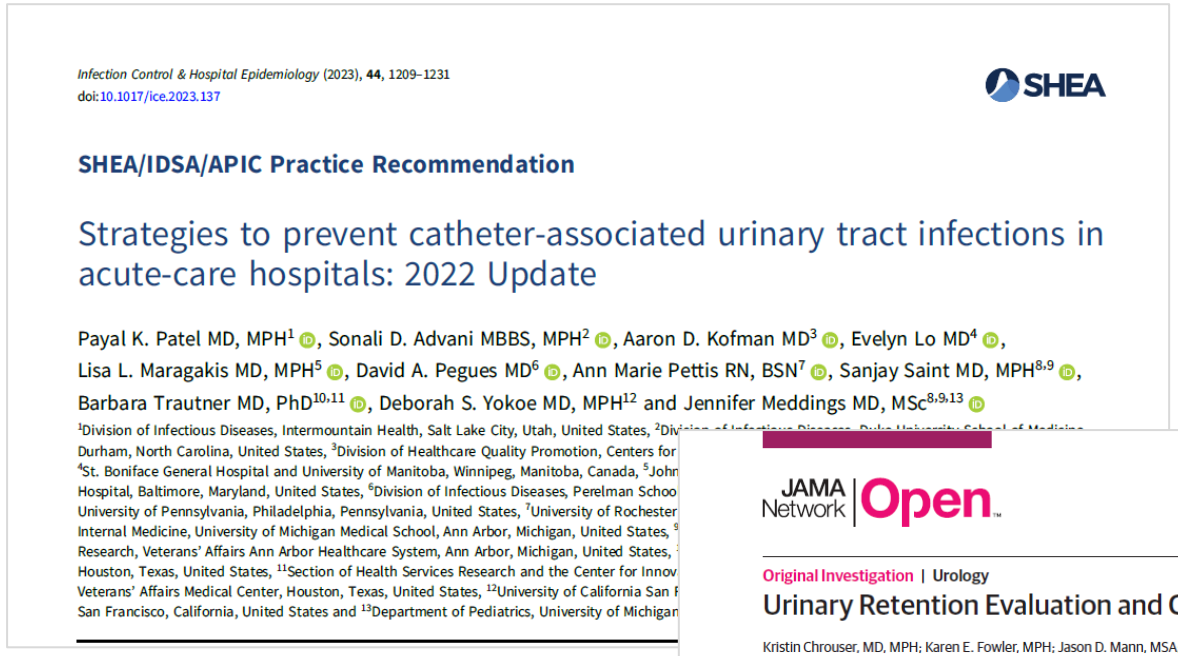
	ICU Encounter	No ICU Encounter
Incremental Hospital Cost	**$42,095** P < .001	**$25,207** P < .001
Incremental Length of Stay	**14.9 days** P < .001	**12.1 days** P < .001
30-day Readmission Relative Risk	1.06 P = .647	**1.45** P = .024
Mortality Relative Risk	**3.51** P < .001	Too low to accurately calculate

(Yu. 2023)[1]

Prevention Strategies



CAUTI and Non-CAUTI HOUTI Guidance



Infection Control & Hospital Epidemiology (2023), **44**, 1209–1231
doi:10.1017/ice.2023.137

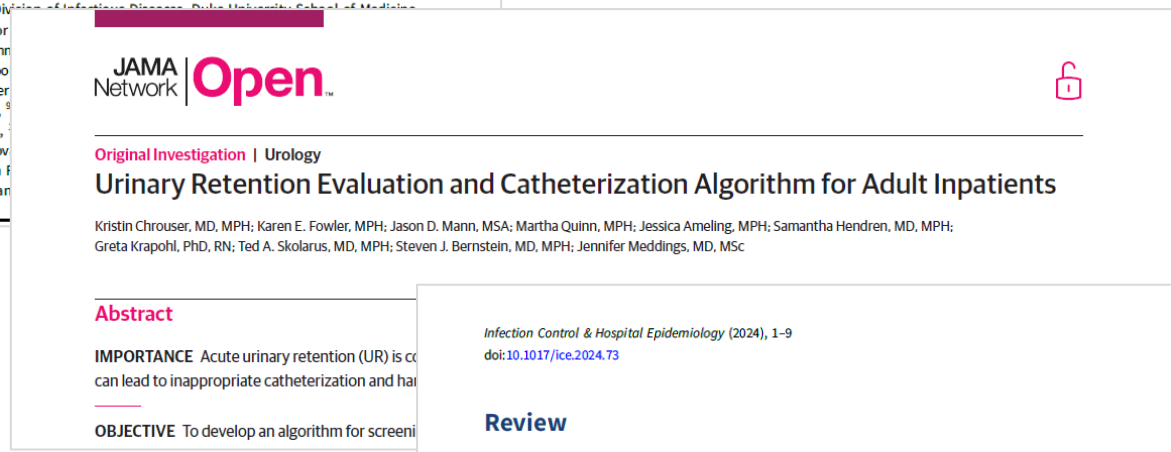
SHEA

SHEA/IDSA/APIC Practice Recommendation

Strategies to prevent catheter-associated urinary tract infections in acute-care hospitals: 2022 Update

Payal K. Patel MD, MPH[1], Sonali D. Advani MBBS, MPH[2], Aaron D. Kofman MD[3], Evelyn Lo MD[4], Lisa L. Maragakis MD, MPH[5], David A. Pegues MD[6], Ann Marie Pettis RN, BSN[7], Sanjay Saint MD, MPH[8,9], Barbara Trautner MD, PhD[10,11], Deborah S. Yokoe MD, MPH[12] and Jennifer Meddings MD, MSc[8,9,13]

[1]Division of Infectious Diseases, Intermountain Health, Salt Lake City, Utah, United States, [2]Div... Durham, North Carolina, United States, [3]Division of Healthcare Quality Promotion, Centers for... [4]St. Boniface General Hospital and University of Manitoba, Winnipeg, Manitoba, Canada, [5]John... Hospital, Baltimore, Maryland, United States, [6]Division of Infectious Diseases, Perelman Schoo... University of Pennsylvania, Philadelphia, Pennsylvania, United States, [7]University of Rochester... Internal Medicine, University of Michigan Medical School, Ann Arbor, Michigan, United States, ... Research, Veterans' Affairs Ann Arbor Healthcare System, Ann Arbor, Michigan, United States, ... Houston, Texas, United States, [11]Section of Health Services Research and the Center for Innov... Veterans' Affairs Medical Center, Houston, Texas, United States, [12]University of California San ... San Francisco, California, United States and [13]Department of Pediatrics, University of Michigan...



JAMA Network Open

Original Investigation | Urology

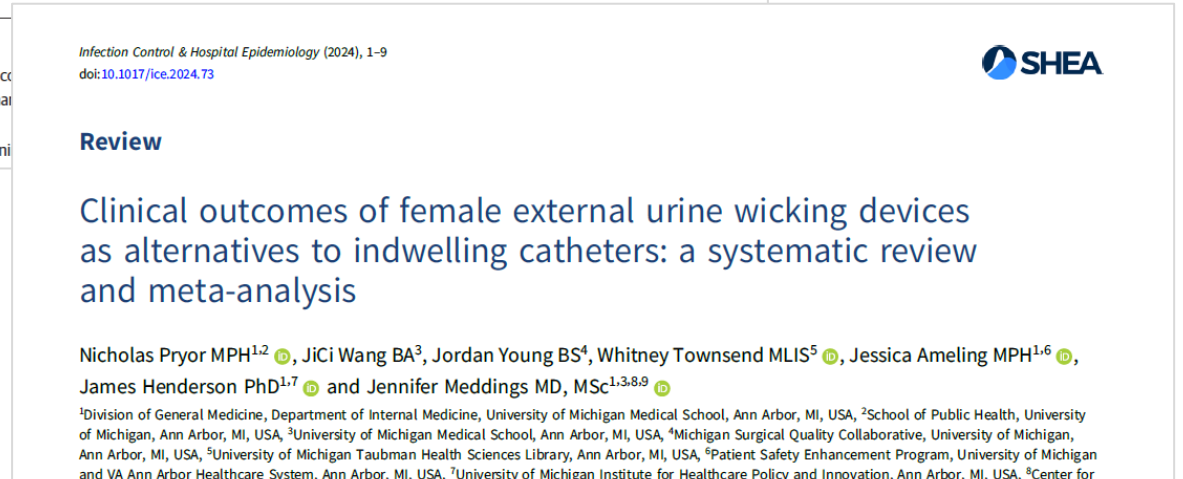
Urinary Retention Evaluation and Catheterization Algorithm for Adult Inpatients

Kristin Chrouser, MD, MPH; Karen E. Fowler, MPH; Jason D. Mann, MSA; Martha Quinn, MPH; Jessica Ameling, MPH; Samantha Hendren, MD, MPH; Greta Krapohl, PhD, RN; Ted A. Skolarus, MD, MPH; Steven J. Bernstein, MD, MPH; Jennifer Meddings, MD, MSc

Abstract

IMPORTANCE Acute urinary retention (UR) is c... can lead to inappropriate catheterization and ha...

OBJECTIVE To develop an algorithm for screeni...



Infection Control & Hospital Epidemiology (2024), 1–9
doi:10.1017/ice.2024.73

SHEA

Review

Clinical outcomes of female external urine wicking devices as alternatives to indwelling catheters: a systematic review and meta-analysis

Nicholas Pryor MPH[1,2], JiCi Wang BA[3], Jordan Young BS[4], Whitney Townsend MLIS[5], Jessica Ameling MPH[1,6], James Henderson PhD[1,7] and Jennifer Meddings MD, MSc[1,3,8,9]

[1]Division of General Medicine, Department of Internal Medicine, University of Michigan Medical School, Ann Arbor, MI, USA, [2]School of Public Health, University of Michigan, Ann Arbor, MI, USA, [3]University of Michigan Medical School, Ann Arbor, MI, USA, [4]Michigan Surgical Quality Collaborative, University of Michigan, Ann Arbor, MI, USA, [5]University of Michigan Taubman Health Sciences Library, Ann Arbor, MI, USA, [6]Patient Safety Enhancement Program, University of Michigan and VA Ann Arbor Healthcare System, Ann Arbor, MI, USA, [7]University of Michigan Institute for Healthcare Policy and Innovation, Ann Arbor, MI, USA, [8]Center for

- Consider recent analyses by Jennifer Meddings, MD, SC, et al.

Patel and Meddings, et al. 2023.[14]
Chrouser and Meddings, et al. 2024.[15]
Pryor and Meddings, et al. 2024.[16]

CAUTI and Non-CAUTI HOUTI Guidance

Management of indwelling catheters
1. Properly secure indwelling catheters after insertion to prevent movement and urethral traction.[91,92] (Quality of evidence: LOW)
2. Maintain a sterile, continuously closed drainage system.[92,93] (Quality of evidence: LOW)
3. Replace the catheter and the collecting system using aseptic technique when breaks in aseptic technique, disconnection, or leakage occur. (Quality of evidence: LOW)
4. For examination of fresh urine, collect a small sample by aspirating urine from the needleless sampling port with a sterile syringe/cannula adaptor after cleansing the port with disinfectant. (Quality of evidence: LOW)
5. Facilitate timely transport of urine samples to laboratory. If timely transport is not feasible, consider refrigerating urine samples or using sample collection cups with preservatives. Obtain larger volumes of urine for special analyses (eg, 24-hour urine) aseptically from the drainage bag. (Quality of evidence: LOW)
6. Maintain unobstructed urine flow. (Quality of evidence: LOW)
a. Remind bedside caregivers, patients, and transport personnel to always keep the collecting bag below the level of the bladder.
b. Do not place the bag on floor.
c. Keep the catheter and collecting tube free from kinking, which can impair urinary flow and increase stasis within the bladder, increasing infection risk.
d. Empty the collecting bag regularly using a separate collecting container for each patient. Avoid touching the draining spigot to the collecting container.
7. Employ routine hygiene. Cleaning the meatal area with antiseptic solutions is an unresolved issue, though emerging literature supports chlorhexidine use prior to catheter insertion.[94–97] Alcohol-based products should be avoided given concerns about the alcohol causing drying of the mucosal tissues. (Quality of evidence: LOW)

Patel and Meddings, et al. 2023.[14]

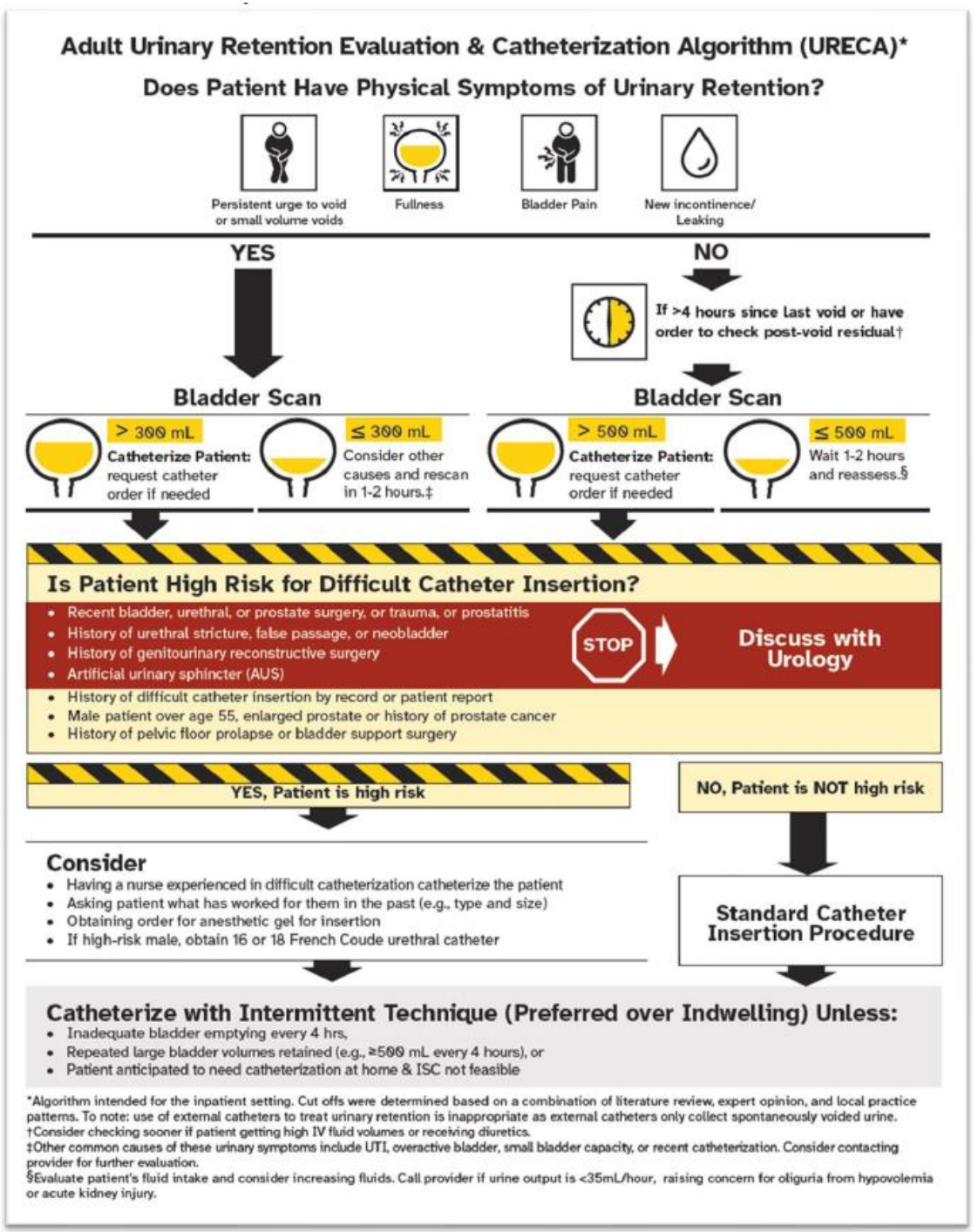
CAUTI and Non-CAUTI HOUTI Guidance

Table 2. Characteristics and outcomes of peer-reviewed published manuscripts included in meta-analyses

1st Author, Year	Design	Setting	Study Population	No. of Patients	FEUWD Used	Other CAUTI Prevention Strategies	Indwelling CAUTI Trend
Beeson, 2023[20]	Pre-post	Critical, progressive care units	Female inpatients requiring UIM, ≥ 18	NR	PrimaFit	Nurse-empowered IUC removal	Decreased
Eckert, 2020[22]	Pre-post	ICU, telemetry, med-surg, orthopedic-neurology, acute rehabilitation inpatient units	Female inpatients requiring UIM	NR	PureWick	CAUTI reduction initiative, auditing bundle adherence*	Decreased
Jasperse, 2022[23]	Pre-post	Internal medicine, family medicine, neurology units	Female patients, ≥ 18	848 (292 received intervention)	PureWick	NS	Increased
Lem, 2022[25]	Pre-post	General surgery or another surgical subspecialty	Female patients, ≥ 18	906 (127 received intervention)	PureWick	IUC reduction initiative†	Increased
Noval, 2022[26]	Pre-post	ICU (medical, surgical, neurocritical, cardiac surgery)	Female ICU patients	4,640 patient encounters (~771 received intervention)	PureWick	NS	Decreased
Rearigh, 2021[27]	Pre-post	Hospital-wide (medical and surgical services)	Female inpatients	2,347 received intervention	PureWick	CAUTI reduction initiative*	Decreased‡
Zavodnick, 2020[35]	Pre-post	ICU	Female ICU patients, ≥ 18	NR	PureWick	Nurse-empowered IUC removal	Decreased‡

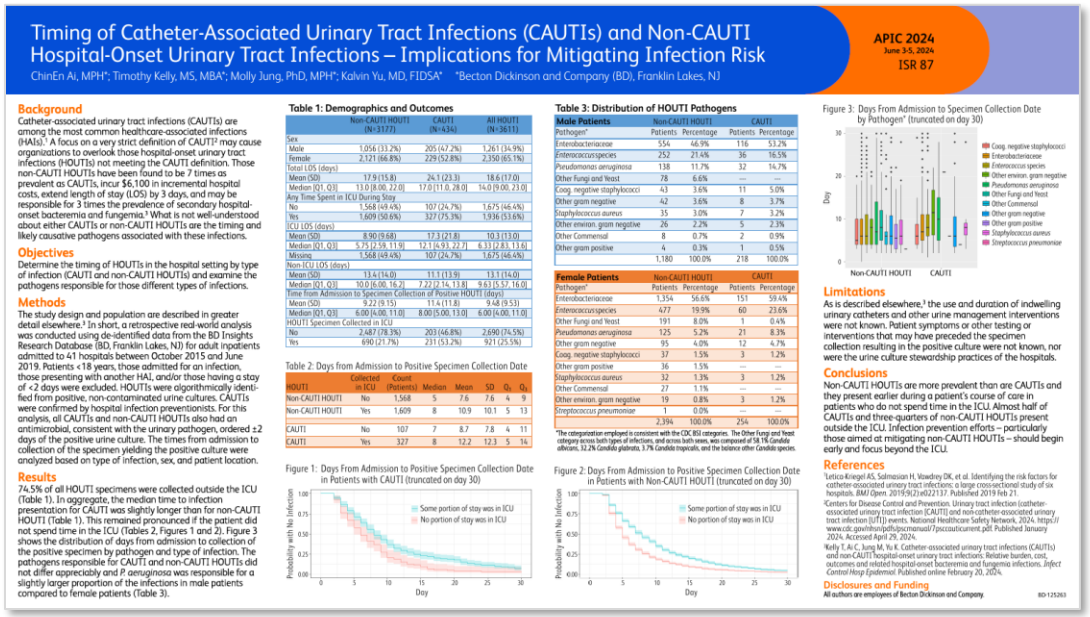
Pryor and Meddings, et al. 2024.[16]

CAUTI and Non-CAUTI HOUTI Guidance



Chrouser and Meddings, et al. 2024.[15]

Be Attentive to Device Maintenance and Patient Bathing



Timing of Catheter-Associated Urinary Tract Infections (CAUTIs) and Non-CAUTI Hospital-Onset Urinary Tract Infections – Implications for Mitigating Infection Risk

APIC 2024 June 3-5, 2024 ISR 87

ChinEn Ai, MPH*; Timothy Kelly, MS, MBA*; Molly Jung, PhD, MPH*; Kalvin Yu, MD, FIDSA* *Becton Dickinson and Company (BD), Franklin Lakes, NJ

Background

Catheter-associated urinary tract infections (CAUTIs) are among the most common healthcare-associated infections (HAIs).[1] A focus on a very strict definition of CAUTI[2] may cause organizations to overlook those hospital-onset urinary tract infections (HOUTIs) not meeting the CAUTI definition. Those non-CAUTI HOUTIs have been found to be 7 times as prevalent as CAUTIs, incur $6,100 in incremental hospital costs, extend length of stay (LOS) by 3 days, and may be responsible for 3 times the prevalence of secondary hospital-onset bacteremia and fungemia.[3] What is not well-understood about either CAUTIs or non-CAUTI HOUTIs are the timing and likely causative pathogens associated with these infections.

Objectives

Determine the timing of HOUTIs in the hospital setting by type of infection (CAUTI and non-CAUTI HOUTIs) and examine the pathogens responsible for those different types of infections.

Methods

The study design and population are described in greater detail elsewhere.[3] In short, a retrospective real-world analysis was conducted using de-identified data from the BD Insights Research Database (BD, Franklin Lakes, NJ) for adult inpatients admitted to 41 hospitals between October 2015 and June 2019. Patients <18 years, those admitted for an infection, those presenting with another HAI, and/or those having a stay of <2 days were excluded. HOUTIs were algorithmically identified from positive, non-contaminated urine cultures. CAUTIs were confirmed by hospital infection preventionists. For this analysis, all CAUTIs and non-CAUTI HOUTIs also had an antimicrobial, consistent with the urinary pathogen, ordered ±2 days of the positive urine culture. The times from admission to collection of the specimen yielding the positive culture were analyzed based on type of infection, sex, and patient location.

Results

74.5% of all HOUTI specimens were collected outside the ICU (Table 1). In aggregate, the median time to infection presentation for CAUTI was slightly longer than for non-CAUTI HOUTI (Table 1). This remained pronounced if the patient did not spend time in the ICU (Tables 2, Figures 1 and 2). Figure 3 shows the distribution of days from admission to collection of the positive specimen by pathogen and type of infection. The pathogens responsible for CAUTI and non-CAUTI HOUTIs did not differ appreciably and *P. aeruginosa* was responsible for a slightly larger proportion of the infections in male patients compared to female patients (Table 3).

Table 1: Demographics and Outcomes

	Non-CAUTI HOUTI (N=3177)	CAUTI (N=436)	All HOUTI (N=3611)
Sex			
Male	1,056 (33.2%)	205 (47.2%)	1,261 (34.9%)
Female	2,121 (66.8%)	229 (52.8%)	2,350 (65.1%)
Total LOS (days)			
Mean (SD)	17.9 (15.8)	24.1 (23.3)	18.6 (17.0)
Median [Q1, Q3]	13.0 [8.00, 22.0]	17.0 [11.0, 28.0]	14.0 [9.00, 23.0]
Any Time Spent in ICU During Stay			
No	1,568 (49.4%)	107 (24.7%)	1,675 (46.4%)
Yes	1,609 (50.6%)	327 (75.3%)	1,936 (53.6%)
ICU LOS (days)			
Mean (SD)	8.90 (9.68)	17.3 (21.8)	10.3 (13.0)
Median [Q1, Q3]	5.75 [2.59, 11.9]	12.1 [4.93, 22.7]	6.33 [2.83, 13.6]
Missing	1,568 (49.4%)	107 (24.7%)	1,675 (46.4%)
Non-ICU LOS (days)			
Mean (SD)	13.4 (14.0)	13.1 (13.9)	13.1 (14.0)
Median [Q1, Q3]	10.0 [6.00, 16.7]	7.22 [2.14, 13.8]	9.63 [5.57, 16.0]
Time from Admission to Specimen Collection of Positive HOUTI (days)			
Mean (SD)	9.22 (9.15)	11.4 (11.8)	9.48 (9.53)
Median [Q1, Q3]	6.00 [4.00, 11.0]	8.00 [5.00, 13.0]	6.00 [4.00, 11.0]
HOUTI Specimen Collected in ICU			
No	2,487 (78.3%)	203 (46.8%)	2,690 (74.5%)
Yes	690 (21.7%)	231 (53.2%)	921 (25.5%)

Table 2: Days from Admission to Positive Specimen Collection Date

HOUTI	Collected in ICU	Count (Patients)	Median	Mean	SD	Q_1	Q_3
Non-CAUTI HOUTI	No	1,568	5	7.6	7.6	4	9
Non-CAUTI HOUTI	Yes	1,609	8	10.9	10.1	5	13
CAUTI	No	107	7	8.7	7.8	4	11
CAUTI	Yes	327	8	12.2	12.3	5	14

Figure 1: Days From Admission to Positive Specimen Collection Date in Patients with CAUTI (truncated on day 30)

Table 3: Distribution of HOUTI Pathogens

Male Patients	Non-CAUTI HOUTI		CAUTI	
Pathogen*	Patients	Percentage	Patients	Percentage
Enterobacteriaceae	554	46.9%	116	53.2%
Enterococcus species	252	21.4%	36	16.5%
Pseudomonas aeruginosa	138	11.7%	32	14.7%
Other Fungi and Yeast	78	6.6%	---	---
Coag. negative staphylococci	43	3.6%	11	5.0%
Other gram negative	42	3.6%	8	3.7%
Staphylococcus aureus	35	3.0%	7	3.2%
Other environ. gram negative	26	2.2%	5	2.3%
Other Commensal	8	0.7%	2	0.9%
Other gram positive	4	0.3%	1	0.5%
	1,180	100.0%	218	100.0%

Female Patients	Non-CAUTI HOUTI		CAUTI	
Pathogen*	Patients	Percentage	Patients	Percentage
Enterobacteriaceae	1,354	56.6%	151	59.4%
Enterococcus species	477	19.9%	60	23.6%
Other Fungi and Yeast	191	8.0%	1	0.4%
Pseudomonas aeruginosa	125	5.2%	21	8.3%
Other gram negative	95	4.0%	12	4.7%
Coag. negative staphylococci	37	1.5%	3	1.2%
Other gram positive	36	1.5%	---	---
Staphylococcus aureus	32	1.3%	3	1.2%
Other Commensal	27	1.1%	---	---
Other environ. gram negative	19	0.8%	3	1.2%
Streptococcus pneumoniae	1	0.0%	---	---
	2,394	100.0%	254	100.0%

Figure 2: Days From Admission to Positive Specimen Collection Date in Patients with Non-CAUTI HOUTI (truncated on day 30)

Figure 3: Days From Admission to Specimen Collection Date by Pathogen* (truncated on day 30)

Limitations

As is described elsewhere,[3] the use and duration of indwelling urinary catheters and other urine management interventions were not known. Patient symptoms or other testing or interventions that may have preceded the specimen collection resulting in the positive culture were not known, nor were the urine culture stewardship practices of the hospitals.

Conclusions

Non-CAUTI HOUTIs are more prevalent than are CAUTIs and they present earlier during a patient's course of care in patients who do not spend time in the ICU. Almost half of CAUTIs and three-quarters of non-CAUTI HOUTIs present outside the ICU. Infection prevention efforts – particularly those aimed at mitigating non-CAUTI HOUTIs – should begin early and focus beyond the ICU.

References

[1] Letica-Kriegel AS, Salmasian H, Vawdrey DK, et al. Identifying the risk factors for catheter-associated urinary tract infections: a large cross-sectional study of six hospitals. *BMJ Open*. 2019;9(2):e022137. Published 2019 Feb 21.

[2] Centers for Disease Control and Prevention. Urinary tract infection (catheter-associated urinary tract infection [CAUTI] and non-catheter-associated urinary tract infection [UTI]) events. National Healthcare Safety Network, 2024. https://www.cdc.gov/nhsn/pdfs/pscmanual/7psccauticurrent.pdf. Published January 2024. Accessed April 29, 2024.

[3] Kelly T, Ai C, Jung M, Yu K. Catheter-associated urinary tract infections (CAUTIs) and non-CAUTI hospital-onset urinary tract infections: Relative burden, cost, outcomes and related hospital-onset bacteremia and fungemia infections. *Infect Control Hosp Epidemiol*. Published online February 20, 2024.

Disclosures and Funding

All authors are employees of Becton Dickinson and Company.

BD-125263

(Ai, Kelly, et al. 2024)[17]

A Final Comment on the HOB Measure

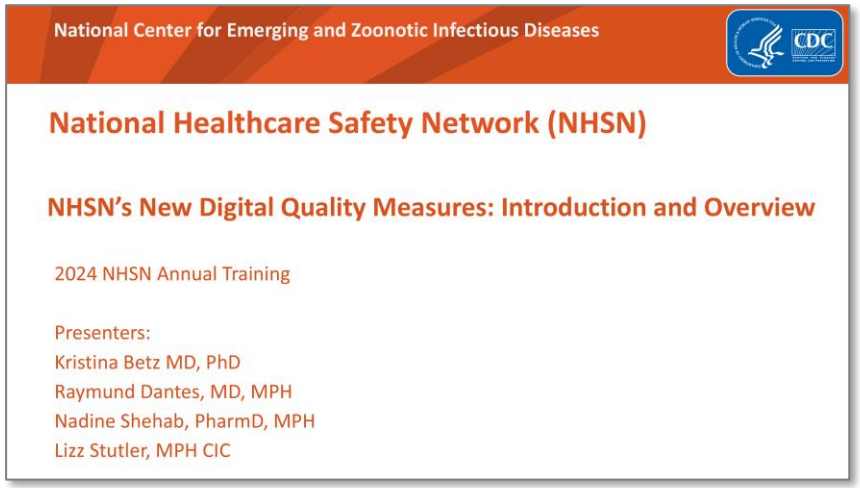
- CDC presentation at the Annual APIC Conference (Leaptrot and Godfrey. 2024)[18]

Comparison of CLABSI vs. HOB

NHSN Measure	CLABSI	HOB
Numerator Data Categories	Positive blood culture on HD ≥3 + eligible central line	Positive blood culture on HD ≥4
Submission types	Manual user interface, CDA	FHIR
Status in 2024	Currently in use	Future Use: in development
Near-term plans	Continue CLABSI reporting (in parallel with HOB & MRSA bacteremia once releases)	NHSN launch in 2024 for select hospitals, initially running in parallel with *CLABSI*
Longer-term plans	Retire from NHSN and quality measures	Widespread use and reporting for appropriate quality programs

49

A Final Comment on the HOB Measure


National Center for Emerging and Zoonotic Infectious Diseases

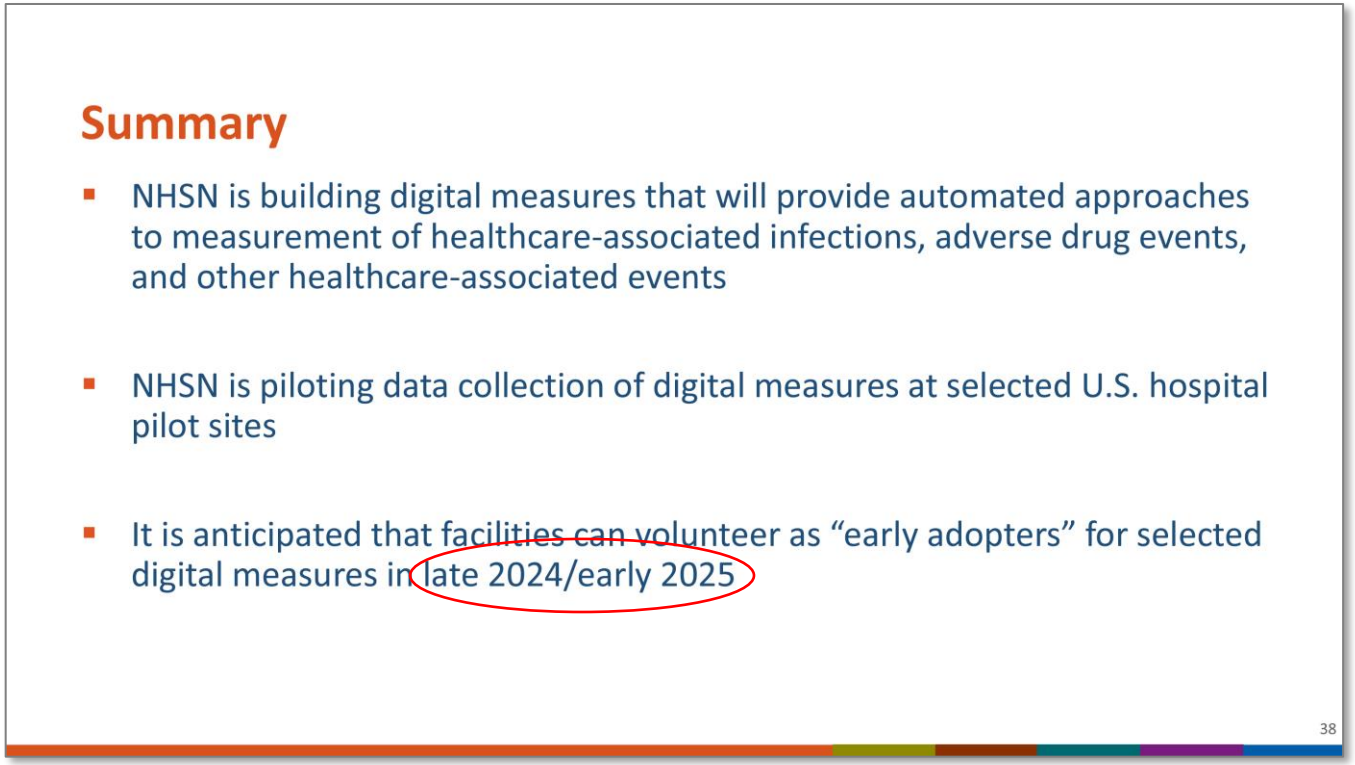
National Healthcare Safety Network (NHSN)

NHSN's New Digital Quality Measures: Introduction and Overview

2024 NHSN Annual Training

Presenters:
Kristina Betz MD, PhD
Raymund Dantes, MD, MPH
Nadine Shehab, PharmD, MPH
Lizz Stutler, MPH CIC

- CDC NHSN Annual Training (Betz, Dantes, Shehab, Stutler. 2024)[19]


Summary

- NHSN is building digital measures that will provide automated approaches to measurement of healthcare-associated infections, adverse drug events, and other healthcare-associated events
- NHSN is piloting data collection of digital measures at selected U.S. hospital pilot sites
- It is anticipated that facilities can volunteer as "early adopters" for selected digital measures in late 2024/early 2025

38

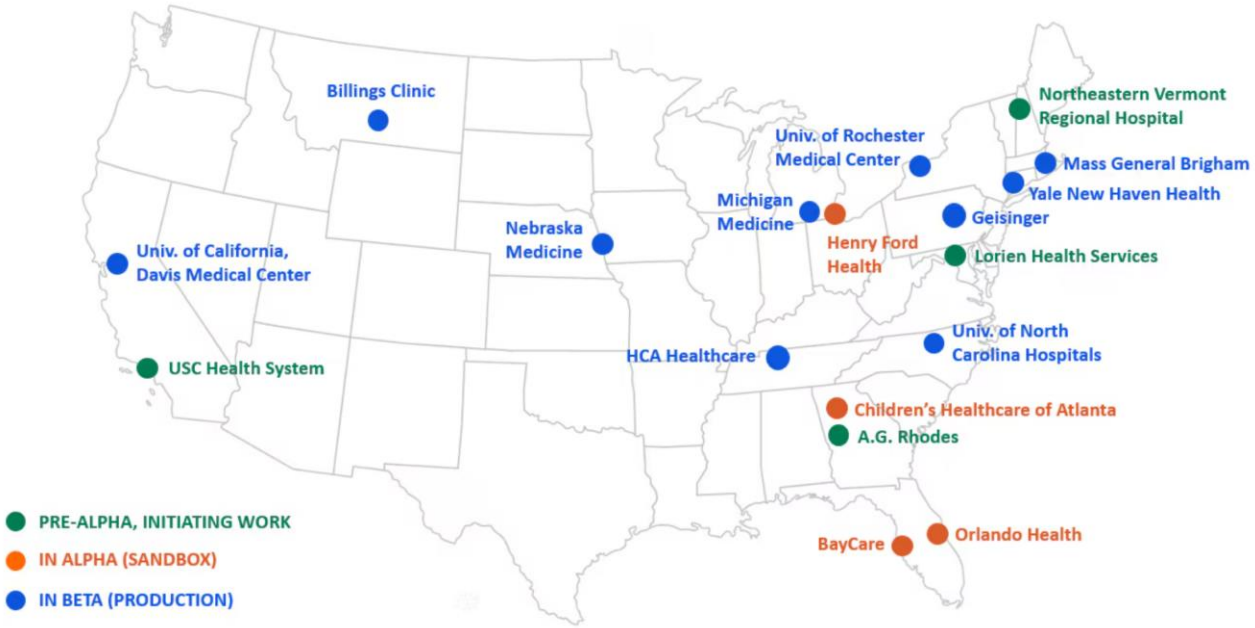
Take-aways

- Be attentive to the “bottom of the iceberg”
  - Non-CAUTI HOUTIs are common
  - Non-CAUTI HOUTIs cause substantial HOB

- Non-CAUTI HOUTIs and non-CLABSI HOB extend length of stay and increase hospital costs (Kelly. 2024)[2] (Yu. 2023)[1]
  - Non-CAUTI HOUTIs: 2.98 days / $6,101
  - Non-CLABSI HOB: 14.9 days* / $42,095*
- Monitor the emergence and implementation of an HOB dQM
  - Timing and implications for the HAC Reduction Program remain unknown

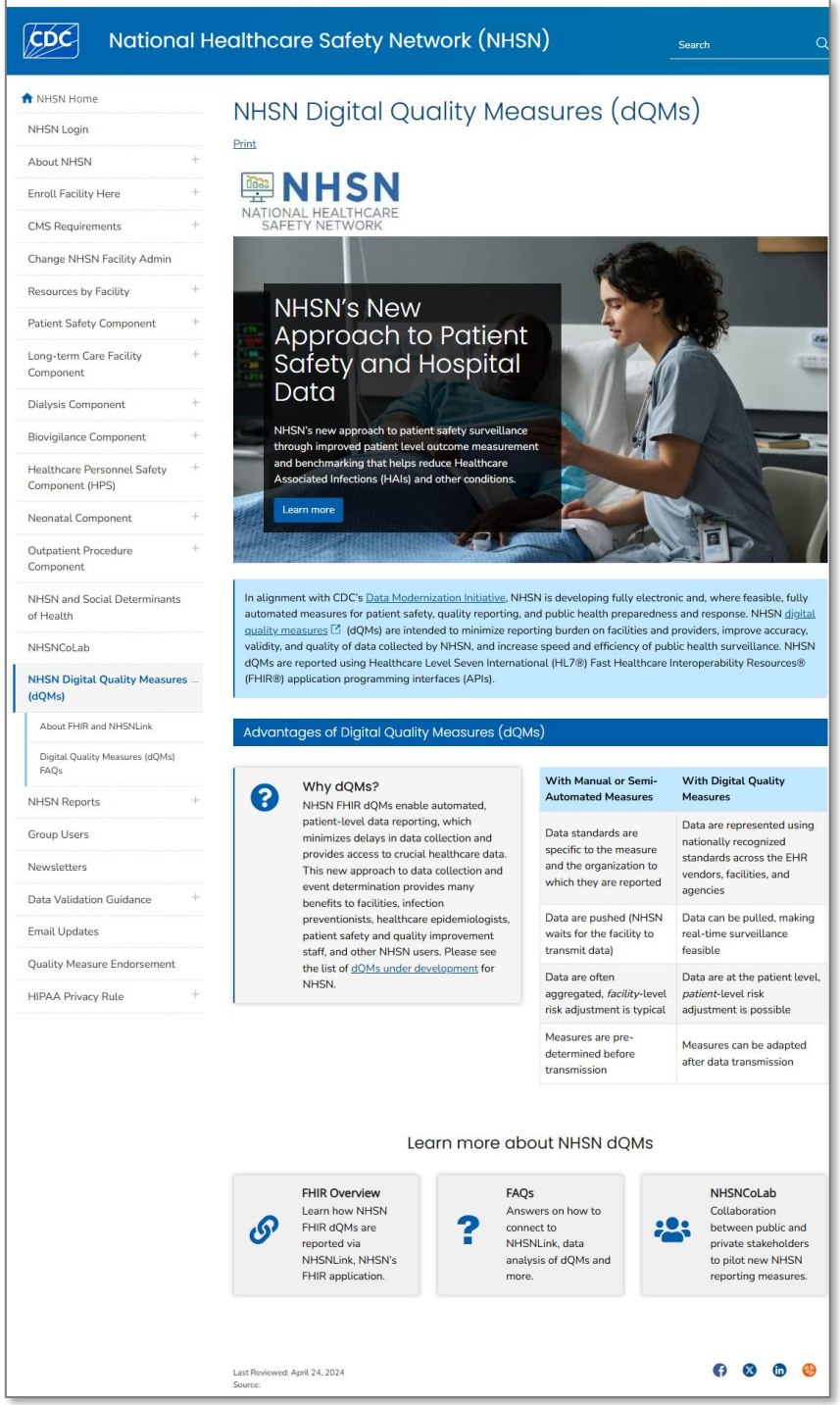
*in patients with an ICU encounter

dQM Information



NHSNCoLab – organizations piloting, implementing and validating the new dQMs
https://www.cdc.gov/nhsn/nhsncolab/index.html
Last updated January 8, 2025

NHSN Digital Quality Measures | NHSN | CDC
https://www.cdc.gov/nhsn/fhirportal/



References

[1]Yu KC, Jung M, Ai C. Characteristics, costs, and outcomes associated with central-line-associated bloodstream infection and hospital-onset bacteremia and fungemia in US hospitals. *Infect Control Hosp Epidemiol*. 2023;44(12):1920-1926. doi:10.1017/ice.2023.132

[2]Kelly T, Ai C, Jung M, Yu K. Catheter-associated urinary tract infections (CAUTIs) and non-CAUTI hospital-onset urinary tract infections: Relative burden, cost, outcomes and related hospital-onset bacteremia and fungemia infections. *Infect Control Hosp Epidemiol*. Published online February 20, 2024. doi:10.1017/ice.2024.26

[3]Dantes RB, Rock C, Milstone AM, et al. Preventability of hospital onset bacteremia and fungemia: A pilot study of a potential healthcare-associated infection outcome measure. *Infect Control Hosp Epidemiol*. 2019;40(3):358-361. doi:10.1017/ice.2018.339

[4]Centers for Medicare & Medicaid Services. 42 CFR Parts 411, 412, 419, 488, 489, and 495. Federal Register. Vol. 88, No. 83, Page 27053. May 1, 2023.

[5]Howard-Anderson J, Morgan DJ. Moving Beyond Central Line-Associated Bloodstream Infections. Ann Intern Med. 2024 May 21. doi: 10.7326/M24-0546. Epub ahead of print. PMID: 38768455.

References

[6]Centers for Disease Control and Prevention. Catheter-Associated Urinary Tract Infections – Background/Epidemiology. https://www.cdc.gov/infectioncontrol/guidelines/cauti/background.html#print Page last reviewed: November 5, 2015. Accessed May 1, 2024.

[7]Wagenlehner FM, Weidner W, Naber KG. Optimal management of urosepsis from the urological perspective. *Int J Antimicrob Agents*. 2007;30(5):390-397. doi:10.1016/j.ijantimicag.2007.06.027

[8]Ryan J, O'Neill E, McLornan L. Urosepsis and the urologist! *Curr Urol*. 2021;15(1):39-44. doi:10.1097/CU9.0000000000000006

[9]Dickerson Mayes K, Schuur JD, Chou SC. Trends in Urinary Catheter Use by Indication in US Emergency Departments, 2002-2019. *JAMA*. 2022;328(15):1557-1559. doi:10.1001/jama.2022.14378

[10]Klevens RM, Edwards JR, Richards CL Jr, et al. Estimating health care-associated infections and deaths in U.S. hospitals, 2002. *Public Health Rep*. 2007;122(2):160-166. doi:10.1177/003335490712200205

[11]Magill SS, O'Leary E, Janelle SJ, et al. Changes in Prevalence of Health Care-Associated Infections in U.S. Hospitals. *N Engl J Med*. 2018;379(18):1732-1744. doi:10.1056/NEJMoa1801550

[12]Fakih MG, Groves C, Bufalino A, Sturm LK, Hendrich AL. Definitional Change in NHSN CAUTI Was Associated with an Increase in CLABSI Events: Evaluation of a Large Health System. *Infect Control Hosp Epidemiol*. 2017;38(6):685-689. doi:10.1017/ice.2017.41

References

[13]Ai C, Jung M, Kelly T, Yu K. Catheter-associated urinary tract infections (CAUTIs) and Secondary Hospital-Onset Bloodstream Infections (HO-BSIs)… Only the Tip of the Iceberg? *IDWeek 2022.* Washington, DC: October 19-23, 2022.

[14]Patel PK, Advani SD, Kofman AD, et al. Strategies to prevent catheter-associated urinary tract infections in acute-care hospitals: 2022 Update. *Infect Control Hosp Epidemiol*. 2023;44(8):1209-1231. doi:10.1017/ice.2023.137

[15]Chrouser K, Fowler KE, Mann JD, et al. Urinary Retention Evaluation and Catheterization Algorithm for Adult Inpatients. *JAMA Netw Open*. 2024;7(7):e2422281. Published 2024 Jul 1. doi:10.1001/jamanetworkopen.2024.22281

[16]Pryor N, Wang J, Young J, et al. Clinical outcomes of female external urine wicking devices as alternatives to indwelling catheters: a systematic review and meta-analysis. *Infect Control Hosp Epidemiol*. Published online May 6, 2024. doi:10.1017/ice.2024.73

[17]Ai C, Kelly T, Jung M, Yu K. Timing of Catheter-Associated Urinary Tract Infections (CAUTIs) and Non-CAUTI Hospital-Onset Urinary Tract Infections – Implications for Mitigating Infection Risk. San Antonio: APIC Annual Conference. Jun 3-5, 2024.

[18]Leaptrot DE, Godfrey D. NHSN on FHIR: Comparing the Legacy Measures and Digital FHIR Measures. San Antonio: APIC Annual Conference. Jun 3-5, 2024.

[19]Betz K, Dantes R, Shehab N, Stutler L. NHSN Annual Training - NHSN's New Digital Quality Measures: Introduction and Overview. Centers for Disease Control & Prevention. 2024.

Thank you! Questions?

tim.kelly@bd.com

BD UCC Support – Elna Cardenas

elna.cardenas@bd.com