Presentation Type:
Poster Presentation - Poster Presentation
Subject Category: Diagnostic Stewardship
Validation and Use of a Measure in Critical Access Hospitals to Reduce Treatment of Asymptomatic Bacteriuria

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Background: Inappropriate diagnosis and treatment of urinary tract infections (UTI) contributes to antibiotic overuse. The Inappropriate Diagnosis of UTI (ID-UTI) measure—which quantifies the percentage of treated bacteriuria that is asymptomatic (ASB) using a standard definition of UTI—has been validated in acute care hospitals, but not in critical access hospitals (CAHs) where resources differ. **Methods:** From October 2022-July 2023, ten CAHs participated in a program to reduce ASB treatment, including education, coaching, and hospital feedback using the ID-UTI measure. Our primary aim was to assess performance characteristics of the ID-UTI standard definition and measure in CAHs (Figure 1). Non-physician abstractors from each CAH submitted clinical data (e.g., signs/symptoms) via REDCap for consecutive adult patients who were admitted or discharged from the emergency department and received antibiotics for bacteriuria. The case abstraction goal for each CAH was 5-6 cases/month. To assess feasibility, we evaluated the ability of each CAH to achieve goal case abstractions. To assess validity and reliability of the ID-UTI standard definition, two physicians reviewed 10% of submitted cases using deidentified patient notes and assessed agreement with the standard ID-UTI definition and consensus clinical opinion. Based on submitted data, we provided bimonthly feedback reports to CAHs including the hospital-level ID-UTI measure to benchmark progress and for peer comparison. We measured monthly change in the ID-UTI measure using a mixed-effects logistic regression model (Figure 1, Figure 2). **Results:** Among 10 CAHs, 4 (40%) submitted >59 cases over 10 months (goal) while 3 (30%) submitted >35 cases (secondary goal). Physician reviewers assessed 9.5% (58/608) of cases. Utilizing the ID-UTI standard definition, there was high agreement (93%) in ASB vs UTI designation between each physician reviewer and the CAH's REDCap assessment (Figure 3). Compared to clinical opinion, the ID-UTI standard definition identified 48% (16/33) of ASB cases and 100% (25/25) of UTI cases (Figure 4). Over the program, the percentage of cases

Figure 2. ID-UTI standard definition and assessments performed of submitted cases

ID-UTI standard definition	**UTI** is defined as a patient with bacteriuria and any of the following symptoms: urgency, rigors, frequency, dysuria, suprapubic pain or tenderness, acute hematuria, costovertebral or flank pain or tenderness, documentation of pyelonephritis, fever >38.0 or new onset mental status changes with systemic signs of infection. **ASB** cases are bacteriuric patients who received antibiotics but did not meet definition for a UTI.
REDCap Assessment Using ID-UTI Definition (real world measurement)	Using the hospitals' submitted REDCap data, an algorithm within the REDCap submission form classified each case as UTI vs. ASB according to the ID-UTI definition
Individual Physician Reviewer's Assessment using ID-UTI definition	After reviewing deidentified primary clinical information (e.g., notes), each physician reviewer classified each case as UTI v. ASB according to the ID-UTI definition
Consensus Physician Reviewer's Assessment using ID-UTI definition	If there were discrepancies in individual reviewer's standard assessment, reviewers met to come to consensus.
Individual Physician Reviewer's Clinical Opinion	After reviewing deidentified primary clinical information (e.g., notes), each physician reviewer assessed each case as UTI vs. ASB based on their own clinical judgment.
Gold standard: Consensus physician clinical opinion	If there were discrepancies in individual reviewer's clinical opinion, reviewers met to come to consensus. Consensus clinical opinion represented the "gold standard" for assessing UTI vs. ASB

Figure 3. Reliability assessment: percent agreement between reviewers and REDCap tool assessment using ID-UTI definition

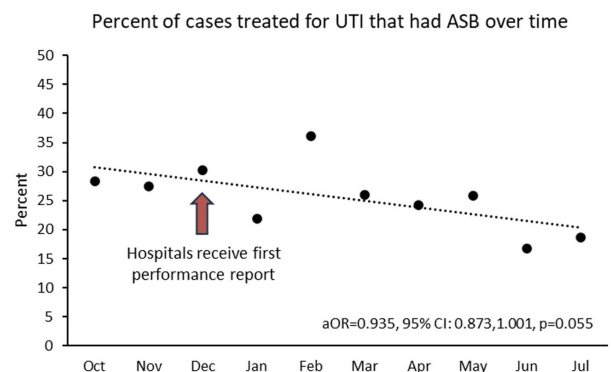|	Percent agreement (%)	Cohen's Kappa
Physician assessment using the ID-UTI definition: reviewer #1 vs reviewer #2	93.1	0.82 (strong)
Consensus physician reviewer assessment using the ID-UTI definition vs CAH REDCap assessment using the ID-UTI definition	93.1	0.83 (strong)

Figure 4. Validity assessment: Cases that were identified as UTI or ASB based on consensus physician review using the ID-UTI definition vs. gold standard (consensus clinical opinion)

		Consensus clinical opinion (gold standard)	
		ASB	UTI
Consensus physician review using standard ID-UTI definition[a,b]	ASB	16	0
	UTI	17	25

[a]Same results if the standard ID-UTI definition was performed by case abstraction with REDCap assessment

[b]Based on these data, the ID-UTI definition was associated with a sensitivity of 48.5%, specificity of 100%, positive predictive value for ASB of 100% and a negative predictive value for ASB of 59.5%

Figure 1. How each measure characteristic was assessed

Measure characteristic	How each characteristic was assessed
Feasibility (i.e., ease of obtaining data for measurement)	- Ability to submit the requested number of cases (≥59 over 10-month period) via REDCap - Secondary goal: ability to submit ≥35 cases over 10-month period
Reliability (i.e., ability to get the same answer every time ID-UTI definition assessed)	- Agreement between hospital-submitted REDCap classification and physician adjudication of deidentified cases. - Both REDCap and physician adjudication use the ID-UTI standard definition of UTI vs ASB.
Validity (i.e., accuracy of ID-UTI definition compared to gold standard)	- Agreement between physician adjudication of cases using ID-UTI standard definition and gold standard. - Agreement between REDCap designation of each case using ID-UTI standard definition and gold standard. - Here, gold standard defined as physician clinical opinion of whether each case was UTI vs ASB
Usability (real-world impact)	- Assessment of whether bi-monthly feedback reports using ID-UTI measure helped CAHs reduce ASB treatment - Impact on ASB treatment assessed over time using mixed-effects logistic regression model

Figure 5. Usability assessment: Hospital performance over time

Percent of cases treated for UTI that had ASB over time

Hospitals receive first performance report

aOR=0.935, 95% CI: 0.873,1.001, p=0.055

treated for UTI that were ASB decreased from 28.4% (range 0-63%) to 18.6% (range, 0-33%; p=0.055) (Figure 5). **Conclusions:** Case abstraction with use of the ID-UTI measure was feasible and reliable to implement with modifications for CAHs. Data collection by untrained staff was as reliable as physician adjudication. Though the ID-UTI standard definition under-counted ASB cases (low sensitivity), cases reported as ASB were always ASB when adjudicated (high specificity). The program, including performance feedback using the ID-UTI measure, was associated with a trend toward lower treatment of ASB.

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Does Serial Procalcitonin Monitoring predict Clinical Outcomes in Children with Sepsis? A diagnostic stewardship study
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Background: In the management of children with sepsis, inflammatory markers are often obtained upon admission and repeated frequently. It is unclear if serial monitoring of procalcitonin is useful for predicting patient outcomes. The focus of our study is to identify if the trend of procalcitonin levels was predictive of the clinical outcomes in children with sepsis. **Methods:** We performed a retrospective diagnostic study to evaluate the association between change in procalcitonin levels and clinical outcomes. Encounters for children 1 to 8 years old with a sepsis ICD 10 diagnosis code and meeting the clinical sepsis criteria from May 2020 to May 2022 at one quaternary care pediatric hospital were included. Encounters with fewer than two procalcitonin values and children with autoimmune diseases, trauma, new onset malignancy, and fungal infections were excluded. Procalcitonin clearance at 48 hours (CL-PCT48) was defined as the difference in procalcitonin values drawn on admission and at 48 hours divided by initial procalcitonin value. The primary outcome was good early clinical response, defined as composite measure of temperature, hemodynamic stability, supplemental oxygen requirement, and need for renal replacement therapy at 120 hours of admission. All-cause in-hospital mortality was a secondary outcome. ROC analysis was performed to measure the correlation of CL-PCT48 and initial procalcitonin value (PCT0) with the outcome. **Result:** There were 320 unique encounters for children who met the clinical criteria of sepsis. The median number of procalcitonin measurements was 4 (Range 2 – 111). Of these encounters, 187 had procalcitonin measurements done at eligible times. The mean age of the study participants was 9 years and 8 months, 103 (55%) were male, and the majority (54%) were Caucasian. Fifty-seven
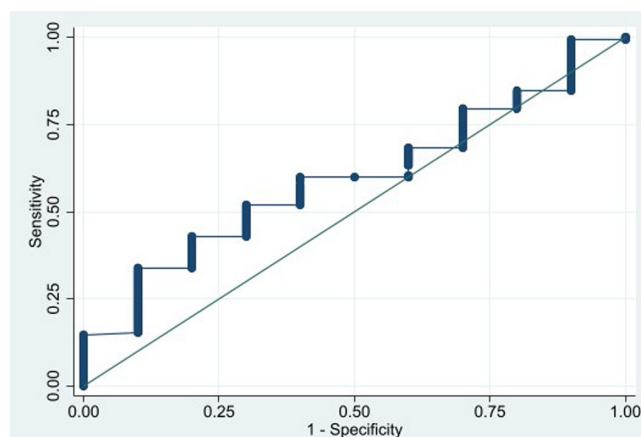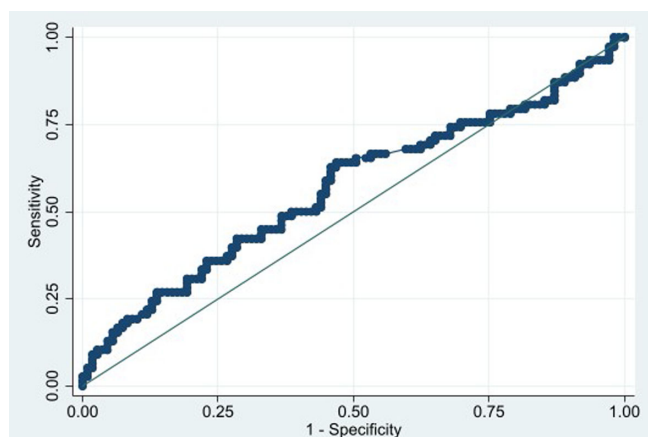

Figure 1: ROC curve for procalcitonin clearance at 48 hours predicting early clinical stability

Figure 2: ROC curve for procalcitonin clearance at 48 hours predicting in hospital mortality

(30%) individuals had bacterial growth from a culture from sterile body fluid or urine. 78 (41.7%) individuals had good early clinical response and 177 (94.7%) survived to hospital discharge. There was no correlation identified between CL-PCT48 and good early clinical response (area under ROC curve [AUC] = 0.57, 95% CI 0.48-0.65, Figure 1) or mortality (AUC = 0.60, 95% CI 0.43-0.76, Figure 2). There was also no correlation between PCT0 and good early clinical response (AUC = 0.47, 95% CI 0.39-0.56) or and mortality (AUC = 0.50, 95% CI 0.29-0.72). **Conclusion:** Procalcitonin clearance at 48 hours after admission did not predict early clinical response in children with sepsis.

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It Takes a Village: Leveraging a Multidisciplinary Team and Technology for Urine Culturing Stewardship
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Background: Patients without urinary tract infection (UTI) symptoms but with a positive urine culture are considered to have asymptomatic bacteriuria (ASB). This often represents colonization and treatment is not recommended or clinically beneficial. Treatment of ASB can promote antimicrobial resistance and increased rates of Clostriodies difficile infections. Many cases of ASB are incorrectly assigned as CAUTIs due to over-culturing practices. We hypothesized that a urine culture algorithm, embedded within a best practice alert (BPA) in the electronic medical record (EMR), would reduce urine culturing practices for ASB. **Methods:** From Feb 2022 through May 2023, a multidisciplinary team implemented an Inpatient Urine Culturing Stewardship Guideline. A BPA fired when a provider placed a urinalysis with reflex to culture (UACC) or urine culture (UC) order for patients who met criteria (Image 1). The BPA directed providers to remove the order, select the appropriate pathway from the guideline, or provide a rationale for placing the order. The intervention was piloted on three intensive care units and two progressive care units, containing both medical and surgical patients. Monthly ordering practices, CAUTI rates, and gram-negative rod (GNR) bacteremia rates from a 13-month pre-intervention baseline period were compared to a 16-month intervention period. Over the same time periods, we also assessed changes