Modified Laboratory Reporting to Prevent Catheter-Associated Urinary Tract Infections (CAUTIs)

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Abstract

Background: Catheter-associated urinary tract infections (CAUTIs) are among the most common healthcare-associated infections. Many patients at our institution with a CAUTI do not have signs or symptoms of infection and bacterial growth likely represents asymptomatic bacteriuria (ASB). As a result, we implemented a Modified Lab Workflow (MLW) focused on diagnostic stewardship to improve urine culture (UCx) reporting and prevent misclassification and unnecessary treatment of CAUTIs.

Methods: On Sep. 1, 2019, laboratory reporting of Foley UCx was modified according to the protocol in Figure 1. UCx results were divided into 3 groups: (1) no growth, (2) mixed bacterial flora (≥3 organisms) not consistent with infection or (3) growth of ≤2 organisms with at least 1 organism $\geq 10^5$ cfu/ml per National Healthcare and Safety Network (NSHN) CAUTI definition. Group 3 UCx were resulted with instructions to the clinician (see Figure 1). When requested, group 3 results were reviewed by Infection Prevention and released with organism identification and antibiotic susceptibility if it met Infectious Diseases Society of America (IDSA) CAUTI criteria. Otherwise they were resulted as: "Bacterial growth indicative of contamination or colonization."

Results: Between Sep. 1, 2019 to Mar. 1, 2020, a total of 134 UCx from catheterized patients were reviewed. Forty-two (31%) of UCx were from patients with a Foley in-situ ≥48 hours and processed through MLW; 92 UCx were from a Foley in place <48 hours and excluded from the study. Of the 42 UCx processed via MLW, 16 (38%) were no growth and 7 (17%) had bacterial growth suggestive of contamination. For group 3, 19/42 (45%) had growth of significant bacteria but only 1(5%) met IDSA criteria for reporting. During the study, 6 additional CAUTIs were reported due to incorrect specimen labeling causing Foley urine specimens to subvert the MLW.

Conclusion: During our study, we identified 1 CAUTI through MLW use. Seven total CAUTIs occurred (SIR=0.66); the majority due to incorrect UCx source labeling, resulting in missed MLW screening. Ten CAUTIs (SIR=0.97) were reported in the preceding 6 months. As part of a comprehensive CAUTI prevention program, a MLW can help reduce classification of ASB as a CAUTI. Education to providers on precise labeling of UCx source is a key component of a successful MLW.

Background

Catheter-associated urinary tract infections (CAUTIs) are among the most common healthcare-associated infections. Many patients at our institution with a CAUTI do not have signs or symptoms of infection and bacterial growth likely represents asymptomatic bacteriuria (ASB).

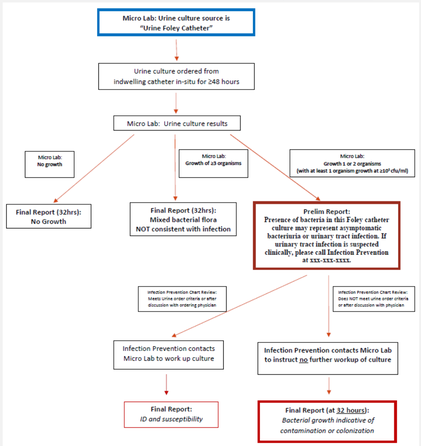
Research on CAUTI reduction has historically focused on infection prevention strategies such as improved care of Foley catheters. We implemented a Modified Lab Workflow (MLW) focused on diagnostic stewardship to improve urine culture (UCx) reporting and prevent misclassification and unnecessary treatment of CAUTIs.

Methods

NorthShore University HealthSystem, located north of Chicago, Illinois is comprised of 4 hospitals with a total of 832 beds. Each hospital provides acute care, surgical, and subspecialty services.

Between September 1, 2019 to March 1, 2020 laboratory reporting of Foley urine cultures was modified according to the protocol in Figure 1. Urine cultures from Foley catheters which did not meet Infectious Diseases Society of America (IDSA) CAUTI criteria were resulted as "Bacterial growth indicative of contamination or colonization."

Figure 1. Modified Laboratory Reporting Workflow for Urine Cultures from Foley Catheters



Results

- A total of 134 urine cultures from adult inpatients with indwelling urinary catheters were reviewed through MLW between September 1, 2019 – March 1, 2020.
- 6 additional CAUTIs were not identified by the MLW because the urine source was not labelled as a catheter specimen. These 6 urine specimens were excluded from the final analysis.

Figure 2. Results of Modified Reporting Workflow

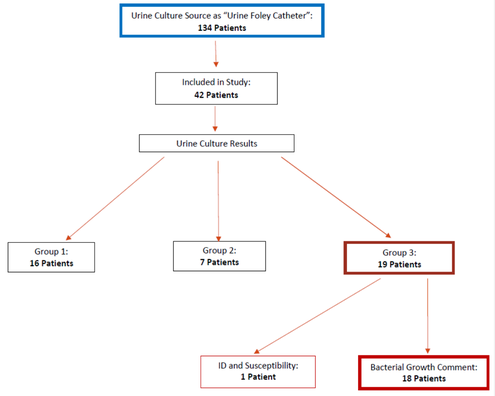


Table 1. Group 3 Patient Demographics

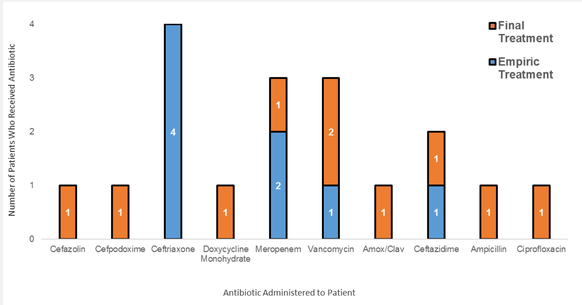
	Urine Culture Result not Requested for Release (N=18)	Urine Culture Result with ID and Susceptibility (N=1)
Age Range	63-93	59
Median	78.5	
Range	63-93	
Sex		
Male	11/18 (61%)	1/1 (100%)
Female	7/18 (39%)	
Ethnicity		
White	13/18 (72%)	1/1 (100%)
Hispanic	2 (11%)	
Black	1 (6%)	
Asian	1 (6%)	
Unlisted	1 (6%)	

Results cont.

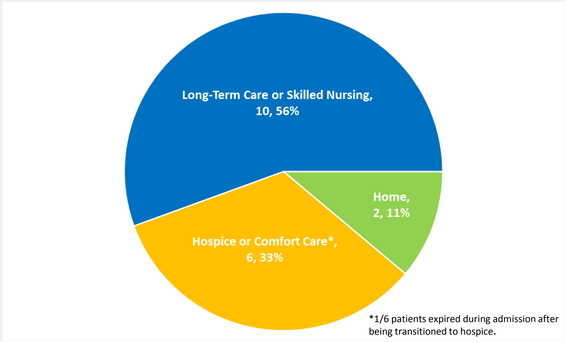
Table 2 . Group 3 Patients Urinalysis and Treatment of UTI

	Urine Culture Result not Requested for Release (N=18)	Urine Culture Result with ID and Susceptibility (N=1)
Urinalysis Collected Before Urine Culture	17/18 (94%)	1/1 (100%)
Abnormal Urinalysis Results	16/17 (94%)	1/1 (100%)
Patient Started on Empiric Treatment	7/18 (39%)	1/1 (100%)
Treatment Continued after Final Urine Culture Result	7/18 (39%)	1/1 (100%)

Graph 1. Empiric & Final Antibiotic Treatment for Group 3 Patients with Bacterial Growth Comment (N=18)



Graph 2. Discharge Location of Group 3 Patients with Bacterial Growth Comment (N=18)



Results cont.

Table 3. Outcomes Summary

	Group 3 Patients with Bacterial Growth Comment (N=18)	Group 3 Patient with Urine ID and Sensitivity (N=1)
30-Day Readmission	0/18 (0%)	0/1 (0%)
All Cause Mortality (30-day)	7/18 (39%)	0/1 (0%)
Hospice or Comfort Care	6/18 (33%)	
Unknown Cause of Death	1/18 (6%)	
Subsequent Positive Urine Culture	1/18 (6%)	0/1 (0%)
Subsequent UTI (30-day)	0/18 (0%)	0/1 (0%)

Discussion

- 19/42 patients received the preliminary MLW comment prompting providers to contact Infection Control if release of urine culture was clinically indicated.
- 1/19 patients had a true CAUTI while the remainder likely had ASB.
- 7/18 ASB patients (39%) were empirically treated for UTI likely due to the abnormal UA result.
  - The most common antibiotics used were ceftriaxone, meropenem, or vancomycin.
- 11/18 ASB patients were not treated and had no adverse clinical outcome.
  - 0/19 of patients were re-admitted within 30 days.
  - All cause 30-day mortality was 37% (7/19 patients)
    - 6/7 patients were transitioned to hospice or comfort care due to poor prognosis not related to UTI.
    - There were no further documentation available on 1/7 patients.

Conclusion

- Using the MLW and careful chart review, we only identified 1 urine culture that met the CAUTI definition.
- Seven CAUTIs occurred (SIR = 0.66) during the intervention period. The majority of these (6) occurred due to incorrect urine source labeling and may not necessarily represent true CAUTIs. Due to incorrect labelling, they were missed by the MLW screening.
- The CAUTI SIR 6 months prior to intervention was 0.97 and 0.66 post intervention.
- As part of a comprehensive CAUTI prevention program, a MLW can help reduce misclassification of ASB as a CAUTI.

References

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