NHSN Catheter-Associated Urinary Tract Infection Surveillance Case Studies 2019

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UTI Case Study #1

Mr. Peabody

UTI Case 1 Mr. Peabody

- 1/19/19 Mr. Peabody Jr. age 47 admitted to **ICU**
- 1/19/19 Triple lumen left Subclavian CL catheter placed
  Indwelling Urinary Catheter (IUC) inserted
- 2/1/19 Fever 100.5^{0}F
- 2/3/19 Subclavian CL catheter removed, PICC placed, Fever continues
- 2/3/19 Urine culture collected; *E.coli* >100,000 CFU/ml
- 2/3/19 Blood Culture collected; positive for *E.coli and Enterobacter cloacae*
- 2/3/19 BP 77/62

Could the BSI be considered secondary to a UTI?

Or is this a primary CLABSI? Identify IWP, DOE, RIT and SBAP.

UTI Case 1 Mr. Peabody

Admit date: 1/19/2019

Hospital Day/Date	First Diagnostic Test	Infection Window Period (*)	Date of Event	Repeat Infection Timeframe (*)	Secondary BSI Attribution Period (*)
13. - 1/31/2019		☐	-		
14. - 2/1/2019		☑ Temp 100.5 F	- **HAI**		
15. - 2/2/2019		☐	-		
16. - 2/3/2019	✓	☑ urine cultureE. coli > 100,000 CFU/ml	-		Blood sample E.coli and Enterobacter cloacae
17. - 2/4/2019		☐	-		
18. - 2/5/2019		☐	-		
19. - 2/6/2019		☐	-		
20. - 2/7/2019			-		
21. - 2/8/2019			-		
22. - 2/9/2019			-		
23. - 2/10/2019			-		
24. - 2/11/2019			-		
25. - 2/12/2019			-		
26. - 2/13/2019			-		
27. - 2/14/2019			-		

Meets SUTI 1a: CAUTI, DOE 2/1; matching blood is secondary

UTI Case 1 Mr. Peabody

- The 2/3/18 – Urine culture E.coli >100,000 CFU/ml

  sets the IWP: 1/31 – 2/6.
- The 2/1 fever is used to meet SUTI, date of event 2/1 which is HAI.
- The IUC was in place more than 2 consecutive days as an inpatient on the DOE therefore this meets SUTI 1a: CAUTI. SUTI RIT: 2/1 – 2/14, SBAP: 1/31 – 2/14
- The 2/3 matching blood pathogens occurs within the Secondary BSI attribution period therefore is considered secondary.
- Teaching Point SUTI 1a sets an RIT and SBAP.

UTI Case 1 Mr. Peabody Bonus Question

What if

- 1/19/19 Mr. Peabody Jr. age 47 admitted to **ICU**
- 1/19/19 Triple lumen left Subclavian CL catheter placed
  Indwelling Urinary Catheter (IUC) inserted
- 2/1/19 Fever 100.5^{0}F
- 2/3/19 Subclavian CL catheter removed, PICC placed, Fever continues
- 2/3/19 Urine culture collected; *E.coli* 80,000 CFU/ml
- 2/3/19 Blood Culture collected; positive for *E.coli and Enterobacter cloacae*
- 2/3/19 BP 77/62

Could the BSI be considered secondary to a UTI?

UTI Case 1 Mr. Peabody Bonus Question Answer

For purposes of NHSN, in order for a bloodstream infection to be determined secondary to another site of infection the following requirements must be met

- At least one organism from the blood specimen must match an organism identified from the site-specific infection that is used as an element to meet the NHSN site-specific infection criterion and the blood specimen is collected in the secondary BSI attribution period.
- The urine culture of E. coli 80,000 CFU/ml does not meet criteria to be used as an element to meet the NHSN site-specific infection criterion (SUTI). No infection identified, no IWP, no SBAP.
- The + blood sample must be investigated as a primary BSI or as an element to meet another site-specific infection

UTI Case Study #2

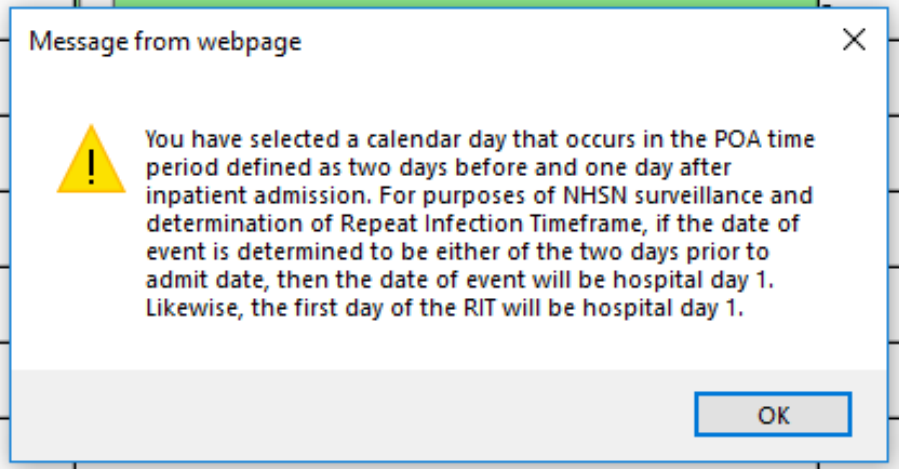
Ms. Urea

UTI Case 2 Ms. Urea

- 1/27/19 Ms. Urea, age 77 was admitted to the **Medical Unit** E4 **at Safe Hospital** with hematuria x 1 week and dysuria the day before admission which is documented in the medical record
- 1/28/19 Positive urine culture *P. mirabilis* >100,000 *CFU/ml,* fever 100.9^0 F
- 1/30/19 Fever 101^0 F
- 2/2/19 Foley catheter inserted by urology due to gross hematuria and clots.
- 2/3/19 Febrile 100.7^0 F
- 2/3/19 Documented hematuria
- 2/8/19 Positive urine culture *ESBL E. coli* >100,000 *CFU/ml,* fever 100.8^0 F

What is Ms. Urea's determination (include IWP, DOE, RIT and SBAP)?

'25/2019		☐	-	
'26/2019		☑ Dysuria	-	
- 1/27/2019 - Admit ate		☐	-	
- 1/28/2019	✓	☑ Urine P. Mirabilis & Fever 100.9 F	-	
- 1/29/2019				
- 1/30/2019				
- 1/31/2019				
- 2/1/2019				
- 2/2/2019				
- 2/3/2019				
- 2/4/2019				
). - 2/5/2019			-	
1. - 2/6/2019			-	
2. - 2/7/2019			-	



UTI Case 2 Ms. Urea

Admit date: 1/27/2019

Hospital Day/Date	First Diagnostic Test	Infection Window Period (*)	Date of Event	Repeat Infection Timeframe (*)	Secondary BSI Attribution Period (*)
1/25/2019		☐	-		
1/26/2019		☑ Dysuria	-		
1. - 1/27/2019 - Admit Date		☐	- **POA**		
2. - 1/28/2019	✓	☑ Urine Culture P. mirabilis & Fever 100.9 F	-		
3. - 1/29/2019		☐	-		
4. - 1/30/2019		☐ Fever 101 F	-		
5. - 1/31/2019		☐	-		
6. - 2/1/2019		IUC Placed	-		
7. - 2/2/2019			-		
8. - 2/3/2019		Fever 100.7 F			
9. - 2/4/2019					
10. - 2/5/2019					
11. - 2/6/2019					
12. - 2/7/2019			-		
13. - 2/8/2019		Fever 100.8	-	Urine culture E.coli > 100,000 CFU/ml	
14. - 2/9/2019			-		

Meets SUTI 1b: non-CAUTI, DOE 1/27 (POA)

2/3 Positive urine culture and fever occur within the RIT; does not become catheter associated

UTI Case 2 Ms. Urea Answer

- The 1/26 dysuria and 1/28 positive urine culture meet **SUTI 1b: Non-CAUTI**, DOE 1/27 which is POA. The RIT is 1/27 – 2/9. The SBAP is 1/25 – 2/9.
- The 2/8 fever and positive urine culture occur within the RIT therefore this is **not a new event**; additional pathogen is considered part of the POA event. Even though Foley is in place > 2 days on 2/8 this does not become CAUTI.

Teaching points:

- Can meet SUTI 1b: POA in patient > 65 years of age by using additional symptoms besides fever.
- When symptoms occur prior to admission, if documented in the medical record and symptom occurs within the IWP the DOE becomes day 1 of admission.
- Do not change device association during the RIT.
- Add new pathogen

UTI Case 2 Ms. Urea Bonus Question

- 1/27/19 Ms. Urea, age 77 was admitted to the **Medical Unit** E4 **at Safe Hospital** with hematuria x 1 week and dysuria the day before admission which is documented in the medical record
- 1/28/19 Positive urine culture *P. mirabilis* >100,000 *CFU/ml,* fever 100.9^0 F
- 1/30/19 Fever 101^0 F
- 2/2/19 Foley catheter inserted by urology due to gross hematuria and clots.
- 2/3/19 Febrile 100.7^0 F
- 2/3/19 Documented hematuria
- 2/8/19 Positive urine culture *ESBL E. coli* >100,000 *CFU/ml,* fever 100.8^0 F

What if there was no temp on 2/8?

Within the RIT, not a new infection

Group Exercise: Analyzing Catheter-Associated Urinary Tract Infections (CAUTI)

Agasha Katabarwa, MPH

Scenario

Sarah Savvy, a new infection preventionist for a freestanding LTACH called Safe Hospital would like to know how her facility's CAUTI SIR is calculated. After gathering her data for the annual survey, she tallies up 10920 annual patient days and 329 annual admissions. Safe Hospital has 2 adult wards; (E4 and W5), and 1 ICU unit. Safe Hospital observed 5 infections in E4 ward and 980 Foley days in this unit in 2018.

Table 1. CAUTI in Long-Term Acute Care Hospitals (LTACHs)

Parameter	Parameter Estimate	Standard Error	p-value
Intercept	-6.6068	0.0585	<0.0001
Average length of stay* : ≥ 27.52 days	0.2063	0.0342	<0.0001
Average length of stay* : < 27.52 days	REFERENT	-	-
Setting**: Freestanding	0.1941	0.0716	0.0067
Setting**: Within a Hospital	REFERENT	-	-
Location Type: ICU	0.3135	0.1077	0.0036
Location Type: Ward	REFERENT	-	-

*Average length of stay is taken from the annual LTACH Survey. It is calculated as: total number of patient days/total number of annual admissions

**LTACH setting (free-standing vs. within a hospital) is taken from the Annual LTACH survey.

1. Calculate Safe Hospital's average length of stay.

$$\text{Average length of stay} = \frac{Total\ Annual\ Patient\ Days}{Total\ Annual\ Admissions} = \frac{10920}{329} = 33.19$$

2. Calculate Safe Hospital's predicted number of infections for E4 ward

$$\text{Logit}(\lambda) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots \beta_i X_i$$

Where α = intercept
β_i = parameter estimate
X_i = presence of risk factor
i= Number of Predictors

Safe Hospital: CAUTI LTACH model	
Factor	Parameter Estimate
Intercept	-6.6068
Average length of stay* : ≥ 27.52 days	0.2063
Average length of stay* : < 27.52 days	REFERENT
Setting: Freestanding**	0.1941
Setting: Within a Hospital**	REFERENT
Location Type: ICU	0.3135
Location Type: Ward	REFERENT

2. Calculate Safe Hospital's predicted number of infections for E4 ward

Logit (λ) = exp [- 6.6068
+ 0.2063(Average length of stay ≥ 27.52)
+ 0.1941(Setting: Free standing)
+ 0.3135(Location Type: Ward)] * catheter days

Logit (λ) = exp [- 6.6068
+ 0.2063(1)
+ 0.1941(1)
+ 0.3135(0)] * 980 catheter days

= 1.976 predicted infections

SIR = *Observed Infections/ Predicted Infections* = *5/1.976* = 2.530

3. If the p-value of this SIR score is greater than 0.05, how can the results be interpreted?

Safe Hospital's observed catheter associated urinary tract infection are not statistically significantly more than the predicted number of infections, based on the 2015 national aggregate data.

4. If the number of catheter days is the same in the ICU as in the Ward, would the number of predicted infections be higher, lower, or the same as the ward?

Logit (λ) = exp [- 6.6068
+ 0.2063(Average length of stay ≥ 27.52)
+ 0.1941(Setting: Free standing)
+ 0.3135(Location Type: ICU)] * catheter days

Logit (λ) = exp [- 6.6068
+ 0.2063(1)
+ 0.1941(1)
+ 0.3135(1)] * 980 catheter days

= 2.704 predicted infections

If the number of catheter days was the same in the ICU as in the ward, the number of predicted infections would be higher.

Thank you

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov