Case Studies

• Purpose
  – Train on use of definitions based on the January 2015 NHSN Patient Safety Manual
  – Learn to accurately apply definitions
  – Optimize consistency in the application of the definitions
  – Improve data quality

• Surveillance ≠ Clinical
Investigating a Positive Urine Culture as Possible CAUTI

<table>
<thead>
<tr>
<th>Proceed in this order*:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Determine infection window period (IWP)</td>
</tr>
<tr>
<td>2. Determine if all criteria occur within IWP, i.e., is it an event? Yes = continue; No = Stop no event</td>
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<tr>
<td>3. Determine date of event (DOE).</td>
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<tr>
<td>4. Determine if present on admission (POA) or healthcare-associated (HAI).</td>
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<tr>
<td>• If POA, previously discharged that day or day before? Yes = UTI attributable to discharging location; No = Stop, POA.</td>
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<tr>
<td>• If HAI, continue</td>
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<td>5. Determine if device-associated.</td>
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<tr>
<td>6. Determine attributable location/facility.</td>
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<tr>
<td>7. Determine Repeat Infection Timeframe</td>
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<tr>
<td>8. Determine Secondary BSI Attribution Period (if necessary)</td>
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</table>

Case 1

- February 1, hospital day 4. Foley has been in place for >2 days and patient spikes temp of >38.0°C. Urine culture collected and positive for $10^5$ CFU/ml of *Klebsiella pneumoniae*, *Citrobacter freundii* (2 species)
- February 3, urine culture collected and positive for $10^5$ CFU/ml *Klebsiella ornithinolytica*
This patient has a CAUTI with date of event Feb. 1

A. True
B. False

This patient meets criteria for CAUTI on Feb 1 with fever, positive urine culture ≥ 100,000 CFU/ml of not more than 2 organisms.

Foley had been in place > 2 days therefore = CAUTI.

NOTE: Do NOT total # organisms from multiple urine cultures.

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Case 2

- 03/02/15 – 66 y.o. to OR from ER for exploratory lap; Foley inserted in OR. Transferred to surgical ward post-op.
- 03/03/15 – Patient is stable, Foley in place.
- 03/05/15 – Foley remains in place. Patient febrile (38.9°C) and complaining of pain in right lower back. WBC increased to 19,000/mcL. He has cloudy, foul-smelling urine. Urine collected for culture positive for >100,000 CFU/ml E. coli.
Is this a CAUTI? If so, what type?

1. No UTI
2. Yes, catheter-associated
   SUTI criterion 1a.
3. Yes, catheter-associated
   SUTI criterion 2a.
4. Yes, catheter-associated
   ABUTI.

Case 2 - Rationale

SUTI 1a: Patient must meet 1, 2, and 3 below:

- Patient has an indwelling urinary catheter in place for the entire day on the date of event and such catheter had been in place for >2 calendar days, on that date (day of device placement = Day 1)

- Patient has at least one of the following signs or symptoms:
  - fever (>38.0 °C)
  - suprapubic tenderness*
  - costovertebral angle pain or tenderness*

- Patient has a urine culture with no more than two species of organisms, at least one of which is a bacteria of ≥10^5 CFU/ml. All elements of the UTI criterion must occur during the Infection Window Period

Date of event (3/5) occurred on or after day 3 of admission. This UTI is catheter-associated because the date of event was Foley day 4. Right or left lower back is the CVA and there was no other cause for the CVA pain. Patient has >10^5 CFU/ml of single bacteria in urine.
Case 3

- Day 1: 58-year-old patient is admitted to the ED with GI bleed. Foley inserted.
- Day 2: Patient spikes temp of 38.6°C. Indwelling catheter remains in place.
- Day 3: Urine specimen is collected.
- Day 4: Culture results 100,000 CFU/ml *Pseudomonas aeruginosa*. Antibiotics started.
- Day 5: Patient asymptomatic and afebrile.

Is this an HAI? If so, what type?

1. Yes, healthcare-associated UTI but not a CAUTI because catheter had not been in for > 2 calendar days
2. No, it is a UTI that is POA
3. Yes, CAUTI, SUTI criterion 1a
Case 3 Rationale

• Date that the first element of the SUTI 1a criterion occurred during the infection window period was on Day 2 of hospitalization.

• Date of event = Day 2. This is within the POA time period.

Case 3-Continued

Day 15: Foley remains in place. Patient completed treatment for UTI on hospital day 11 and has been afebrile since. Hospitalization has been complicated by development of DVT. Temperature today 38.1°C. Cough productive of yellow phlegm. Rhonchi present.


Day 17: Urine specimen collected.

Day 18: Urine and sputum cultures both positive for *S. aureus* with > 100,000 CFU/ml in urine.
Should another CAUTI be reported?

1. No. The UTI is secondary to a respiratory infection.

2. No, the date of event for a UTI related to this culture occurs during the RIT of previous UTI.

3. Yes. First UTI resolved and treatment finished.
Case 3-Rationale

- Unlike CLABSIs, CAUTIs may NOT be excluded as secondary to another infection. **Fever cannot be attributed to another source of infection.**‡

- The date of event for this UTI would be Day 15 (date of fever) which is within RIT for POA UTI from Day 2.

- If earlier UTI was HAI and was reported, *S. aureus* would be added as pathogen to that event.

‡ See March 2012 Newsletter; also note the lack of “*” following fever in criteria.
Case 4

04/05/15: 76-year-old woman is admitted from LTAC at 8 a.m. for surgical debridement of sacral decubitus. Medical history notable for severe rheumatoid arthritis, CHF and atrial fibrillation. Routine admission U/A performed, positive for leukocyte esterase, and 3 WBC by HPF of spun urine. Patient afebrile, denies urinary urgency, frequency or pain. No suprapubic or CVA pain. Foley catheter present on admission, and peripheral IV is inserted in OR. Admit postoperatively to telemetry unit.

04/06/15: Wound care specialist documents wound clean. Temperature 37.4°C. Foley draining cloudy urine.

Case 4

04/07/15: Transfer to surgical unit. WBC’s 12,100/mcL. Temp of 37.9°C. Foley removed. Encouraged to push p.o. fluids. Urine specimen sent to lab for culture and sensitivity.

04/08/15: Patient complains of dysuria and tenderness with palpation to suprapubic area. Bactrim started.

04/09/15: Urine specimen sent on 04/07 results are positive for Candida albicans 100,000 CFU/ml. Patient afebrile. Preparing for discharge back to LTAC.
As of 4/9 does this patient have a UTI and if so, is it a CAUTI?

1. No. UTI criterion not yet met.
2. No, UTI was present on admission
3. Yes, Patient has a SUTI 1a. and it is a CAUTI
4. Yes, Patient has a SUTI 1b. but it is not a CAUTI

Case 4 - Rationale

- Because the only organism present at ≥ 100,000 CFU/ml was not a bacteria, this patient does not meet NHSN UTI criteria.

- If a positive urine culture with at least 1 bacterium of ≥ 100,000 CFU/ml and not > 2 organisms, is collected sometime 4/10-4/11 = non-catheter-associated UTI. (A positive urine culture collected on one of these days could be combined with the dysuria on 4/8, in an infection window period extending 3 days prior and 3 days after the urine culture).
Case 4- Continued

- What if everything was the same except that the urine culture result was positive for *S. aureus* 100,000 CFU/ml and *Candida albicans* 100,000 CFU/ml?

Does this patient have a UTI and is it a CAUTI?

1. No, UTI criterion not met
2. No, UTI was present on admission
3. Yes, Patient has a SUTI 1a and it is a CAUTI
4. Yes, Patient has a SUTI 1b but it is not a CAUTI
Case 4 Rationale

- DOE= 4/7 – Date of urine culture
- No more than 2 organisms in urine, 1 of which was bacteria > 100,000 CFU/ml
- SUTI 1a criterion met; Infection Window Period = 4/4-4/10.
- Foley had been in > 2 days on DOE and removed that day = catheter-associated

Case 4-

To which location would the CAUTI be attributed?

1. Telemetry unit
2. Surgical unit

Rationale: The date of event is the day after of transfer from the telemetry unit.
Case 5

May 15: 48-year-old male involved in motorcycle accident. Closed head injury, multiple fractures. Taken to OR for ORIFs and evacuation of subdural hematoma. Foley catheter and left subclavian catheter placed in ED. Patient remains on ventilator which was placed in OR. Lungs clear bilaterally.

May 21: Tmax 99.8°F, Lungs clear bilaterally. Foley remains in place draining, clear yellow urine. Patient remains ventilated, sputum production slightly increased.
Case 5

May 22: Tmax 100.4°F; vent settings stable. No change to sputum production.

May 23: Tmax 100.4°F; WBC 14,000/mcL. Lungs sounds clear; CXR clear, remains on vent; Foley and central line remain in place. Pan cultures sent. Empiric antibiotic treatment begun.

May 24: Urine culture: >100,000 CFU/ml of *P. aeruginosa* and >100,000 CFU/ml of *C. glabrata*. Blood culture: *P. aeruginosa*. Physical assessment normal. No patient response to suprapubic or costovertebral angle palpation.

Does this patient have a UTI? If so, what type and pathogen(s)?

1. No UTI.
2. Yes, ABUTI with *P. aeruginosa* and *C. glabrata*.
3. Yes, ABUTI with *P. aeruginosa* ✔️
4. Yes, SUTI 1a.
Case 5 - Rationale

- Yes. Patient without UTI criteria symptoms in the presence of blood culture matching urine culture ($\geq 100,000$ CFU/ml) = ABUTI.

- Candida is not a pathogen for UTI therefore not documented in pathogen list.

- Note that fever must be GREATER than 100.4°F to meet the fever requirements for NHSN definitions.

Case 6

08/25: 73-year-old patient in neurosurgical ICU, admitted following cerebrovascular accident. Ventilated, subclavian catheter and Foley catheter inserted on admit. Patient reacts only to painful stimuli.

9/2: WBCs slightly elevated, at 12,000/mcL, temp maximum 38.2°C, urine cloudy. Lungs clear to auscultation. Still ventilated, and catheterized.
Case 6

9/3: WBC 15,800/mcL, Temperature maximum: 37.6°C. Breath sounds slightly coarse, minimal clear sputum. Urine unchanged. U/A performed. Blood, endotracheal and urine specimens collected for culture. No suprapubic or CVA pain noted.

9/4: Urinalysis positive for leukocyte esterase, nitrites and WBC too numerous to count. Blood and endotracheal cultures no growth. Urine > 10,000 CFU/ml *E. faecium*. Antibiotics begun for UTI.

9/5-9/7: Afebrile

Does this patient have a UTI? If so, what type?

1. Yes, ABUTI.
2. Yes, SUTI Criterion 1a.
3. Yes, SUTI Criterion 1b.
4. No UTI.
Case 6 Rationale

- Urine reported >10,000 CFU/ml
- May not reach minimum ≥100,000 CFU/ml
- Physician diagnosis and treatment not part of NHSN UTI criteria

* Must check with your lab to understand their reporting definitions

Case 7: Peter Unlucky

March 1: Peter Unlucky, 48-years-old, is admitted postoperatively to your surgical ward following injuries sustained in a crocodile wrestling tournament. A Foley catheter was placed during surgery. He is found to be severely anemic and is transfused with 2 units of blood. IV antibiotics begun.

March 2: Peter’s Foley was removed this a.m. but he has been having trouble voiding and has not felt that he has been emptying his bladder. He is catheterized post-void and 600 ml of residual urine is collected. The Foley catheter is left in place and urine culture is sent. Temp 38.2°C.

March 3: Urine culture is reported positive for 80,000 CFU/ml of *E. faecium*. Temp 38.1°C.
Peter Unlucky

March 4: Afebrile. Foley continues.

March 5: Foley discontinued.

March 6: Urine pink-tinged. Temp 38.0°C.

March 7: Temp 38.3°C. Right leg wounds slightly reddened.

March 8: Temp 38.0°C

March 9: Temp 37.9°C. Small amount of pus right leg wounds. Wound cultures collected.

March 10: Urine culture collected. Positive for 100,000 CFU/ml *E. faecium*. Wound culture positive for *P. aeruginosa*.

Does Peter Unlucky have a healthcare-associated UTI?

1. Yes, SUTI criterion 1a, date 3/7
2. No. Peter’s fever is due to his leg infection.
3. No. Peter’s UTI is POA because of the positive urine culture collected during the POA timeframe.
Peter Unlucky Rationale

- The urine culture of 80,000 CFU/ml cannot be used to meet UTI criterion.

- A positive urine culture with $\geq 100,000$ CFU/ml of a bacterium and not more than 2 organisms was collected on 3/10.

- Fever was present during the infection window period (3/7-3/13).

- Date of event = first date of first element during IWP (fever 3/7).

- (Also meets SKIN Cr 1: purulent drainage)

<table>
<thead>
<tr>
<th>Hosp Day</th>
<th>Device</th>
<th>UTI Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (3/1)</td>
<td>Foley (F)</td>
<td>Urine culture (&quot;+&quot; 80,000 CFU/ml E. faecium) Temp 38.2°C</td>
</tr>
<tr>
<td>2</td>
<td>F discont; reinserted</td>
<td>Temp 38.1°C</td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td>Temp 38.1°C</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>5 (3/5)</td>
<td>F discont.</td>
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<td>6</td>
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<tr>
<td>7 (3/7)</td>
<td></td>
<td>Temp 38.3°C</td>
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<td>8</td>
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<td>9</td>
<td></td>
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<tr>
<td>10 (3/10)</td>
<td></td>
<td>Urine culture (&quot;+&quot; 100,000 CFU/ml E. faecium)</td>
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<tr>
<td>11</td>
<td></td>
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<tr>
<td>12</td>
<td></td>
<td><strong>Note that this is NOT catheter-associated</strong></td>
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<tr>
<td>13-20</td>
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</tbody>
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Date of event

14 Day Repeat Infection Timeframe (RIT)
Case 8

April 15: 8-month-old female, admitted for cardiac surgery. Foley inserted in OR.

April 18: Foley still in place for strict intake and output. Patient progressing but more irritable. Temp 38.1°C. Blood and urine cultures collected. WBC: 13,000/mcL.

April 19: Temp 38.4°C. Urine specimen result = $10^5$ CFU/ml E. Coli; Blood culture: E. Coli.

Does this patient have a UTI? If so, what type?

1. Yes, ABUTI.

2. Yes, SUTI Criterion 1a with secondary BSI.

3. Yes, SUTI Criterion 2 with secondary BSI.

4. Yes, Either 2 or 3 above

5. No. UTI is secondary to BSI.

*Patient also has secondary BSI.*
Case 8 - Rationale

- *Urine culture is positive for ≤ 2 organisms*
- *At least one is bacterium ≥ 100,000 CFU/ml*
- *Fever > 38.0°C during the Infection Window Period (4/15-4/21)*
- *Date of event = 4/18*
- *Note: SUTI 1a can be used for patients < 1 year of age.*

**Q: Is this a CAUTI?**

**A: Yes. Catheter in place > 2 days on the date of event and still in place.**

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<tr>
<th>Hosp Day</th>
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<th>UTI Criterion</th>
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</thead>
<tbody>
<tr>
<td>1 (4/15)</td>
<td>Foley (F)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>4 (4/18)</td>
<td>F</td>
<td>Urine culture (&quot;+&quot; 100,000 CFU/ml <em>E. coli</em>); Blood culture (&quot;+&quot; <em>E. coli</em>); Temp 38.1°C</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Temp 38.4°C</td>
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<tr>
<td>10</td>
<td>SUTI 1a with <em>E. coli</em>;</td>
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<td>11</td>
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<td><strong>Date of event: 4/18;</strong></td>
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<tr>
<td>12</td>
<td></td>
<td><strong>Secondary BSI</strong></td>
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<td>14-17</td>
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14 Day Repeat Infection Timeframe (RIT)

Date of event

Secondary BSI Att. Period
Great Job!!!

Also Worth Considering in Your Facility

- Culturing practices
  - Change long-dwelling catheters before collecting urine? - exclude colonization
  - Reflex urine cultures? - send U/A along with culture and only perform culture if U/A is positive
  - Indications for urine cultures?
  - Improving diagnostic practices can:
    - improve patient safety
    - improve CAUTI rates
    - increase staff moral
Questions?

Questions: email user support
nhsn@cdc.gov

NHSN Website:
http://www.cdc.gov/nhsn/