Overview of Revised LTC Surveillance Definitions

First developed in 1991 by McGeer et al
Modified from CDC acute care definitions
Provide standardized definitions for benchmarking and research activities
Updated version published in 2012
Consensus obtained from infectious disease physicians, geriatricians, infection prevention nurses
Evidence-based review of literature
Overview: LTC Surveillance Definitions

- Intended for use in LTC facilities among older adults who require care for impaired cognition, assistance with activities of daily living or skilled nursing care
- Not designed for use in long-term care hospitals, inpatient rehabilitation facilities or pediatric LTC facilities

Guiding principles:
- Specificity: Increase likelihood that identified events are true healthcare-associated infections (HAIs).
- Sensitivity: Definitions may not be adequate for real-time case finding, diagnosis or clinical decision-making.
- Surveillance is targeted toward identifying preventable events or those with high risk of transmission.

HAIs are those with no evidence of incubation at time of admission to facility, and onset of symptoms occurs > 2 calendar days after admission.

Diagnosis by a physician alone is not sufficient to meet surveillance definitions.
Overview: LTC Surveillance Definitions

Consider the following when applying surveillance definitions:
- All symptoms must be new or acutely worse.
- Alternate noninfectious causes should be considered.
- Identification of an infection should not be based on a single piece of evidence but should also include clinical presentation and available microbiological and radiologic information.

Constitutional criteria
- Standardized definitions for fever, acute change in mental status and acute functional decline are provided.
- Criteria are consistent with 2008 Infectious Disease Society of America guidelines.
- New lower threshold for fever increases sensitivity.
- Standardizes assessment of mental status and functional change using Minimum Data Set scoring system.

SHEA/CDC Position Paper


SHEA = Society for Healthcare Epidemiology of America
Surveillance for UTI

Background

- 20-30% of reported HAIs among LTC residents are UTIs.
- UTI prevalence is estimated at 25-50%, and accounts for large amount of antibiotic use.
- Risk factors
  - Age-related changes in the urinary tract
  - Co-morbid conditions resulting in neurogenic bladder
  - Instrumentation required to manage bladder voiding

Background

- Complications of catheter-associated urinary tract infections (CAUTI) include functional decline, bacteremia, septic shock, increased mortality.
**Background**

- UTI protocol is designed for
  - Certified skilled nursing facilities/nursing homes.
  - Intermediate/chronic care facilities for the developmentally disabled.
- Surveillance should be done facility-wide.
- For residents transferred from an acute care facility: Signs/symptoms within first 2 calendar days of admission are considered present at time of transfer and should be reported back to the transferring facility.

**UTI Surveillance Protocol**

Signs/symptoms of infection occurring within 2 calendar days of admission (date of admission is day 1) are considered present on admission and are not HAIs.

### Example: Classification of HAI Events

<table>
<thead>
<tr>
<th>Admission date</th>
<th>June 4</th>
<th>June 5</th>
<th>June 6</th>
<th>June 7</th>
<th>June 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>Day 2</td>
<td>Day 3</td>
<td>Day 4</td>
<td>Day 5</td>
<td></td>
</tr>
<tr>
<td>POA—not an HAI</td>
<td>Potential HAI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A positive urine culture is necessary for diagnosis of UTI and is required for both CAUTI and non-CAUTI events.

- Voided specimen: need at least 100,000 (10^5) CFU/ml of microorganisms, no more than 2 species.
- Indwelling catheter: need at least 100,000 (10^5) CFU/ml of any microorganisms.
- If collected by in and out catheter: need at least 100 (10^2) CFU/ml of any number of organisms.
**UTI Surveillance Protocol**

- Before urine samples for culture are obtained from residents with chronic catheters (in place for more than 14 days) the original catheter should be replaced and specimen obtained from the new catheter.
- Repeat cultures, or "tests of cure" are not recommended.

**UTI Definitions**

- Date of event: date when the first clinical evidence (signs/symptoms) of the UTI appeared, OR, the date of specimen collection, whichever comes first.
- Symptomatic UTI (SUTI): resident has signs/symptoms localized to the urinary tract (e.g., acute dysuria, new/marked increased frequency, suprapubic tenderness).

**UTI Definitions**

- CA-SUTI: resident develops signs/symptoms localized to urinary tract while indwelling catheter is in place, OR, removed within the 2 calendar days prior to the date of the event (where day of catheter removal is day 1).
  
  Note: catheter must be in place for a minimum of 2 calendar days prior to onset of infection (date of event).
### UTI Definitions

<table>
<thead>
<tr>
<th>June 1</th>
<th>June 2</th>
<th>June 3</th>
<th>June 4</th>
<th>June 5</th>
<th>June 6</th>
<th>June 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1 insertion</td>
<td>Day 2 insertion</td>
<td>Day 3 insertion</td>
<td>Day 1 removal</td>
<td>Day 2 removal</td>
<td>Day 3 removal</td>
<td>Day 4 removal</td>
</tr>
<tr>
<td>Not CA-SUTI event days</td>
<td>Potential CA-SUTI event days</td>
<td>Not a CA-SUTI event day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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#### UTI Definitions

- **Indwelling urinary catheter**: a drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a closed collection system (also called a Foley catheter).
- **Straight in and out, condom and suprapubic catheters** are not indwelling catheters.

Note: UTIs in residents managed with non-indwelling catheters will be considered SUTIs, not CA-SUTIs.

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#### UTI Definitions

Asymptomatic bacteremic UTI (ABUTI): resident has no signs/symptoms localizing to the urinary tract but has urine and blood cultures positive for at least one matching organism, whether or not a catheter is in place.
Examples of Matching Organisms

<table>
<thead>
<tr>
<th>Culture</th>
<th>Companion culture</th>
<th>Report as</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus epidermidis</td>
<td>Coagulase-negative staphylococci</td>
<td>S. epidermidis</td>
</tr>
<tr>
<td>Klebsiella oxytoca</td>
<td>Klebsiella spp.</td>
<td>K. oxytoca</td>
</tr>
<tr>
<td>Streptococcus salivarius</td>
<td>Strep viridans</td>
<td>S. salivarius</td>
</tr>
</tbody>
</table>

Symptomatic Urinary Tract Infection (SUTI) Event in LTCF (non-catheter-associated)

Resident name _____________ Record number________________ Date of admission____________
Date of review___________ Date of event___________ (date first signs/symptoms appeared or specimen was collected, whichever is first)

- □ Signs and symptoms of UTI develop > 2 calendar days after admission
- □ Resident does not have an indwelling urinary catheter in place, nor was it removed within the 2 calendar days prior to date of event

Criteria 1a
- □ Resident has at least one of the following signs and symptoms
  - acute dysuria
  - acute pain, swelling or tenderness of the testes, epididymis or prostate
  - AND
  - □ One of the following laboratory results:
    - a voided urine culture with $\geq 10^5$ CFU/ml of no more than 2 species of microorganisms
    - a positive culture with $\geq 10^2$ CFU/ml of any microorganisms from straight in/out catheter specimen

Criteria 2a
- □ Resident has at least one of the following
  - fever
  - leukocytosis
  - AND
  - □ At least one of the following signs and symptoms
    - costovertebral angle pain or tenderness
    - new or marked increase in suprapubic tenderness
    - gross hematuria
    - new or marked increase in incontinence
    - new or marked increase in urgency
    - new or marked increase in frequency
  - AND
  - □ One of the following laboratory results:
    - a voided urine culture with $\geq 10^5$ CFU/ml of no more than 2 species of microorganisms
    - a positive culture with $\geq 10^5$ CFU/ml of any microorganisms from straight in/out catheter specimen

*fever: single temperature $\geq 37.8$ °C ($> 100$ °F) or $> 37.2$ °C ($> 99$ °F) on repeated occasions, or an increase of $> 1.1$ °C ($> 2$ °F) over baseline
*leukocytosis: $> 14,000$ WBC/mm$^3$, or a left shift ($> 6$% bands or $1,500$ bands/mm$^3$)
Symptomatic Urinary Tract Infection (SUTI) Event in LTCF (non-catheter-associated)

Criteria 3a
- Resident has at least two of the following signs and symptoms
  - costovertebral angle pain or tenderness
  - new or marked increase in suprapubic tenderness
  - gross hematuria
  - new or marked increase in incontinence
  - new or marked increase in urgency
  - new or marked increase in frequency

AND
- At least one of the following laboratory results
  - a voided urine culture with ≥ 10^5 CFU/ml of no more than 2 species of microorganisms
  - positive culture with ≥ 10^2 CFU/ml of any microorganisms from straight in/out catheter specimen

Catheter-Associated Symptomatic Urinary Tract Infection Event in LTCF (CA-SUTI)


Asymptomatic Bacteremic Urinary Tract Infection Event in LTCF (ABUTI)

**UTI Denominator Data**

- **Catheter-days**
  - Defined as the number of residents with an indwelling urinary catheter; collected daily for all residents in the facility and totaled at the end of the month.
- **Resident-days**
  - Calculated using the daily census of residents in the facility each day of the month and totaled at the end of the month.

Note: If a resident is transferred to an acute care facility for a suspected UTI, no additional indwelling catheter days are counted after the day of transfer.

**UTI Data Calculations**

**Total UTI incidence rate/1,000 resident-days**

\[
\text{Total UTI incidence rate/1,000 resident-days} = \frac{\text{number of UTI events (SUTI + CA-SUTI + ABUTI)}}{\text{total resident-days}} \times 1,000
\]

- \(\% \text{ SUTI} = \frac{\text{number of SUTI events}}{\text{total number of UTI events}} \times 100\)
- \(\% \text{ CA-SUTI} = \frac{\text{number of CA-SUTI events}}{\text{total number of UTI events}} \times 100\)
- \(\% \text{ ABUTI} = \frac{\text{number of ABUTI events}}{\text{total number of UTI events}} \times 100\)

**SUTI incidence rate/1,000 resident-days**

\[
\text{SUTI incidence rate/1,000 resident-days} = \frac{\text{number of SUTI events}}{\text{total resident-days} - \text{total catheter-days}} \times 1,000
\]

These events are not catheter-associated.
**UTI Data Calculations**

**CA-SUTI incidence rate/1,000 catheter-days**

\[
\text{number of CA-SUTI events/total catheter-days} \times 1,000
\]

Only symptomatic events which develop at the time an indwelling catheter is in place or recently removed (within last 2 calendar days) will contribute to the CA-SUTI rate.

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**UTI Data Calculations**

**Urinary catheter utilization ratio**

\[
\text{total urinary catheter-days/total resident-days}
\]

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**Links**

- **NHSN UTI protocol**
- **NHSN denominator form**
  [http://www.cdc.gov/nhsn/PDFs/LTC/forms/57.142_DenominatorLTCF_BLANK.pdf](http://www.cdc.gov/nhsn/PDFs/LTC/forms/57.142_DenominatorLTCF_BLANK.pdf)
- **DPH UTI surveillance worksheets**
Catheter-Associated Symptomatic Urinary Tract Infection Event in LTCF (CA-SUTI)


Resident name _____________ Record number __________________ Date of admission ____________
Date of review _____________ Date of event _______________ (date first signs/symptoms appeared or specimen was collected, whichever is first)

- Signs and symptoms of UTI develop > 2 calendar days after admission
- Resident has at least one of the following, with no alternate cause
  - Fever
  - Rigs
  - New onset hypotension, with no alternate site of infection
  - New onset of confusion/functional decline AND leukocytosia
  - New costovertebral angle pain or tenderness
  - New or marked increase in suprapubic tenderness
  - Acute pain, swelling, or tenderness of the testes, epididymis, or prostate
  - Pusulent discharge from around the catheter

AND
- At least one of the following
  - Urinary catheter was removed within the past 2 calendar days of date of event AND a voided urine culture with ≥ 10^5 CFU/ml of no more than 2 species of microorganisms was obtained
  - Urinary catheter was removed within the past 2 calendar days of date of event AND a positive culture with ≥ 10^2 CFU/ml of any microorganisms from straight in/out catheter specimen was obtained
  - Urinary catheter is in place and a positive culture with ≥ 10^5 CFU/ml of any microorganisms from indwelling catheter specimen was obtained

* Fever: single temperature ≥ 37.8°C (> 100°F) or > 37.2°C (> 99°F) on repeated occasions, or an increase of > 1.1°C (> 2°F) over baseline
  - Leukocytosia: > 14,000 WBC/mm^3, or a left shift (> 6% or 1,500 bands/mm^3)

Surveillance for MDRO

Background

MDRO module includes surveillance for
- *C. difficile* infections (CDI)
- Methicillin sensitive *S. aureus* (MSSA)
- Methicillin-resistant *S. aureus* (MRSA)
- Vancomycin-resistant *Enterococcus* spp. (VRE)
- Cephalosporin-resistant *Klebsiella* spp.
- Carbapenem-resistant *E. coli* and *Klebsiella* spp. (CRE)
- Multidrug-resistant *Acinetobacter* spp.
Background

- A large proportion of LTC residents are at risk for MDRO carriage; infections with MDRO are associated with increased lengths of stay, hospitalizations, readmissions, healthcare costs and mortality.
- Both MDRO and CDI prevalence is increasing.

Purpose of CDI/MDRO protocol is to enable facilities to collect, report and analyze data that will inform infection prevention strategies.
- Two components of the protocol:
  - CDI
  - MDRO
- Protocols based on laboratory test data to be used without clinical evaluation of the resident.
- Data are collected facility-wide.

Prevention Resources

Prevention Resources

- DPH Guidance for Prevention of Transmission of CRE in Skilled Nursing Facilities 
  http://www.dhs.wisconsin.gov/publications/P0/p00532.pdf

CRE Surveillance Protocol

- Laboratory-based, with no clinical evaluation of the resident.
- Surveillance is conducted facility-wide.

CRE Definition

- Any Klebsiella spp. or E. coli testing non-susceptible to any one of the carbapenem antibiotics
  - Imipenem
  - Meropenem
  - Doripenem
- Non-susceptible: intermediate or resistant, with an MIC > 1 ug/ml
Laboratory-identified MDRO Event in LTCF

Resident name ___________________ Record number________________ Date of admission__________ Date of previous MDRO culture result________ Date of review___________ Date of event___________ (date of specimen collection)

MDRO laboratory-identified event (MDRO LabID)
□ Individual is receiving care at the LTCF at time of specimen collection AND
□ Specimen is collected for clinical assessment purposes (not active surveillance testing) AND
□ One of the following definitions of a unique laboratory event is met
    □ MDRO isolate is the first one obtained in the calendar month from any specimen source (e.g., urine, wound, sputum, blood) for the resident (if source is blood, a prior positive blood culture with the same MDRO must not occur ≤14 days before the current blood culture, even if in different calendar months)
    □ MDRO isolate the first obtained from a blood source in the calendar month (with no prior positive blood culture with the same MDRO ≤14 days before the current blood culture). A prior MDRO may or may not have been obtained from another source (e.g., urine, wound, sputum)

CRE Denominator Data

Resident-days
- Calculated using the daily census of residents in the facility each day of the month and totaled at the end of the month.
CRE Data Calculations

Total CRE rate

\[
\frac{\text{number of CRE LabID events per month}}{\text{number of resident-days per month}} \times 1,000
\]

CRE Response

- Report to DPH HAI Prevention Program.
- Follow DPH CRE response protocol in the nursing home toolkit.
- DPH CRE webpage
  [http://www.dhs.wisconsin.gov/communicable/ARO/CRE.htm](http://www.dhs.wisconsin.gov/communicable/ARO/CRE.htm)
- DPH CRE toolkit for skilled nursing facilities
  [http://www.dhs.wisconsin.gov/publications/P0/p00532.pdf](http://www.dhs.wisconsin.gov/publications/P0/p00532.pdf)

Cases of CRE among Wisconsin Hospital Inpatients
\( n = 49 \)

Cases are assigned to county where the reporting hospital is located.
CRE Report

http://www.dhs.wisconsin.gov/publications/P0/P00578.pdf

Links

NHSN MDRO/CDI protocol

NHSN denominator form
http://www.cdc.gov/nhsn/PDFs/LTC/forms/57.142_DenominatorLTCF_BLANK.pdf

DPH MDRO/CDI surveillance worksheet

Surveillance for CDI
CDI Surveillance

- Report positive *C. difficile* laboratory assays obtained from any resident receiving care at the facility.
- Do not include tests obtained when the resident was not admitted to the facility.
- Number of resident admissions and number of resident-days are recorded for each month.
- Testing should be done only on liquid or watery stool samples (i.e., conforming to the shape of the container).

CDI Definitions

- *C. difficile* positive laboratory assay: a positive result for *C. difficile* toxin A or B by enzyme immunoassay (EIA), OR, a toxin-producing organism detected in the stool by culture or other laboratory means (nucleic acid amplification testing by PCR)
- Duplicate *C. difficile* positive laboratory assay: any *C. difficile* positive test from the same resident following a previous positive test within the past two weeks

CDI Definitions

CDI laboratory-identified (LabID) event: all non-duplicate positive assays obtained while a resident is receiving care in the LTC facility. Laboratory results obtained from outside facilities should not be considered LabID events.
CDI Definitions

- Incident CDI LabID event: the first event ever reported for a resident, OR, a subsequent event reported > 8 weeks after the most recent LabID event reported.
- Recurrent CDI LabID event: any LabID event reported > 2 weeks and ≤ 8 weeks after the most recent LabID event reported.

Example: Classification of CDI LabID Events as CO or LO

<table>
<thead>
<tr>
<th>Admission date</th>
<th>June 5</th>
<th>June 6</th>
<th>June 7</th>
<th>June 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>Day 2</td>
<td>Day 3</td>
<td>Day 4</td>
<td>Day 5</td>
</tr>
<tr>
<td>Community-onset (CO)</td>
<td>Long-term care facility-onset (LO)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Labratory-identified C. difficile Infection Event in LTCF
NHSN LTCF MDRO/C. difficile protocol

Resident name ___________________ Date of admission Date of previous positive C. difficile test result
Date of review ___________________ Date of event (date of specimen collection)

C. difficile infection laboratory-identified event (CDI LabID)

- Individual is receiving care at the LTCF at the time of specimen collection
  AND
- Stool specimen to be tested conforms to the collection container
  AND
- A positive C. difficile test result is obtained by at least one of the following laboratory methods
  ○ detection of C. difficile toxin A or B by enzyme immunoassay (EIA)
  ○ detection of a toxin-producing C. difficile organism by stool culture or by other laboratory means (e.g., nucleic acid amplification by PCR)
  AND
- Any previous C. difficile positive test result was obtained >14 days prior to the current test result

Figure 1. C. difficile Test Result Algorithm for Laboratory-identified (LabID) Events.

CDI Denominator Data

Monthly totals for:
- Resident-days
- Resident admissions
CDI Data Calculations

Total CDI rate/10,000 resident-days

\[
\frac{\text{number of CDI LabID events per month}}{\text{number of resident days per month}} \times 10,000
\]

CDI Data Calculations

CDI LTC facility-onset incidence rate/10,000 resident days

\[
\frac{\text{number of all incident LO CDI LabID events per month}}{\text{number of resident days}} \times 10,000
\]

(This formula excludes recurrent CDI events.)

CDI Data Calculations

Percent community-onset

\[
\frac{\text{number of CO CDI LabID events}}{\text{total number of CDI LabID events}} \times 100
\]

Percent LTC facility-onset

\[
\frac{\text{number of LO CDI LabID events}}{\text{total number of CDI LabID events}} \times 100
\]

Percent recurrent CDI

\[
\frac{\text{number of recurrent CDI LabID events}}{\text{total number of CDI LabID events}} \times 100
\]