



**Surveillance in Long-Term Care Facilities:
Urinary Tract Infections (UTI) and
Multidrug-Resistant Organisms (MDRO)**

Wisconsin Division of
Public Health
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**Overview of Revised LTC
Surveillance Definitions**

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**Overview: 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

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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

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Overview: LTC Surveillance Definitions



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.

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Overview: LTC Surveillance Definitions



- 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.

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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.

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Overview: LTC Surveillance Definitions



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.

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SHEA/CDC Position Paper



Stone ND, Ashraf MS, Calder J, et al. Surveillance definitions in long-term care facilities: Revisiting the McGeer criteria. *Infect Control Hosp Epidemiol* 2012;33(10):965-977.

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SHEA = Society for Healthcare Epidemiology of America

Surveillance for UTI



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Background



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- 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



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- Complications of catheter-associated urinary tract infections (CAUTI) include functional decline, bacteremia, septic shock, increased mortality.
- CDC Guideline for the Prevention of CAUTI can be accessed at http://www.cdc.gov/hicpac/cauti/002_cauti_toc.html



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.

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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

| Admission date | | | | |
|----------------|--------|---------------|--------|--------|
| June 4 | June 5 | June 6 | June 7 | June 8 |
| Day 1 | Day 2 | Day 3 | Day 4 | Day 5 |
| POA—not an HAI | | Potential HAI | | |

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UTI Surveillance Protocol

- 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.

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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.

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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).

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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).

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UTI Definitions

| June 1 | June 2 | June 3 | June 4 | June 5 | June 6 | June 7 |
|------------------------|-----------------|------------------------------|---------------|---------------|---------------|-------------------------|
| Day 1 insertion | Day 2 insertion | Day 3 insertion | Day 1 removal | Day 2 removal | Day 3 removal | Day 4 removal |
| Not CA-SUTI event days | | Potential CA-SUTI event days | | | | Not a CA-SUTI event day |

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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.

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Examples of Matching Organisms



| Culture | Companion culture | Report as |
|-----------------------------------|----------------------------------|-----------------------|
| <i>Staphylococcus epidermidis</i> | Coagulase-negative staphylococci | <i>S. epidermidis</i> |
| <i>Klebsiella oxytoca</i> | <i>Klebsiella</i> spp. | <i>K. oxytoca</i> |
| <i>Streptococcus salivarius</i> | <i>Strep viridans</i> | <i>S. salivarius</i> |

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Symptomatic Urinary Tract Infection (SUTI) Event in LTCF (non-catheter-associated) NHSN LTCF UTI protocol http://www.cdc.gov/nhsn/PDFs/LTC/LTCF-UTI-protocol_FINAL_8-24-2012.pdf

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
 - o acute dysuria
 - o acute pain, swelling or tenderness of the testes, epididymis or prostate

AND

- One of the following laboratory results:
 - o a voided urine culture with $\geq 10^5$ CFU/ml of no more than 2 species of microorganisms
 - o a positive culture with $\geq 10^2$ CFU/ml of any microorganisms from straight in/out catheter specimen

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

Criteria 2a

- Resident has at least one of the following
 - o fever^a
 - o leukocytosis^b

AND

- At least one of the following signs and symptoms
 - o costovertebral angle pain or tenderness
 - o new or marked increase in suprapubic tenderness
 - o gross hematuria
 - o new or marked increase in incontinence
 - o new or marked increase in urgency
 - o new or marked increase in frequency

AND

- One of the following laboratory results
 - o a voided urine culture with $\geq 10^5$ CFU/ml of no more than 2 species of microorganisms
 - o positive culture with $\geq 10^2$ CFU/ml of any microorganisms from straight in/out catheter specimen

^a fever: single temperature $\geq 37.8^\circ\text{C}$ ($> 100^\circ\text{F}$) or $> 37.2^\circ\text{C}$ ($> 99^\circ\text{F}$) on repeated occasions, or an increase of $> 1.1^\circ\text{C}$ ($> 2^\circ\text{F}$) over baseline

^b leukocytosis: $> 14,000$ WBC/mm³, or a left shift ($> 6\%$ bands or 1,500 bands/mm³)

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 $\geq 10^5$ CFU/ml of no more than 2 species of microorganisms
 - positive culture with $\geq 10^2$ CFU/ml of any microorganisms from straight in/out catheter specimen

Catheter-Associated Symptomatic Urinary Tract Infection Event in LTCF (CA-SUTI)
NHSN LTCF UTI protocol http://www.cdc.gov/nhsn/PDFs/LTC/LTCF-UTI-protocol_FINAL_8-24-2012.pdf

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^a
 - rigors
 - new onset hypotension, with no alternate site of infection
 - new onset of confusion/functional decline AND leukocytosis^b
 - new costovertebral angle pain or tenderness
 - new or marked increase in suprapubic tenderness
 - acute pain, swelling, or tenderness of the testes, epididymis or prostate
 - purulent 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 $\geq 10^5$ 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 $\geq 10^2$ CFU/ml of any microorganisms from straight in/out catheter specimen was obtained
 - urinary catheter is in place and a positive culture with $\geq 10^5$ CFU/ml of any microorganisms from indwelling catheter specimen was obtained

^a fever: single temperature $\geq 37.8^\circ\text{C}$ ($> 100^\circ\text{F}$) or $> 37.2^\circ\text{C}$ ($> 99^\circ\text{F}$) on repeated occasions, or an increase of 1.1°C ($> 2^\circ\text{F}$) over baseline
^b leukocytosis: $> 14,000$ WBC/mm³, or a left shift ($> 6\%$ or $1,500$ bands/mm³)

Asymptomatic Bacteremic Urinary Tract Infection Event in LTCF (ABUTI)
NHSN LTCF UTI protocol http://www.cdc.gov/nhsn/PDFs/LTC/LTCF-UTI-protocol_FINAL_8-24-2012.pdf

Resident name _____ Record number _____ Date of admission _____
Date of review _____ Date of event _____ (date of specimen collection)

- Criteria develop > 2 calendar days after admission

- Resident with or without an indwelling urinary catheter has none of the following urinary signs or symptoms (if no catheter is in place, fever alone does not exclude ABUTI if other criteria are met)
 - urgency
 - frequency
 - acute dysuria
 - suprapubic tenderness
 - costovertebral angle pain or tenderness

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
 - positive culture with $\geq 10^2$ CFU/ml of any microorganisms from straight in/out catheter specimen
 - positive culture with $\geq 10^5$ CFU/ml of any microorganisms from indwelling catheter specimen

AND

- A positive blood culture with at least one matching organism in the urine culture



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.

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UTI Data Calculations

Total UTI incidence rate/1,000 resident-days

number of UTI events (SUTI + CA-SUTI + ABUTI)/total resident-days x 1,000

- % SUTI = number of SUTI events/total number of UTI events x 100
- % CA-SUTI = number of CA-SUTI events/total number of UTI events x 100
- % ABUTI = number of ABUTI events/total number of UTI events x 100

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UTI Data Calculations

SUTI incidence rate/1,000 resident-days

number of SUTI events/total resident-days minus total catheter-days x 1,000

These events are not catheter-associated.

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UTI Data Calculations

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

number of CA-SUTI events/total catheter-days x 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

total urinary catheter-days/total resident-days

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Links

NHSN UTI protocol
http://www.cdc.gov/nhsn/PDFs/LTC/LTCF-UTI-protocol_FINAL_8-24-2012.pdf

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

DPH UTI surveillance worksheets
<http://www.dhs.wisconsin.gov/communicable/HAI/Worksheets/LTCFUTI.pdf>

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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.
- CDC Threat Report 2013:
<http://www.cdc.gov/drugresistance/threat-report-2013/pdf/ar-threats-2013-508.pdf>

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Background

- 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.

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Prevention Resources

- APIC Guide to the Elimination of MRSA Transmission in Hospital Settings, 2nd Edition.
http://www.apic.org/Resource_/EliminationGuideForm/631fcd91-8773-4067-9f85-ab2a5b157eab/File/MRSA-elimination-guide-2010.pdf
- APIC Guide to Preventing *C. difficile* Infections
http://www.apic.org/Resource_/EliminationGuideForm/59397fc6-3f90-43d1-9325-e8be75d86888/File/2013CDiffFinal.pdf

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Prevention Resources

- CDC Management of MDRO in Healthcare Settings, 2006.
<http://www.cdc.gov/hicpac/pdf/MDRO/MDROGuideline2006.pdf>
- DPH Guidelines for Prevention and Control of Antibiotic Resistant Organisms in Healthcare Settings, 2005.
<http://www.dhs.wisconsin.gov/publications/P4/P42513.pdf>
- DPH Guidance for Prevention of Transmission of CRE in Skilled Nursing Facilities
<http://www.dhs.wisconsin.gov/publications/P0/p00532.pdf>

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CRE Surveillance Protocol

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

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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

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CRE Data Calculations



Total CRE rate

number of CRE LabID events per
month/number of resident-days per month x
1,000

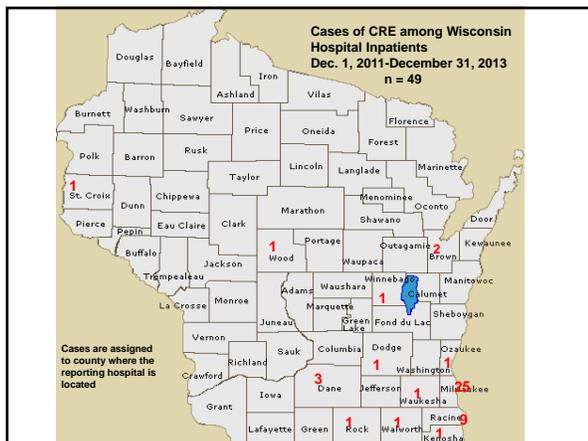
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CRE Response



- 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>
- DPH CRE toolkit for skilled nursing facilities
<http://www.dhs.wisconsin.gov/publications/P0/p00532.pdf>

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CRE Report

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

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Links

NHSN MDRO/CDI protocol
http://www.cdc.gov/nhsn/PDFs/LTC/LTCF-LabID-Event-Protocol_FINAL_8-24-12.pdf

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

DPH MDRO/CDI surveillance worksheet
<http://www.dhs.wisconsin.gov/communicable/HAI/Worksheets/LTCFMDROCdiff.pdf>

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Surveillance for CDI

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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).

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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

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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.

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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.

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CDI Definitions

- Community-onset (CO) LabID event: date specimen collected is ≤ 3 calendar days from the date of current admission to the facility (i.e., days 1, 2, or 3 of admission).
- Long-term care facility-onset (LO) LabID event: date specimen collected is > 3 calendar days after current admission to the facility (i.e., on or after day 4).

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CDI Definitions

Example: Classification of CDI LabID Events as CO or LO

| | | | | |
|----------------------|--------|--------|------------------------------------|--------|
| Admission date | June 5 | June 6 | June 7 | June 8 |
| June 4 | Day 1 | Day 2 | Day 3 | Day 4 |
| Day 1 | Day 2 | Day 3 | Day 4 | Day 5 |
| Community-onset (CO) | | | Long-term care facility-onset (LO) | |

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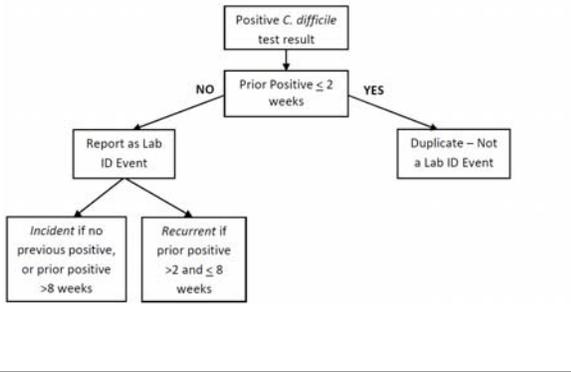
Laboratory-identified *C. difficile* Infection Event in LTCF
 NHSN LTCF MDRO/*C. difficile* protocol http://www.cdc.gov/nhsn/PDFs/LTC/LTCF-LabID-Event-Protocol_FINAL_8-24-12.pdf

Resident name _____
 Record number _____ 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

number of CDI LabID events per month/number of resident days per month x 10,000

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CDI Data Calculations

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

number of all incident LO CDI LabID events per month/number of resident days x 10,000

(This formula excludes recurrent CDI events.)

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CDI Data Calculations

Percent community-onset
number of CO CDI LabID events/total number of CDI LabID events x 100

Percent LTC facility-onset
number of LO CDI LabID events/total number of CDI LabID events x 100

Percent recurrent CDI
number of recurrent CDI LabID events/total number of CDI LabID events x 100

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