



Laboratory-identified Multidrug-Resistant Organism (MDRO) & *Clostridium difficile* Infection (CDI) Events for Long-term Care Facilities

Background: *Clostridium difficile* infections (CDI), methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* spp. (VRE) and certain multidrug-resistant gram-negative bacilli (e.g. carbapenem-resistant *Klebsiella* spp.) have increased in prevalence in U.S. healthcare settings over the last three decades and have important implications for residents of long-term care facilities (LTCF). Studies have demonstrated a large proportion of residents are at risk for carrying or acquiring these multidrug-resistant organisms (MDRO) in LTCF. MDRO infections are associated with increased lengths of stay, hospitalizations and readmissions, increased healthcare costs, and mortality due to more severe illnesses and limited treatment options. CDI can present a variety of ways including uncomplicated diarrhea, pseudomembranous colitis, and toxic megacolon which can, in some instances, lead to sepsis and even death. Infections from *C. difficile* represent a subset of gastroenteritis and gastrointestinal tract infections. Standard definitions for CDI should be incorporated into infection surveillance programs to obtain a more complete understanding of how *C. difficile* can manifest and be transmitted in LTCFs.

The Laboratory-identified (LabID) Event Module of the NHSN LTCF Component is a tool designed for use in certified skilled nursing facilities/nursing homes (LTC:SKILLNURS) and intermediate/chronic care facilities for the developmentally disabled (LTC:DEVDIS) to help meet criteria outlined in guidelines for the prevention, control and surveillance of MDRO & CDI¹⁻⁵. As outlined in these guidelines, these pathogens may require specialized monitoring to evaluate if intensified infection control efforts are required to reduce the occurrence of these organisms and related infections. The goal of this module is to provide a mechanism for facilities to collect, report, and analyze data that will inform infection control staff of the impact of prevention efforts. This module contains two options, one focused on CDI and the second on MDROs.

1: Smith et al. SHEA/APIC Guideline: Infection Prevention and Control in the Long-Term Care Facility. *Infection Control and Hospital Epidemiology* 2008;29:785-814.

2: Healthcare Infection Control Practices Advisory Committee (HICPAC) approved guidelines for the control of multidrug resistant organism (MDRO). Available at www.cdc.gov/hicpac/pdf/MDRO/MDROGuideline2006.pdf

3: Cohen et al. Clinical Practice Guideline for *Clostridium difficile* infection in Adults: 2010 Update by SHEA and IDSA. *Infection Control and Hospital Epidemiology* 2010;31:431-55.

4: Simor et al. *Clostridium difficile* in Long-Term Care Facilities for the Elderly. SHEA Position Paper. *Infection Control and Hospital Epidemiology* 2002;23:696-703.

5: Cohen et al. Recommendations for Metrics for Multidrug-Resistant Organisms in Healthcare Settings: SHEA/HICPAC Position Paper. *Infection Control and Hospital Epidemiology* 2008;29:901-13.

I. *Clostridium difficile* Infection (CDI) Surveillance by Laboratory-identified (LabID) Event

Methods: The CDI surveillance option allows laboratory testing data to be used without clinical evaluation of the resident, allowing for a less labor intensive method to track *C. difficile*. This method provides proxy measures of *C. difficile* healthcare acquisition, exposure burden, and infection burden based solely on laboratory data and limited resident admission/transfer data.

The data collected will enable participating facilities and CDC to calculate several infection surveillance metrics (listed below). NHSN forms should be used to collect all required data, using the definitions of each data field as indicated in the *Tables of Instructions*.

Settings: CDI LabID Event reporting is currently available for certified skilled nursing facilities/nursing homes (LTC:SKILLNURS) and intermediate/chronic care facilities for the developmentally disabled (LTC:DEVDIS). Events reported should include *C. difficile* positive laboratory assays obtained from any resident who is receiving care at the facility. Laboratory results available from other healthcare facilities before the resident was admitted to your facility should not be reported as LabID Events.

Requirements: Facilities must report LabID Events and denominators (number of resident admissions and number of resident-days) for the entire facility (FacWideIN) each month for at least 6 consecutive months, which allows for the most easily obtainable complete data acquisition. *C. difficile* laboratory testing should be performed only on liquid or watery stool samples (i.e., conforming to the shape of the specimen collection container).

Facilities must indicate their reporting for the calendar month in the *Monthly Reporting Plan for LTCF* (CDC 57.141).

Definitions:

C. difficile -positive laboratory assay: A positive result for a laboratory test for *C. difficile* toxin A and/or B (e.g., enzyme immunoassay, or EIA test), **OR** a toxin-producing *C. difficile* organism detected in the stool specimen by culture or other laboratory means (e.g., nucleic acid amplification testing by polymerase-chain reaction, or PCR).

Duplicate *C. difficile*-positive laboratory assay: Any *C. difficile* positive laboratory test from the *same* resident following a previous *C. difficile* positive test *within the past two weeks*

CDI Laboratory-identified (LabID) Event: All non-duplicate *C. difficile* positive laboratory assays obtained while a resident is receiving care in the long-term care facility. (See Figure 1 - *C. difficile* Test Result Algorithm for Laboratory-identified (LabID) Events.)

NOTE: Laboratory results obtained from outside facilities, before a resident's admission, should not be entered as LabID Events.

Incident CDI LabID Event: The first LabID Event ever entered or a subsequent LabID Event entered > 8 weeks after the most recent LabID Event reported for an individual resident.

Recurrent CDI LabID Event: Any LabID Event entered > 2 weeks and ≤ 8 weeks after the most recent LabID Event reported for an individual resident.

All incident or recurrent LabID Events will be further categorized by NHSN into Community-onset vs. LTCF-onset based on date of current admission to facility and date of specimen collected. Because of variability in documenting time of admission to the LTCF, calendar days are used to categorize LabID Events.

Community-onset (CO) LabID Event: Date specimen collected ≤ 3 calendar days from 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 > 3 calendar days after current admission to the facility (i.e., on or after day 4).

LO can be further sub-classified as;

Acute Care Transfer-Long-term Care Facility-onset (ACT-LO): LTCF-onset (LO) LabID Event with date specimen collected ≤ 4 weeks following date of last transfer from an Acute Care Facility (Hospital, Long-term acute care hospital, or acute inpatient rehabilitation facility only).

Example: NHSN Classification of Lab ID Events as Community-onset or LTCF-onset				
Admission date				
June 4 th	June 5 th	June 6 th	June 7 th	June 8 th
day 1	day 2	day 3	day 4	day 5
Community-onset (CO)			Long-term Care Facility-onset (LO)	

Numerator and Denominator Data:

Numerator: Data on each CDI LabID Event will be reported using the *Laboratory-identified MDRO or CDI Event for LTCF* form (CDC 57.138). (See *Tables of Instructions* for information on how to complete this form.)

Denominator: Monthly totals for resident-days and resident admissions are collected using the *Denominators for LTCF* form (CDC 57.142). (See *Tables of Instructions* for information on how to complete this form.)

CDI Data Analysis:

Data are stratified by time (e.g., month, quarter, etc.), whether an episode is incident or recurrent, community-onset or LTCF-onset and aggregated across the entire facility.

Calculated CDI Rates and Metrics:

Line lists of CDI LabID Events will be available as part of the analysis within the NHSN LTCF component. Below are measures and calculations which will be incorporated into the analytics output that will be available for use in 2013.

Total CDI Rate/10,000 resident-days = Number of CDI LabID Events per month regardless of time spent in the facility (i.e., CO + LO) / Number of resident-days per month x 10,000.

CDI Long-term Care 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.

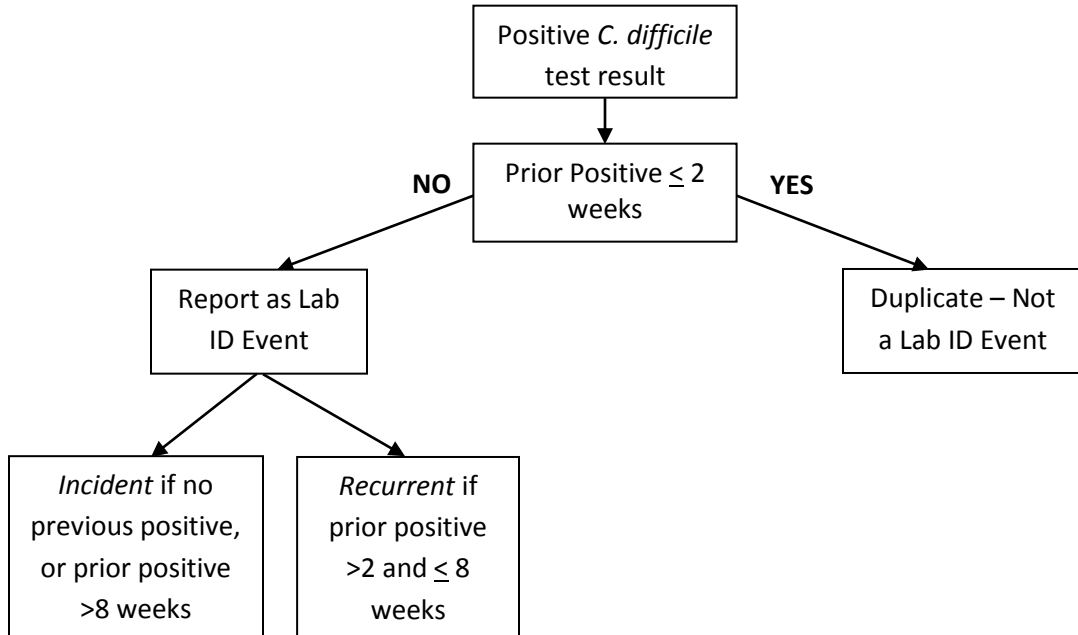
Percent that is Community-onset = Number of CDI LabID Events that are CO / Total number of CDI LabID Events x 100.

Percent that is Long-term Care Facility-onset = Number of CDI LabID Events that are LO / Total number of CDI LabID Events x 100.

Percent of LO that is Acute Care Transfer-Long-term Care Facility-onset = Number of ACT-LO CDI LabID Events / Total number of LO CDI LabID Events x 100.

Percent that is Recurrent CDI = Number of CDI LabID Events that are recurrent / Total number of CDI LabID Events x 100.

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



II. MDRO Surveillance by Laboratory-identified (LabID) Event

Methods: Facilities may choose to monitor one or more of the following MDROs: *Staphylococcus aureus*, both methicillin-resistant (MRSA) and methicillin-susceptible (MSSA), vancomycin-resistant *Enterococcus spp.* (VRE), cephalosporin-resistant *Klebsiella spp.*, carbapenem-resistant *Klebsiella spp.*, carbapenem-resistant *E. coli*, and multidrug-resistant *Acinetobacter spp.*

Laboratory-identified (LabID) Event reporting is the surveillance method for LTCF and allows laboratory testing data to be used without clinical evaluation of the resident, creating a less labor intensive method to track MDROs. This method provides proxy measures of MDRO infections, healthcare acquisition, exposure burden, and infection burden based solely on laboratory data and limited resident admission/transfer data.

LabID Event reporting is **ONLY** for collecting and tracking isolates from positive cultures that are taken for "clinical" purposes (i.e., for diagnosis and treatment), which means that Active Surveillance Culture/Testing (e.g., nasal swabs for MRSA or perirectal swabs for VRE) results are not reported as LabID Events. Laboratory results available from other healthcare facilities before the resident was admitted to your facility should not be reported as LabID Events.

The data collected will enable participating facilities and CDC to calculate several measures, depending on which MDROs the facility chooses to track. NHSN forms should be used to collect all required data, using the definitions of each data field as indicated in the *Tables of Instructions*.

Setting: MDRO LabID Event reporting is currently available for certified skilled nursing facilities/nursing homes (LTC:SKILLNURS) and intermediate/chronic care facilities for the developmentally disabled (LTC:DEVDIS). Events reported should include MDRO positive laboratory cultures obtained from any resident who is receiving care at the facility.

Requirements: Facilities must report LabID Events and denominators (number of resident admission and number of resident-days) for the entire facility (FacWideIN) each month for at least 6 consecutive months, which allows for the most easily obtainable complete data acquisition. Report only one LabID Event organism (positive isolate) per form.

Facilities must indicate their reporting for the calendar month in the *Monthly Reporting Plan for LTCF* (CDC 57.141).

Definitions: The following MDROs can be selected for tracking in the LabID Event module:

Gram-stain positive organisms:

- MRSA: Includes *S. aureus* cultured from any specimen that tests oxacillin-resistant, ceftazidime-resistant, or methicillin-resistant by standard susceptibility testing methods, these methods may also include a positive result by any FDA-approved test for direct MRSA detection from that specimen source.
- MSSA: *S. aureus* cultured from any specimen testing intermediate or susceptible to oxacillin, ceftazidime, or methicillin by standard susceptibility testing methods; a positive result from any FDA-approved test for direct MSSA detection from that specimen source; or a negative result from a test that is FDA-approved for direct MRSA detection from a specimen source.
- VRE: Any *Enterococcus spp.* (regardless of whether identified to the species level), that is resistant to vancomycin, by standard susceptibility testing methods or by a positive result from any FDA-approved test for VRE detection from that specimen source.

Gram-stain negative organisms:

- CephR-*Klebsiella*: Any *Klebsiella spp.* testing non-susceptible (i.e., resistant or intermediate) to cephalosporin antibiotics like ceftazidime, cefotaxime, ceftriaxone, or cefepime.
- CRE-*E. coli*: Any *E. coli* testing non-susceptible (i.e., resistant or intermediate) to carbapenem antibiotics like imipenem, meropenem, or doripenem, by standard susceptibility testing methods or by a positive result by from a FDA-approved test for carbapenemase detection from that specimen source.
- CRE-*Klebsiella*: Any *Klebsiella spp.* testing non-susceptible (i.e., resistant or intermediate) to carbapenem antibiotics like imipenem, meropenem, or doripenem, by standard susceptibility testing methods or by a positive result for any method FDA-approved for carbapenemase detection from that specimen source.

- MDR-*Acinetobacter*: Any *Acinetobacter* spp. testing non-susceptible (i.e., resistant or intermediate) to at least one agent in at least 3 antimicrobial classes of the following 6 antimicrobial classes:

Antimicrobial Class	Agents
β -lactams and β -lactam/ β -lactamase inhibitor combinations	Piperacillin, Piperacillin/tazobactam
Sulbactam	Ampicillin/sulbactam,
Cephalosporins	Cefepime, Ceftazidime, Ceftriaxone, Cefotaxime
Carbapenems	Imipenem, Meropenem, Doripenem
Aminoglycosides	Amikacin, Gentamicin, Tobramycin
Fluoroquinolones	Ciprofloxacin, Levofloxacin

MDRO positive laboratory isolate: Any laboratory specimen source, from which a MDRO is identified, obtained for clinical decision making (as defined above) while a resident is receiving care in the facility.

Duplicate MDRO laboratory isolate: Any MDRO isolate from the *same* resident after an initial isolation of the same organism *during a calendar month*, regardless of the specimen source except when a unique blood source is identified (see definition below and Figure 2).

NOTE: A duplicate MDRO laboratory isolate should not be reported as a LabID Event.

Unique blood source MDRO laboratory isolate: A MDRO isolate identified in a blood culture from a resident with no prior isolation of the MDRO *in blood in the past 2 weeks, even across calendar months*. A unique blood source isolate should be reported even if the resident had this same MDRO previously isolated in a non-blood specimen earlier during the same calendar month (See Figure 2).

NOTE: As a general rule, at a **maximum**, there should be no more than 2 blood isolates (which would be very rare) and 1 other specimen source isolate per MDRO type reported for the same resident during a calendar month.

MDRO Laboratory-identified (LabID) Event: All non-duplicate MDRO positive laboratory isolates from any culture specimen, regardless of specimen source or MDRO unique blood source isolates obtained while a resident is receiving care in the facility.

NOTE: Laboratory data available from outside facilities, before a resident’s admission, should not be entered as LabID Events.

All MDRO LabID Events will be further categorized by NHSN into Community-onset vs. LTCF-onset based on date of current admission to facility and date of specimen collected. Because of variability in documenting time of admission to the LTCF, calendar days are used to categorize LabID Events.

Community-onset (CO) LabID Event: Date specimen collected \leq 3 calendar days after resident admission to the facility (i.e., days 1, 2, or 3 of admission).

Long-term Care Facility-onset (LO) LabID Event: Date specimen collected $>$ 3 calendar days after admission to the facility (i.e., on or after day 4).

LO can be further sub-classified as:

Acute Care Transfer-Long-term Care Facility-onset (ACT-LO): LTCF-onset (LO) LabID Event with date specimen collected \leq 4 weeks following date of last transfer from an Acute Care Facility (Hospital, Long-term acute care hospital, or acute inpatient rehabilitation facility only).

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Community-onset (CO)			Long-term Care Facility-onset (LO)	

Numerator and Denominator Data:

Numerator: Data on each MDRO LabID Event will be reported using the *Laboratory identified MDRO or CDI Event for LTCF* form (CDC 57.138). (See *Tables of Instructions* for information on how to complete this form.)

Denominator: Monthly totals for resident admissions and resident-days are collected using the *Denominators for LTCF* (CDC 57.142). (See *Tables of Instructions* for information on how to complete this form.)

MDRO Data Analysis:

Data are stratified by time (e.g., month, quarter, etc.), whether an episode is community-onset or LTCF-onset and aggregated across the entire facility.

Calculated MDRO Rates and Metrics*:

Line lists of MDRO LabID Events will be available as part of the analysis within the NHSN LTCF component. Below are measures and calculations which will be incorporated into the analytics output that will be available for use in 2013.

*Note: These calculations will be performed for each specific MDRO included in the reporting plan during a month (e.g., MRSA, VRE, etc.)

Total MDRO Rate/1,000 resident-days = Number of MDRO LabID Events per month (regardless of time spent in the facility i.e., CO + LO) / Number of resident-days per month x 1,000.

MDRO Long-term Care Facility-onset Incidence Rate/ 1,000 resident-days = Number of all LO MDRO LabID Events per month / Number of resident-days x 1,000.

Percent of MDRO LabID Events that is Community-onset = Number of MDRO LabID Events that are CO / Total number of MDRO LabID Events x 100.

Percent of MDRO LabID Events that is Long-term Care Facility-onset = Number of MDRO LabID Events that are LO / Total number of MDRO LabID Events x 100.

Percent of LO LabID Events that is Acute Care-Transfer-Long-term Care Facility-onset = Number of ACT-LO MDRO LabID Events / Total number of LO MDRO LabID Events x 100.

Figure 2. MDRO Test Result Algorithm for Laboratory-identified (LabID) Events.

