Multidrug-Resistant Organism (MDRO) & *Clostridium difficile* Infection (CDI) & Event 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 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. A primary reason for concern about MDROs is that infections from these organisms are associated with increased lengths of stay, rehospitalizations, costs, mortality, and limited treatment options . *Clostridium difficile* is responsible for a spectrum of *C. difficile* infections (CDI) including uncomplicated diarrhea, pseudomembranous colitis, and toxic megacolon which can, in some instances, lead to sepsis and even death. CDI represents a subset of gastroenteritis and gastrointestinal tract infections, and specific 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 LTCF.

The MDRO & CDI Event of the NHSN LTCF Component is a tool designed for use in Skilled Nursing Facilities (SNF)/Nursing Homes (NH) and intermediate/chronic care facilities for the developmentally disabled to help meet some of the criteria outlined in guidelines for the prevention, control and surveillance of infections[1-5]. 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 these facilities to report and analyze data collected 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/ncidod/dhqp/pdf/ar/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 (Lab-ID) Event

Methods: The CDI surveillance option allows laboratory testing data to be used without clinical evaluation of the resident, allowing for a much 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 (Chapter 14).

Settings: CDI Lab-ID event reporting is currently available for certified skilled nursing facilities/nursing homes and intermediate/chronic care facilities for the developmentally disabled. Surveillance must be performed facility-wide where *difficile* laboratory testing is performed routinely only on unformed (i.e., conforming to the shape of the container) stool samples. Consider including *C. difficile* positive laboratory assays from all residents tested at the facility, as well as in other healthcare settings where care is provided to residents after transfer or prior to admission to the facility (e.g. from acute care hospitals, emergency departments, physician offices, or outpatient clinics).

Requirements: Facilities must report LabID Events for the entire facility (facility-wide) and a denominator (number of resident admission and number of resident-days) for the entire facility each month, which allows for the most complete data acquisition and can provide easily obtainable and valuable information.

Facilities must indicate their reporting for the calendar month in the *Monthly Reporting Plan for LTCF* (CDC 57.141). Surveillance for positive laboratory results must be reported for at least 6 consecutive months to provide meaningful measures.

Definitions:

CDI-positive laboratory assay: A positive result for a laboratory assay for *C. difficile* toxin A and/or B, **OR** A toxin-producing *C. difficile* organism detected in the stool sample by culture or other laboratory means.

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

Laboratory-Identified (LabID) Event*:* All non-duplicate *C. difficile* positive laboratory assays including specimens collected during last day of hospital stay if collected on the same day as resident transfer (See Figure 1 - *C. difficile Test Result Algorithm for Laboratory Identified (LabID) Events*.)

Numerator and Denominator Data:

Numerator: Data will be reported using the *Laboratory-Identified MDRO or CDI Event for LTCF* form (CDC 57.138). (See Tables of instructions Table XX for completion instructions.)

Denominator: Resident days and admissions are reported using the *MDRO and CDI Monthly Monitoring* form (CDC 57.139). (See Tables of Instructions Table XX for completion instructions.)

CDI Data Analysis: Data are stratified by time (e.g., month, quarter, etc.), incident or recurrent, aggregated across the entire facility. Of note, NHSN will categorize all LabID Events as Nursing Home-onset vs. Community-onset to ensure that all Nursing Home-onset cases have been in the NH at least a full 48 hours. Considering: 1) variable times of day that admissions occur and 2) the absence of clinical data to confirm if cultures represent infection incubating at the time of admission, this is operationalized by classifying positive cultures obtained on day 1 (admission date), day 2, and day 3 of admission as community-onset (CO) LabID Events and positive cultures obtained on or after day 4 as Nursing Home-onset (NO) LabID Events.

Based on data provided on the LabID Event form, each event can be categorized by NHSN to populate different measures. The following definitions and calculations are built into the analysis capabilities of NHSN and are based on date of admission to the NH and the date the specimen was collected. These are some of the main metrics that are available in NHSN.

Incident CDI Assay: Any LabID Event from a specimen obtained > 8 weeks after the most recent LabID Event (or with no previous LabID Event documented).

Recurrent CDI Assay: Any LabID Event from a specimen obtained > 2 weeks and ≤ 8 weeks after the most recent LabID Event for that resident.

All incident or recurrent LabID Events are further categorized by NHSN analytical programs utilizing timing of specimen collection, setting where collected, and previous discharge. The following definitions and calculations are built into the analysis capabilities of NHSN. These are some of the main metrics that are available in NHSN.

Community-Onset (CO): LabID Event collected ≤ 3 days after resident admission to the facility (i.e., days 1, 2, or 3 of admission).

Nursing Home -Onset (NO): LabID Event collected > 3 days after admission to the facility (i.e., on or after day 4).

Acute Care Transfer Nursing Home -Onset (ACT-NO): NO LabID Event collected from a resident who was transferred from an Acute Care Facility ≤ 4 weeks prior to date stool specimen collected.

Calculated CDI Prevalence Rates:
Prevalence Rate = Number of non-duplicate CDI LabID Events per resident per month (i.e., CO + NO + ACTNO) regardless of time spent in the facility / Number of resident admissions x 100

Percent Prevalence that is Community-Onset = Number of non-duplicate CDI LabID Events to that are CO / Total number of non-duplicate CDI LabID Events x 100

Percent Prevalence that is Nursing Home-Onset = Number of non-duplicate CDI LabID Events to that are NO / Total number of non-duplicate CDI LabID Events x 100

Percent Prevalence that is Acute Care Transfer Nursing Home-Onset = Number of non-duplicate CDI LabID Events to that are ACTNO / Total number of non-duplicate CDI LabID Events x 100

Calculated CDI Incidence Rates: (see categorization of Incident, NO, and ACTNO above).

CDI Nursing Home-Onset Incidence Rate = Number of all Incident NO CDI LabID Events per month / Number of resident days x 10,000

Non acute care exposure CDI Nursing Home-Onset Incidence Rate= Number of all Incident NO minus ACTNO CDI LabID Events per month / Number of resident days x 10,000

Note: The numerator in this formula excludes LabID Events that are ACTNO

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

Methods: Facilities may choose to monitor one or more of the following MDROs: MRSA, MRSA and MSSA, VRE, multidrug-resistant *Klebsiella* spp., and multidrug-resistant *Acinetobacter* spp. For *S. aureus*, both resistant (MRSA) and susceptible (MSSA) types can be tracked to provide concurrent measures of the susceptible pathogens for as a comparison to those of the resistant pathogens in a setting of active prevention efforts targeted at the resistant pathogen.

Laboratory-identified (LabID) Event reporting is the surveillance option for LTCF and allows laboratory testing data to be used without clinical evaluation of the resident, allowing for a much 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 positive cultures that are taken for "clinical" purposes (i.e., for diagnosis and treatment), which means that no Active Surveillance Culture/Testing results are to be included in this reporting of individual results. Do NOT enter surveillance nasal swabs or other surveillance cultures as reports of LabID Events.

The data collected in the MDRO Option will enable participating facilities and CDC to calculate several measures, depending on which MDROs the facility chooses to follow. NHSN forms should be used to collect all required data, using the definitions of each data field as indicated in the Tables of Instructions (Chapter 14).

Introduction

Setting: MDRO Lab-ID event reporting is currently available for certified skilled nursing facilities/nursing homes (LTC:SNF) and intermediate/chronic care facilities for the developmentally disabled (LTC:DevDis).

Requirements: Surveillance must be performed facility-wide for all specimens (except specimens collected for active surveillance cultures/testing – see above). This method requires reporting of only one denominator for the entire NH.

Facilities must indicate their reporting for the calendar month in the *Monthly Reporting Plan for LTCF* (CDC 57.141). Surveillance for positive laboratory results must be reported for at least 6 consecutive months to provide meaningful measures.

For each MDRO monitored, all MDRO test results are evaluated using the algorithm in Figure 2 to determine reportable LabID events for each calendar month. All first (chronologically) MDRO isolates per resident, per month are reported as a LabID event regardless of specimen source (EXCLUDES tests related to active surveillance testing); if a duplicate MDRO isolate is from blood, it is reported as a LabID event only if it represents a unique blood source (i.e., no prior isolation of the MDRO in blood from the same resident in ≤ 2 weeks, even across calendar months) (Figure 2). As a general rule, at a maximum, there should be no more than 2 blood isolates reported (which would be very rare), and 1 first MDRO isolate (specimen other than blood) reported on any resident during a calendar month for each location chosen for reporting. Report a single LabID Event per form.

Definitions:

MDRO Isolate: Any specimen obtained for clinical decision making testing positive for a MDRO (as defined above).

Duplicate MDRO Isolate: Any MDRO isolate from the same resident after an initial isolation of the specific MDRO during a calendar month, regardless of specimen source except unique blood source (Figure 2).

Laboratory-Identified (LabID) Event: All non-duplicate MDRO isolates from any specimen, regardless of specimen source

Numerator: Data will be reported using the *Laboratory-Identified MDRO or CDI Event for LTCF* form (CDC 57.138). (See Tables of instructions Table XX for completion instructions.)

Denominator: Resident days and admissions are reported using the *MDRO and CDI Monthly Monitoring* form (CDC 57.139). (See Tables of Instructions Table XX for completion instructions.)

Data Analysis: Based on data provided on the LabID Event form, each event can be categorized by NHSN to populate different measures. The following definitions and calculations are built into the analysis capabilities of NHSN and are based on date of admission to the NH and the date the specimen was collected. These are some of the main metrics that are available in NHSN.

Community-Onset (CO): LabID Event collected ≤ 3 days after admission (i.e., days 1, 2, or 3 of NH admission).

Nursing Home-Onset (NO): LabID Event collected > 3 days after admission (i.e., on or after day 4 of NH admission).

Proxy Measures for MDRO Exposure Burden:

Admission Prevalence Rate = Number of 1st LabID Events per resident per month identified ≤ 3 days after admission (i.e., CO) / Number of resident admissions x 100

Overall Prevalence Rate = Number of 1st LabID Events per resident per month regardless of time spent in the NH (i.e., CO + NO) / Number of resident admissions x 100

Proxy Measures for MDRO Infection:

MDRO Infection Incidence Rate = Number of 1st LabID Events per resident per month identified > 3 days after admission (i.e., NO) / Number of resident days x 1,000

Proxy Measures for MDRO Healthcare Acquisition:

Overall MDRO Infection/Colonization Prevalence Rate = Number of 1st LabID Events per resident per month among those with no documented prior evidence of previous infection or colonization with this specific organism type from a previously reported LabID Event and identified > 3 days after admission (i.e., NO) / Number of resident admissions x 100

Overall MDRO Infection/Colonization Incidence Rate = Number of 1st LabID Events per resident per month among those with no documented prior evidence of previous infection or colonization with this specific organism type from a previously reported LabID Event and identified > 3 days after admission (i.e., NO) / Number of resident days x 1,000

Figure 1. C. Difficile Test Result Algorithm for Laboratory-Identified (LabID) Events.

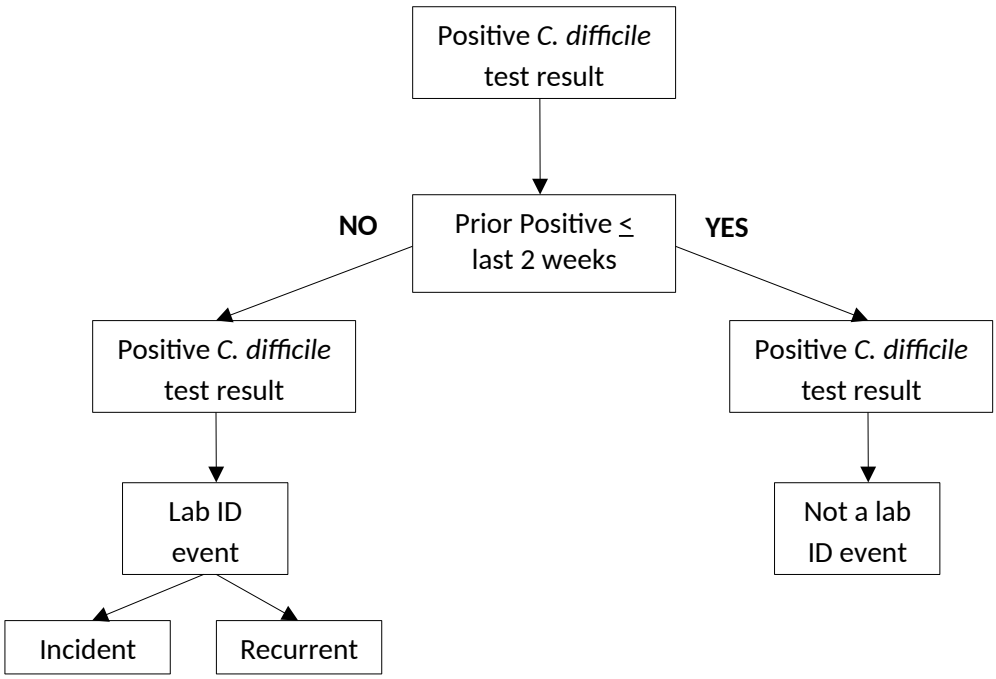

Figure 2. MDRO Test Result Algorithm for Laboratory-Identified (LabID) Events.