
HEALTHCARE-ASSOCIATED INFECTIONS IN MICHIGAN HOSPITALS

**Quarterly Report of Healthcare-Associated Infection
Surveillance Activities**

January 1, 2011–March 31, 2011

Michigan Department of Community Health

**Surveillance for Healthcare-Associated & Resistant Pathogens
(SHARP) Unit**

Introduction

The Surveillance for Healthcare-Associated & Resistant Pathogens (SHARP) Unit within the Bureau of Epidemiology at the Michigan Department of Community Health (MDCH) will quarterly provide an update on healthcare-associated infection (HAI) surveillance activities funded under the American Recovery and Reinvestment Act (ARRA). This report will include Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) data from Michigan hospitals who have agreed to share their data with MDCH SHARP. The main surveillance foci for the SHARP Unit are methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* reports collected through the laboratory-identified (LabID) event option of the multidrug-resistant organism and *Clostridium difficile*-associated disease (MDRO/CDAD) module of NHSN. However, data from other NHSN modules will also be analyzed as data is made available from participating hospitals. Aggregated data will be used to show infection rates and trends in the incidence of specific healthcare-associated infections (HAIs) and multidrug-resistant organisms (MDROs). Previous quarterly reports for fiscal year 2009–2010 are posted on the Michigan HAI website at www.michigan.gov/hai. As additional Michigan hospitals agree to participate in this surveillance initiative, the information and data will become more reliable and complete from quarter to quarter.

Additional background information on HAIs, pertinent definitions related to HAIs, Michigan’s HAI Surveillance and Prevention Plan, Michigan’s HAI Prevention Advisory Group roster, and Michigan’s prevention collaboratives supported under ARRA, can be found at www.michigan.gov/hai.

Acronyms Used in Quarterly Reports

ARRA	American Recovery and Reinvestment Act
CAUTI	Catheter-Associated Urinary Tract Infection
CDAD	<i>Clostridium difficile</i> -Associated Disease
CDC	Centers for Disease Control & Prevention
CDI	<i>Clostridium difficile</i> Infection
CLABSI	Central Line-Associated Bloodstream Infection
DUA	Data Use Agreement
HAI	Healthcare-Associated Infection
ICU	Intensive Care Unit
LabID	Laboratory-Identified Event
MDCH	Michigan Department of Community Health
MDRO	Multidrug-Resistant Organism
MHA	Michigan Health & Hospital Association
MPRO	Michigan’s Quality Improvement Organization
MRSA	Methicillin-Resistant <i>Staphylococcus aureus</i>
NHSN	National Healthcare Safety Network
SCA	Specialty Care Area
SHARP	Surveillance of Healthcare-Associated & Resistant Pathogens
SSI	Surgical Site Infection
VAP	Ventilator-Associated Pneumonia

Surveillance Initiative Statistics

Between January 1 and March 31, 2011, a cumulative total of 41 Michigan hospitals were participating in the SHARP Unit HAI surveillance initiative. Fourteen of these hospitals were using the laboratory-identified (LabID) Event option of the MDRO/CDAD module to monitor MRSA and sharing this data with SHARP; 18 were monitoring and sharing *C. difficile* LabID events. Areas of surveillance within the hospital varied between the participating hospitals and included the intensive care/critical care unit (ICU/CCU), specialty care areas, medical/surgical wards, or other, dependent upon individual hospital choice. Data from this quarter, as well as summary data from the 2009–2010 annual report, are being used to establish aggregate infection rates among participating Michigan hospitals and to monitor quarterly trends.

Of the 41 participating hospitals during this quarter, most were collecting additional NHSN module data as indicated in Table 1. The table also indicates the number of facilities sharing NHSN module data with MDCH SHARP. As additional hospitals participate with the SHARP Unit and confer rights to these modules, analysis of the data will become more complete and reliable.

Table 1.

National Healthcare Safety Network (NHSN) Modules in Use, as Reported by Facility October 1, 2010 through December 31, 2010

NHSN Module	Number of Facilities Using Module	Number of Facilities Sharing Data
Central Line-Associated Bloodstream Infection (CLABSI)	38	23
Ventilator-Associated Pneumonia (VAP)	22	13
Catheter-Associated Urinary Tract Infection (CAUTI)	15	8
Surgical Site Infection (SSI)	19	7
Methicillin-Resistant <i>Staphylococcus aureus</i> (MRSA) Laboratory-identified (LabID) Event	20	14
Methicillin-Resistant <i>Staphylococcus aureus</i> (MRSA) Infection Surveillance	14	5
<i>Clostridium difficile</i> -Associated Disease (CDAD) Laboratory-identified (LabID) Event	23	18
<i>Clostridium difficile</i> -Associated Disease (CDAD) Infection Surveillance	8	3

MRSA Data

Table 2 indicates that between January 1, 2011 and March 31, 2011, 675 isolates of MRSA were reported from fourteen participating hospitals using the MDRO/CDAD module LabID Event option. MRSA LabID Events are defined by NHSN as all first positive MRSA clinical specimens for each calendar month for each unique patient, regardless of specimen source. Specimens must be collected for clinical purposes and not for the purpose of active surveillance testing or screening. Additionally, testing protocol and type of test used (i.e. PCR, assay, culture) vary by facility. Note that data from the LabID Event option of the MDRO/CDAD module are considered proxy measures of MDRO exposure burden, and do not distinguish between patient colonization and infection.

Table 2. MRSA Characteristics	Annual Oct 1, 2009 – Sept 30, 2010	January – March 2011
Frequency, Number		
<i>Hospitals with DUA¹</i>	26	41
<i>Hospitals Reporting MRSA LabID²</i>	10	14
<i>Aggregated isolates</i>	706	675
Onset, Number (%)		
<i>Healthcare-Onset (HO)</i>	123 (17)	106 (16)
<i>Community-Onset (CO)</i>	583 (83)	569 (84)
Previous MRSA, Number (%)		
<i>Previously positive</i>	Not available	120 (18)
Specimen Source, Number (%HO)		
<i>Wound</i>	304 (6)	226 (7)
<i>Sputum</i>	187 (41)	112 (38)
<i>Blood</i>	43 (23)	38 (16)
<i>Skin</i>	24 (0)	59 (5)
<i>Abscess</i>	27 (0)	43 (12)
<i>Urine</i>	37 (3)	72 (7)
<i>Other</i>	84 (20)	125 (23)
Surveillance Location, Number (%)		
<i>Intensive/Critical Care Unit</i>	253 (36)	117 (17)
<i>Specialty Care Area</i>	-	-
<i>Wards</i>	142 (20)	217 (32)
<i>Outpatient</i>	311 (44)	325 (48)
<i>Other</i>	-	16 (2)
¹ DUA: Data Use Agreement		
² LabID: Laboratory Identification Event		

One hundred and six (16%) of all MRSA specimens for this quarter were determined to be healthcare-onset (HO), and the remainder (569, or 84%) were determined to be community-onset (CO). NHSN defines 'healthcare-onset' as a 'LabID Event specimen collected >3 days after admission to the facility (i.e., on or after day 4).' 'Community-onset' is defined by NHSN as a 'LabID Event specimen collected as an outpatient or an inpatient ≤3 days after admission to the facility (i.e., days 1, 2, or 3 of admission).'

For this quarter, the percent of events which were healthcare-onset varied by specimen source. Sputum specimens had the largest proportion of **healthcare-onset** events (38%), followed by other (23%), blood (16%), abscess (12%), urine (7%), wound (7%), and skin (5%). The majority of all MRSA specimens were collected from outpatient locations (325 or 48%), followed by patient wards (217 or 32%), and intensive/critical care units (117 or 17%). Eighteen percent of LabID events occurred in patients who were previously positive for MRSA.

Clostridium difficile Data

As shown in Table 3 (below), for this quarter there were 344 reports of *C. difficile* identified by 18 hospitals which used the MDRO/CDAD LabID Event option. A *C. difficile* LabID event is defined as “all non-duplicate *C. difficile* positive laboratory assays.” As with MRSA LabID events, *C. difficile* LabID event specimens must be collected for clinical purposes, not for the purpose of active surveillance testing or screening, and testing protocol and type of test used (i.e. PCR, assay, culture) vary by facility. *C. difficile* LabID event data are considered proxy measures of exposure burden, and do not distinguish between patient colonization and infection.

Table 3. <i>C. difficile</i> Characteristics	Annual Oct 1, 2009 – Sept 30, 2010	January – March 2010
Frequency, Number		
<i>Hospitals with DUA</i> ¹	26	41
<i>Hospitals Reporting CDAD LabID</i> ²	8	18
<i>Aggregated isolates</i>	184	344
Onset, Number (%)		
<i>Healthcare-Onset (HO)</i>	76 (41)	95 (28)
<i>Community-Onset Healthcare-Assoc (COHA)</i>	34 (19)	77 (22)
<i>Community-Onset (CO)</i>	74 (40)	172 (50)
Previous CDI Number (%)		
<i>Previously positive</i>	Not available	52 (15)
<i>CDI assay, recurrent</i>	Not available	40 (12)
Surveillance Location, Number (%)		
<i>Intensive/Critical Care Unit</i>	60 (33)	58 (17)
<i>Specialty Care Area</i>	8 (4)	6 (2)
<i>Wards</i>	78 (42)	165 (48)
<i>Outpatient</i>	38 (21)	108 (31)
<i>Other</i>	-	7 (2)
¹ DUA: Data Use Agreement		
² LabID: Laboratory Identification Event		

Ninety-five or 28% of the reports were considered to be **healthcare-onset**. Seventy-seven or 22% were considered to be **community-onset healthcare facility-associated (COHA)**, and 172 or 50% were reported to be **community-onset**. *Community-onset healthcare facility-associated* is defined as a ‘community-onset LabID Event collected from a patient who was discharged from the facility ≤4 weeks prior to date stool specimen collected. (Healthcare-onset and community-onset are defined under the MRSA data heading.) Looking at location of *C. difficile* specimens, 165 (48%) were reported from patient wards, 108 (31%) from outpatient locations, 58 (17%) from intensive/critical care, 6 (2%) from a specialty care area, and 7 (2%) from other locations of the hospitals. Fifteen percent of LabID events occurred in patients who were previously positive for *C. difficile*. In addition, 12% of LabID events were recurrent *Clostridium difficile* infection (CDI) assays. A recurrent CDI assay is a *C. difficile* LabID event specimen obtained greater than 2 weeks and less than or equal to 8 weeks after the most recent LabID event for that patient.

Multidrug-Resistant Organisms (MDRO) summary data

Table 4 provides an overview of the rates of LabID events and Infection Surveillance events for multidrug-resistant organisms (MDROs). Data are shown for organisms where five or more facilities are conducting surveillance for that particular organism. Although 14 facilities were conducting MRSA LabID surveillance during this quarter, only 11 facilities provided complete summary data necessary to calculate MDRO and Prevalence Rates. For *C. difficile*, 11 of 18 facilities provided complete summary data and are included in the table. Additionally, one facility is conducting MRSA LabID surveillance in an outpatient setting which requires the number of patient encounters as a denominator. Rates will not be reported where fewer than five facilities are represented. If more facilities choose to monitor outpatient settings, we will expand the table to include patient encounters and an outpatient rate for LabID events.

Table 4.

Cumulative Annual Multidrug-Resistant Organism (MDRO) Rates

MDRO Organism	Number of Facilities	Number of Inpatient Events	Number of Patient Days	Number of Patient Admits	MDRO Rate ¹	MDRO Admission Prevalence Rate ²
MRSA ³	11	100 LabID ⁴	21,527	5,610	4.65	1.78
MRSA	5	5 Infections ⁵	9,378		0.53	
C. diff ⁶	11	90 LabID	61,925	19,870	14.53	0.45
C. diff	3	- Infections	-		-	

Michigan Rate

¹MDRO Rate: The rate of MDRO LabID events per 1,000 patient days (or encounters) for all organisms, except *C. difficile*, which is the number of CDI LabID events per 10,000 patient days.

²MDRO Admission Prevalence Rate. The number of MDRO LabID events per 100 inpatients admitted.

³Methicillin-Resistant *Staphylococcus aureus* (MRSA)

⁴Lab ID: Laboratory-Identified (LabID) Event. This is an option within the Multidrug-Resistant Organism / *Clostridium difficile*-Associated Disease (MDRO/CDAD) Module of NHSN for tracking laboratory results without conducting additional surveillance for infections.

⁵Infection: MDRO event under infection surveillance. This is an option in the MDRO/CDAD module for conducting infection surveillance.

⁶C. diff: *Clostridium difficile*

Table 5.

Device-Associated Rates

Device-Associated Infection	Number of Facilities	Number of Infections	Number of Patient Days	Number of Device Days	MI Device-Associated Infection Rate ¹	US Device-Associated Infection Rate ²	MI DU ³	US DU
CAUTI ⁴	8	8	19,617	6,145	1.3	-	0.313	0.362
CLABSI ⁵	23	15	70,925	23,900	0.627	2.094	0.337	0.342
VAP ⁶	13	20	30,732	9,949	2.01	3.222	0.324	0.338

Michigan Rate
 Comparative National Rate

¹MI Device-Associated Infection Rate: The number of infections per 1,000 device days among participating MI facilities.

²US comparative rates were calculated using a pooled mean from the national estimate on the National Healthcare Safety Network (NHSN). This estimate varies by unit type and with the proportion of device days reported in the unit.

³DU: Device Utilization. The proportion of patient days spent on a device divided by the total number of patient days reported for the unit. The device could be a catheter, central line, or ventilator.

⁴CAUTI: Catheter-Associated Urinary Tract Infection

⁵CLABSI: Central Line-Associated Blood Stream Infection

⁶VAP: Ventilator-Associated Pneumonia

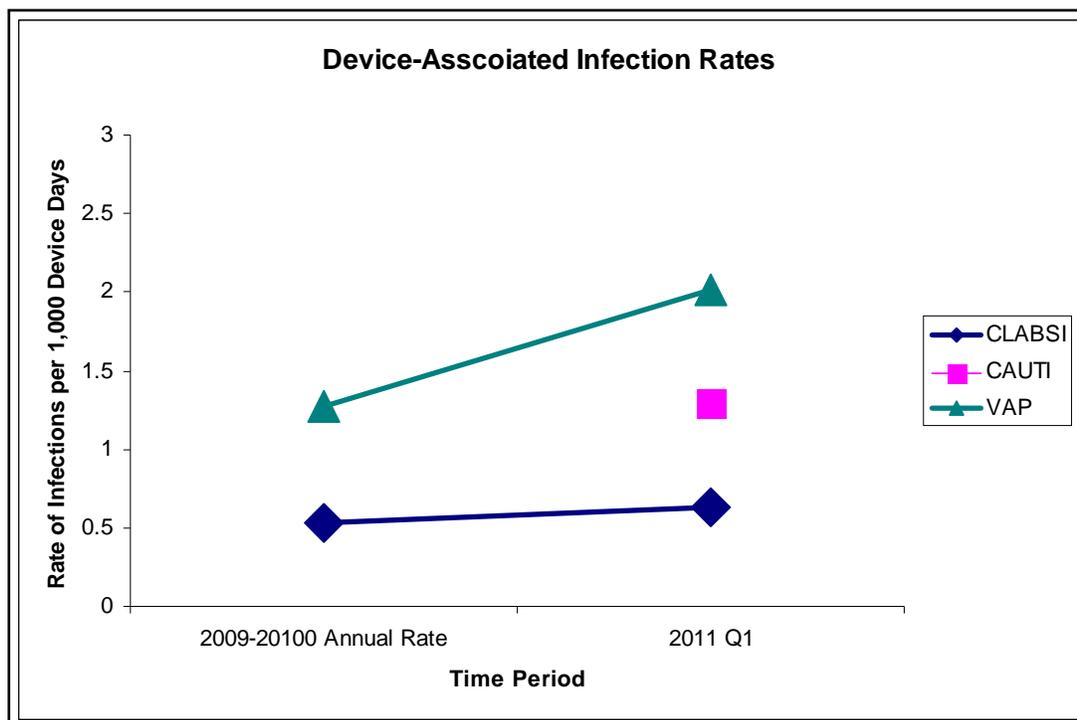


Table 6

Standardized Infection Ratio (SIR)

Type of Infection	Number of Facilities	Procedures Done	Observed ¹	Predicted ²	SIR ³	95% CI ⁴
CLABSI ⁵	20	NA	15	49.64	0.30	(0.17, 0.50)
SSI ⁶	7	766	10	8.65	1.16	(0.63, 1.96)

■ Michigan Rate
 ■ Comparative National Rate

¹Observed: Number of infections (CLABSIs or SSIs) reported during the time frame.

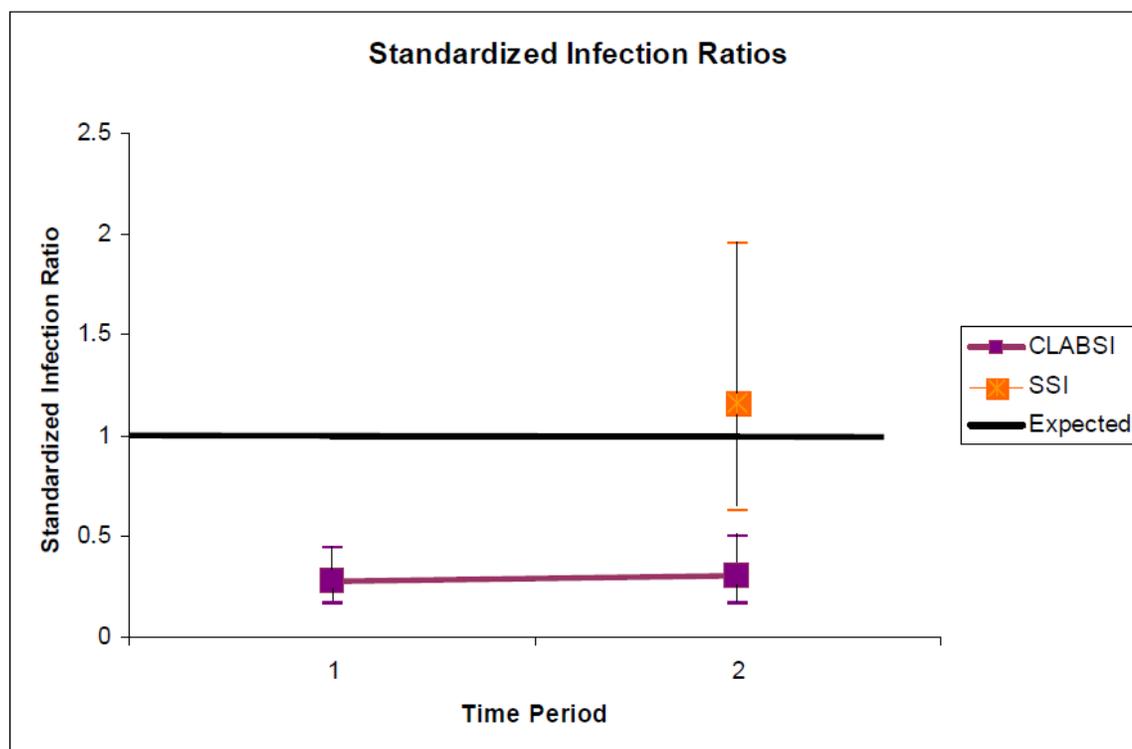
²Predicted: The number of CLABSIs predicted based on the type of hospital unit(s) under surveillance, or the number of SSIs predicted for the same number and type of procedures performed based upon national SSI rates by procedure type.

³SIR: Standardized Infection Ratio. Ratio of observed events compared to the number of predicted events, accounting for unit type or procedure. An SIR of 1 can be interpreted as having the same number of events that were predicted. An SIR that is between 0 and 1 represents **fewer** events than predicted, while an SIR of greater than 1 represents **more** events than expected.

⁴95% CI: 95% confidence interval around the SIR estimate.

⁵CLABSI: Central Line-Associated Blood Stream Infection

⁶SSI: Surgical Site Infection



Conclusions

Aggregated data from this quarter for both MRSA and *C. difficile* appear to be fairly stable and consistent with statistics from the previous year. The overall percentage of healthcare-onset LabID events, as determined by NHSN, also appears to be comparable to cumulative data from last year. Among device-associated modules, there was a slight rise in the reported VAP rate. Due to the small number of facilities reporting on various types of units, this may represent additional high risk units included in the data collection and is not considered significant at this time. Additional facilities and more time collecting aggregate VAP data will give a more accurate picture.

For the first time this quarter, there were enough facilities sharing CAUTI data with the SHARP Unit to report a MI CAUTI rate. National data is not yet available for comparison. The MI CAUTI rate will continue to be monitored over time. The CLABSI rate for this quarter remained constant. The CLABSI SIR also remained consistent at 0.3, or 70% lower than the expected CLABSI rate among MI hospitals.

This report also contained enough data to publish the Michigan SSI SIR. This ratio was 1.16 which represents 16% more surgical site infections than expected by comparing to national data. However, the SSI SIR is not statistically significantly higher than expected. Additional facilities and more time collecting SSI data will demonstrate trends in SSI occurrence. Note too that as the MDCH SHARP Unit continues to enroll hospitals, the data may vary from month to month.