

# HEALTHCARE-ASSOCIATED INFECTIONS IN MICHIGAN HOSPITALS

**2010 – 2011 ANNUAL REPORT**

Michigan Department of Community Health

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

October 1, 2010 – September 30, 2011

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## Background

In 2009, the Surveillance for Healthcare-Associated & Resistant Pathogens (SHARP) Unit was created within the Surveillance & Infectious Disease Epidemiology Section, Communicable Disease Division, Bureau of Disease Control, Prevention, and Epidemiology (formerly Bureau of Epidemiology), at the Michigan Department of Community Health (MDCH). SHARP was initially funded through the American Recovery & Reinvestment Act (ARRA) to improve state HAI prevention infrastructure, to conduct surveillance for healthcare-associated infections (HAIs), focusing at first on methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* (*C. difficile*/*C. diff*), and to support existing prevention initiatives in the state.

With this initial funding, Michigan was able to expand its infrastructure and increase state activities related to HAI surveillance and prevention. Activities in 2009-2011 were focused in acute care hospitals. Unlike many other states, Michigan has no mandate for public reporting of HAIs. Instead, Michigan has been successful in reducing infections through collaborative efforts with the Michigan Health & Hospital Association (MHA) Keystone Center for Patient Safety & Quality (MHA Keystone), with MPRO (Michigan's Quality Improvement Organization), and through collaboration with state and regional professional organizations including the Michigan Society for Infection Prevention & Control (MSIPC), the Greater Detroit Chapter of the Association of Professionals in Infection Control & Epidemiology (APIC-GD), and other professional groups. Activities initiated have been directly related to the 2009 U.S. Department of Health and Human Services (HHS) *Action Plan to Prevent Healthcare-Associated Infections* (<http://www.hhs.gov/ash/initiatives/hai/actionplan/index.html>). Primary HAI activities funded under ARRA included the following:

- Coordination and reporting of Michigan HAI prevention efforts
- Detection and reporting of HAI data (HAI surveillance)
- Establishment or partnership with Prevention Collaboratives

Broad implementation of surveillance and prevention activities in Michigan hospitals has shown dramatic reductions in HAI occurrence. This reduction not only saved lives and reduced suffering, but has also resulted in healthcare cost savings.

Acute care HAI surveillance efforts are ongoing. Hospitals interested in contributing HAI data are encouraged to contact the MDCH SHARP Unit. As additional funds become available, MDCH SHARP plans to expand surveillance initiatives to include other types of healthcare facilities, including long-term care facilities and ambulatory care centers. MDCH SHARP has received other Federal grants to expand HAI surveillance and promote two new prevention initiatives: the MRSA/*Clostridium difficile* infection (CDI) Prevention Initiative and the carbapenem-resistant *Enterobacteriaceae* (CRE) Surveillance and Prevention Initiative. Validation studies are also planned within acute care hospitals to ensure the accuracy of NHSN data reported. Lastly, MDCH SHARP will continue to work with partner agencies such as MHA Keystone and MPRO, as well as state professional societies and consumer groups, to educate the public and healthcare providers about HAIs and the roles each can play in preventing these infections.

## Activities

### Coordination and Reporting of State HAI Prevention Efforts

In 2009, the SHARP Unit formalized the multidisciplinary Michigan HAI Prevention Advisory Group to coordinate and oversee activities related to HAI surveillance and prevention activities. The group consists of representatives from the MDCH, MHA Keystone, MPRO, acute care hospitals, professional infection control and infectious disease societies, and consumers. This group holds monthly meetings to review grant activities and collaborate on future initiatives. The Advisory Group has also played a key role in the development of a Michigan HAI Surveillance and Prevention Plan which outlines targeted HAI activities in Michigan. This plan was submitted to the Department of Health & Human Services (HHS) in December 2009, and is posted on Michigan's HAI website at [http://www.michigan.gov/documents/mdch/MI\\_HAI\\_Plan\\_308688\\_7.pdf](http://www.michigan.gov/documents/mdch/MI_HAI_Plan_308688_7.pdf). This plan will be updated in 2012.

MDCH, MPRO, and the MHA Keystone Center collectively created a crosswalk detailing the HAI initiatives being implemented by each organization. The crosswalk can be found at: [http://www.michigan.gov/documents/mdch/Final\\_HAI\\_Crosswalk\\_FINAL\\_2272012\\_MHA\\_379116\\_7.pdf](http://www.michigan.gov/documents/mdch/Final_HAI_Crosswalk_FINAL_2272012_MHA_379116_7.pdf).

### Detection and Reporting of HAI Data (HAI Surveillance)

In September 2009, SHARP began recruiting hospitals to participate in a voluntary HAI surveillance initiative. Hospitals were asked to share their HAI data submitted to the Centers for Disease Control and Prevention (CDC) using the National Healthcare Safety Network (NHSN). The SHARP Unit's initial focus was on methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* (*C. difficile*) collected through the Laboratory-Identified Event (LabID) option of the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) module. Additional HAI data collected through other NHSN modules have also been welcomed at any time.

To ensure confidentiality of the HAI data shared by hospitals, SHARP developed a data use and confidentiality agreement (DUA) which hospitals were asked to sign before sharing their data. The DUA was developed in coordination with MDCH legal counsel. The HAI surveillance initiative is considered public health surveillance and was deemed exempt from review by the MDCH Internal Review Board (IRB) Committee.

In 2009 and 2010, announcements regarding this surveillance initiative were distributed to hospitals through newsletters and emails from the MHA Keystone and MPRO, as well as through APIC-GD and MSIPC. In September 2010, hospitals were notified that SHARP would award professional development funds to participating hospitals. The first 30 hospitals to sign DUAs and to confer rights were awarded \$1,000. The next 20 hospitals were awarded \$750 each. As of February 14, 2012, 59 acute care hospitals had signed the MDCH SHARP Data Use Agreement and have conferred rights to their data.

### **Establishment or Partnership with Prevention Collaboratives**

As part of the third activity area under ARRA funding, MDCH SHARP has partnered with both MPRO and MHA Keystone to build on their established HAI prevention efforts. Previously, MPRO collected MRSA data from 22 participating hospitals to demonstrate reductions in MRSA infections over time. This project has now ended, and additional prevention efforts are being put into place. MHA Keystone has many quality improvement initiatives underway, including their nationally-known success working with Michigan hospitals to reduce central line-associated bloodstream infections (CLABSIs) in intensive care units (ICUs) through use of a checklist and a comprehensive unit-based safety program (CUSP). The MDCH SHARP Unit is currently supporting all MHA Keystone HAI initiatives including, but not limited to, CLABSI and catheter-associated urinary tract infection (CAUTI) reduction.

In addition, MHA Keystone and the Michigan Vermont Oxford Network (VON) Neonatal ICU (NICU) Collaborative have requested the SHARP Unit to share specific NHSN data in 2012. In order to do this, MDCH SHARP has developed a data use agreement addendum. This addendum was sent directly to hospitals participating with Keystone and VON. MHA Keystone notified their participating hospitals of this request in a mailing announcing their Hospital Engagement Network (HEN) project which is funded through CMS's Partnership for Patients. When signed, the addendum allows MDCH SHARP to provide MHA Keystone and/or VON with monthly NHSN data reports. Only facilities who have signed the MDCH SHARP Master Data Use & Confidentiality Agreement may sign the addendum.

## Introduction

This report includes statewide healthcare-associated infection (HAI) counts and rates in Michigan from October 2010 through September 2011. Surveillance data were collected from acute care hospitals who have voluntarily agreed to share their NHSN data with the MDCH SHARP Unit. NHSN is a secure online surveillance system developed by the CDC. Hospitals sign a MDCH SHARP data use and confidentiality agreement and confer rights to MDCH SHARP to view their NHSN HAI data. All NHSN data collected from participating hospitals have been aggregated and facility de-identified in this report. Aggregated data have been analyzed for trends and compared with national data where appropriate. In an effort to protect facility identity, data are displayed only when 5 or more facilities are included.

In this annual report, participating hospitals are characterized by hospital affiliation, geographic region, and bed size. This report also describes units under surveillance by participating hospitals and the modules used. The SHARP Unit collects data from all modules within NHSN. This annual report and previous quarterly, semi-annual, and annual reports are published on the MDCH HAI website at [www.michigan.gov/hai](http://www.michigan.gov/hai).

As of the data access date, February 14, 2012, 59 hospitals had signed a data use and confidentiality agreement with MDCH SHARP. At that time, only 55 hospitals had conferred rights to SHARP and had a reporting plan in place for at least one month during the inclusive time period. The data from these 55 hospitals were used for development of this annual report; however, not all participating hospitals provided patient- or event-level data. The number of hospitals providing data for analysis is indicated in each table throughout this report and reflects the number of hospitals contributing data to NHSN and sharing that data with MDCH SHARP. For example, although 55 hospitals had conferred rights to their data with a reporting plan in place for the time period between October 1, 2010, and September 30, 2011, at the data access date (see *Table 1* below), only 32 hospitals were using the MDRO/CDI module and reporting data for *C.diff* LabID events. The text “n=...” is used to indicate the number of hospitals or units being referenced.

## Hospital Descriptives and Surveillance

Table 1 and Figure 1 reflect the number of hospitals who have conferred rights and entered a monthly reporting plan in NHSN for each respective month by the data access date. A monthly reporting plan identifies which NHSN modules and surveillance activities a hospital will be participating in during a given month. Because surveillance targets and monthly reporting plans may vary by hospital and month, hospitals may not report to NHSN each month. The SHARP Unit has requested at least three consecutive months of data for their NHSN surveillance initiative.

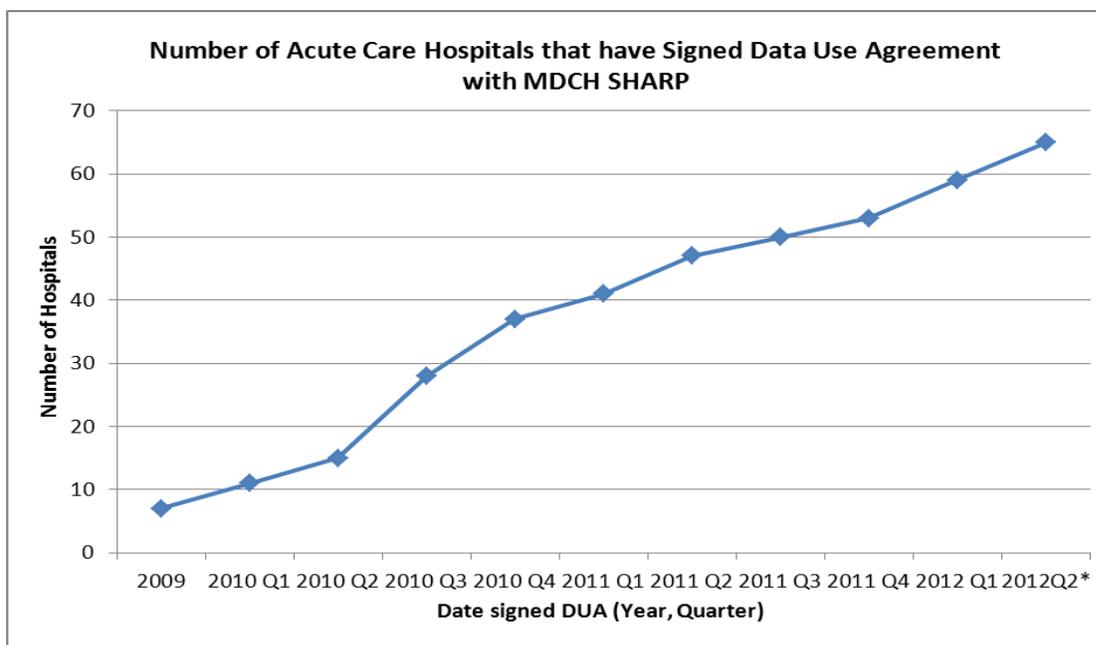
**Table 1.**

### *Number of Hospitals with a Reporting Plan in Place*

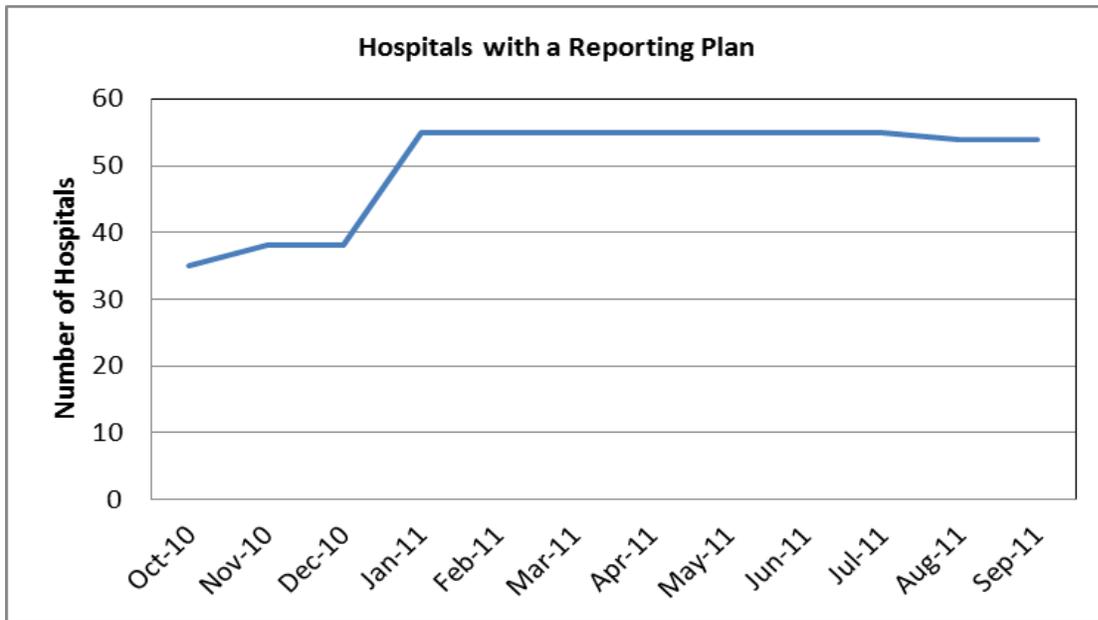
Month	Oct 2010	Nov 2010	Dec 2010	Jan 2011	Feb 2011	Mar 2011	Apr 2011	May 2011	June 2011	July 2011	Aug 2011	Sept 2011
<b>Number of Hospitals</b>	35	38	38	55	55	55	55	55	55	55	54	54

Figure 1 (below) is a graphical representation of the number of facilities who have signed the MDCH SHARP Data Use & Confidentiality Agreement. Figure 2 (below) is a graphical representation of the number of facilities who have conferred rights to MDCH SHARP within NHSN and have a reporting plan in place for at least one month. The number of facilities for each month represents those participating as of February 14, 2012 for the October 2010 through September 2011 time period.

**Figure 1.** Hospitals that have signed a DUA and conferred rights



**Figure 2.** Hospitals with a Reporting Plan



The data in Table 2 were obtained from the 2010 NHSN Annual Facility Survey completed by participating hospitals. Among the 53 facilities which completed an annual survey, hospital affiliation is relatively evenly split between teaching and non-teaching.

**Table 2.**

**Hospital Affiliation**

Hospital Type	Teaching <sup>1</sup>	Non-teaching	Unknown	Total
Number of Facilities	25	28	0	53 <sup>2</sup>

<sup>1</sup>Teaching includes major, graduate, and limited affiliation with medical schools as indicated on their facility survey

<sup>2</sup>Although 55 hospitals are included in the report, only 53 completed the annual survey from which hospital affiliation is calculated

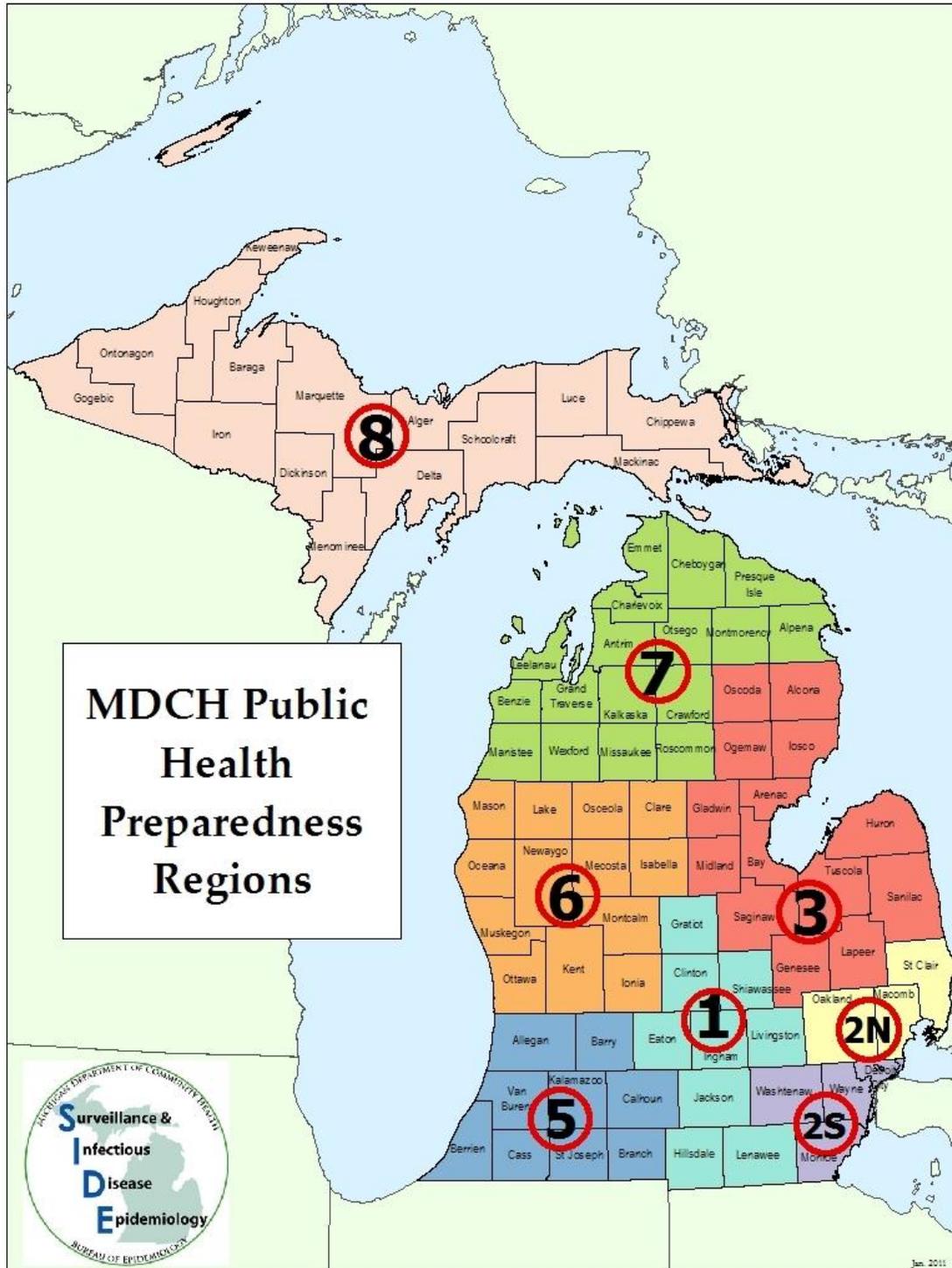
To characterize the geographic distribution of the participating hospitals, hospital locations were categorized according to Public Health Preparedness Regions. Regions 7 and 8 were combined. The Public Health Preparedness Regions and the counties they include is shown on the map in Figure 3, and a map indicating the number of SHARP-participating facilities by region is shown in Figure 4.

Table 3.

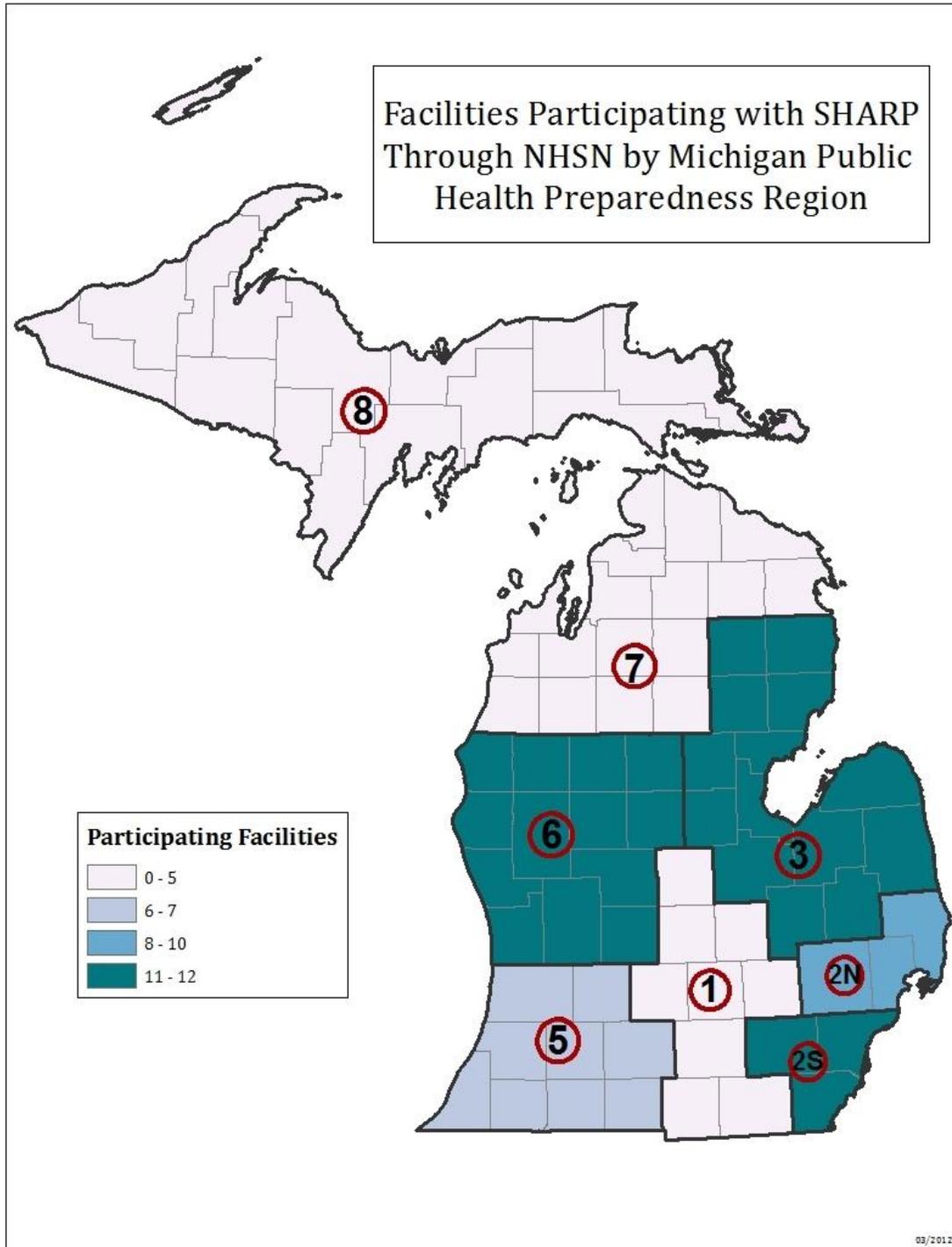
*Number of Participating Hospitals by Region*

Geographic Region	1	2N	2S	3	5	6	7 and 8
Number of Hospitals	≤5	8	10	9	7	12	≤5

Figure 3. Public Health Preparedness Regions



**Figure 4.** Facilities Participating with MDCH SHARP by Michigan Public Health Preparedness Region



Hospital licensure data, including the number of beds in each hospital, were obtained from the 2010 Michigan Certificate of Need Annual Survey. The majority (n= 36 or 68%) of participating hospitals have more than 100 licensed beds in their facility. This is in contrast to the proportion of all Michigan hospitals with 100 or more licensed beds (71 of 174, or 41%). Of the 71 MI hospitals with 100 or more beds, 36 (51%) have enrolled in the SHARP surveillance initiative versus 17 of the 103 (17%) hospitals with fewer than 100 beds. Data indicate that larger hospitals (100 beds or more) are more likely to participate with SHARP in this surveillance initiative. The Certificate of Need Survey includes all acute care hospitals, long-term acute care (LTAC) hospitals, and critical access hospitals in Michigan. There are approximately 19 LTACs using NHSN in Michigan; however, none of these hospitals are sharing data with the SHARP Unit. The number of hospitals enrolled in the SHARP NHSN Group includes acute care hospitals and critical access hospitals only.

**Table 4.**

***Number of Hospitals by Bed Size***

Number of Beds in Hospital	≤100	101 – 200	201 – 500	501 +	TOTAL
Number of hospitals in MI (% of Total)	103 (59)	19 (11)	43 (25)	9 (5)	<b>174</b>
Number of hospitals enrolled in SHARP NHSN Group (% of Total)	17 (32)	11 (21)	18 (34)	7 (13)	<b>53<sup>1</sup></b>

<sup>1</sup>Although 55 hospitals are included in the report, only 53 completed the annual survey from which bed size is calculated

Figure 5 (below) demonstrates the total number of hospitals in Michigan and the number of hospitals in Michigan who are enrolled in NHSN and sharing data with MDCH by bed size.

**Figure 5.**

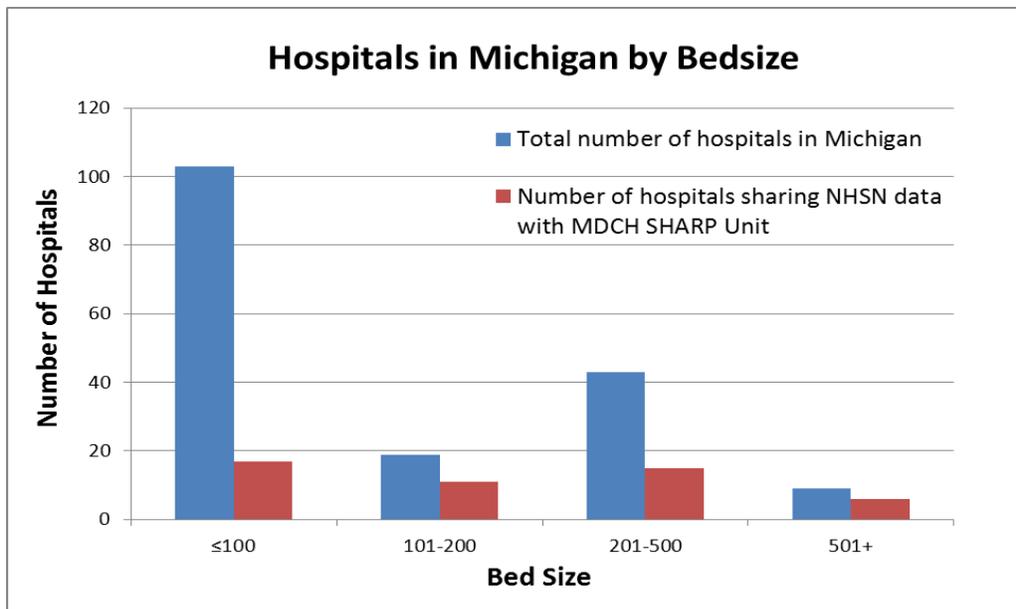


Table 5 indicates that the majority of hospitals participating in SHARP NHSN surveillance are conducting NHSN surveillance in their intensive care units (ICUs). The ICU type is not specified in this report. Many hospitals are also conducting surveillance on one or more patient wards. Eight hospitals are conducting surveillance in a Specialty Care Area (SCA) or a step-down unit (STEP). According to the CDC NHSN Patient Safety Manual, a SCA may be an inpatient long-term acute care unit, a transplant unit, an acute dialysis unit, or a hematology/oncology unit. It should be noted that some hospitals are monitoring multiple unit types within their facility.

**Table 5.**

***Types of Units under NHSN Surveillance***

<b>Unit Type</b>	<b>ICU/CCU</b>	<b>SCA/STEP</b>	<b>Wards</b>	<b>Outpatient</b>
<b>Number of Hospitals Participating</b>	49	8	28	9

Table 6 indicates the NHSN module(s) in use, as indicated by participating hospitals in their monthly reporting plan. From month to month, the type of module(s) being used can change as some modules require varying periods of use. According to data shared with MDCH SHARP, the most commonly used module during this reporting period was the CLABSI module. This is not surprising because of the previous work done by hospitals in conjunction with MHA Keystone to reduce these types of infections. Use of the CLABSI module is also consistent with the 2011 Centers for Medicare & Medicaid Services (CMS) Hospital Inpatient Prospective Payment System (IPPS) reporting rule. Beginning January 1, 2011, hospitals were required to use NHSN to report CLABSIs in adult, pediatric, and neonatal ICUs in order to receive full Medicare reimbursements in 2013.

The column titled “Number of Hospitals Using Module” displays the number of hospitals that have indicated module use in each of their reporting plans for at least one month in the report time period. The column titled “Number of Hospitals Sharing Data” displays the number of hospitals that have shared data for the report time period as of the data access date. There is a discrepancy between these two columns in some instances because not all hospitals that indicate module use necessarily report data, and because of the time difference between when reporting plans were observed and the data access date.

**Table 6.**

***NHSN Modules in use***

<b>NHSN Module</b>	<b>Number of Hospitals Using Module<sup>1</sup></b>	<b>Number of Hospitals Sharing Data<sup>2</sup></b>
<b>Central Line-Associated Bloodstream Infection (CLABSI)</b>	56	51
<b>Ventilator-Associated Pneumonia (VAP)</b>	32	31
<b>Clostridium difficile Infection (CDI) Laboratory-identified (LabID) Event</b>	32	29
<b>Methicillin-Resistant Staphylococcus aureus (MRSA) Laboratory-identified (LabID)</b>	27	19
<b>Surgical Site Infection (SSI)</b>	25	22 <sup>3</sup>
<b>Catheter-Associated Urinary Tract Infection (CAUTI)</b>	22	24 <sup>4</sup>
<b>Methicillin-Resistant Staphylococcus aureus (MRSA) Infection Surveillance</b>	16	14
<b>Vancomycin-Resistant Enterococci (VRE) LabID</b>	7	7
<b>Clostridium difficile Infection (CDI) Surveillance</b>	7	9
<b>Post-Procedure Pneumonia (PPP)</b>	6	<5
<b>Vancomycin-Resistant Enterococci (VRE) Infection Surveillance</b>	5	6
<b>Methicillin-sensitive Staphylococcus aureus (MSSA) LabID</b>	<5	19
<b>Methicillin-sensitive Staphylococcus aureus (MSSA) Infection Surveillance</b>	<5	14
<b>Acinetobacter LabID</b>	<5	<5
<b>Acinetobacter Infection Surveillance</b>	<5	<5
<b>Carbapenem-resistant Enterobacteriaceae LabID</b>	<5	<5
<b>Carbapenem-resistant Enterobacteriaceae Infection Surveillance</b>	<5	<5
<b>Cephalosporin Resistant KlebsiellaLabID</b>	<5	<5
<b>Cephalosporin Resistant KlebsiellaKleb Infection Surveillance</b>	<5	<5

<sup>1</sup>This is the number of hospitals that have indicated module use in each of their reporting plans, for at least one month within the twelve month time period, as of May 1, 2012.

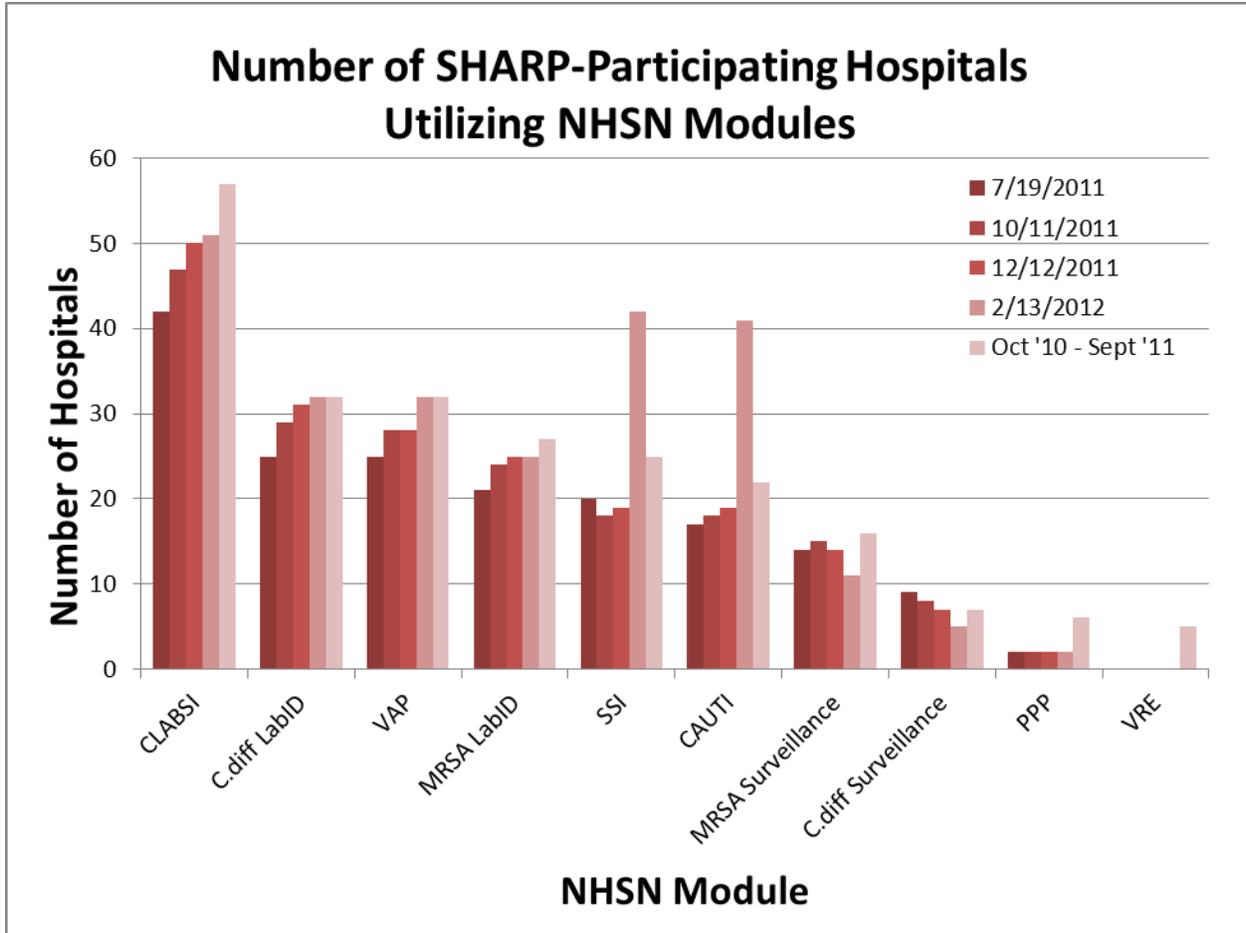
<sup>2</sup>This is the number of hospitals sharing data for the report period, as of the data access date.

<sup>3</sup>As of March 1, 2012

<sup>4</sup>In some instances, the number of hospitals sharing data is greater than the number of hospitals using the module. This is explained by the time difference between when the reporting plans were observed and the data access date.

Figure 6 (below) illustrates the number of hospitals participating with the SHARP Unit which utilize various modules. Each bar represents the date the SHARP Unit counted hospitals' module use in NHSN at that time. It should be noted that reporting plans can and do change from time to time, so most of the dates represent snapshots in time regarding the facility module use for surveillance activities. The values indicated on the bar marked "Oct '10-Sept '11" represent the hospitals with modules in plan for at least one month throughout the entire report time period.

**Figure 6.**



## Cumulative Annual Aggregate MDRO/CDI Module Reports

Table 7 shows aggregate MRSA LabID Event data by quarter, abstracted from each respective quarterly report, along with cumulative data for the annual time period of October 1, 2010 through September 30, 2011. Because of different abstraction dates and different amounts of data being shared during each respective time period, Quarterly Report values may not sum to Annual Report values.

The NHSN definition for MDRO LabID Event is ‘all non-duplicate MDRO isolates [in this case MRSA isolates] from any specimen source and unique blood source MDRO [MRSA] isolates, including specimens collected during an Emergency Department or other clinic visit, if collected the same day as patient admission’. A unique blood source is defined as ‘a MDRO [MRSA] isolate from blood in a patient with no prior positive blood culture for the same MDRO [MRSA] and location in  $\leq 2$  weeks, even across calendar months.’ A duplicate MDRO isolate is defined as ‘any MDRO [MRSA] isolate from the same patient and location after an initial isolation of the specific MDRO [MRSA] during a calendar month, regardless of specimen source except unique blood source’. The specimens must be obtained for clinical decision-making purposes to be considered a LabID Event; thus, isolates obtained for ‘surveillance purposes only’ will not be reflected in this data. Additionally, testing protocol and type of test used (i.e. PCR, assay, culture) vary by facility and are not recorded here.

NHSN defines healthcare-onset (HO) as a ‘LabID Event specimen collected  $>3$  days after admission to the facility (i.e., on or after day 4).’ Community-onset (CO) is defined by NHSN as a ‘LabID Event specimen collected as an outpatient or an inpatient  $\leq 3$  days after admission to the facility (i.e., days 1, 2, or 3 of admission).’ Note that the proportions of healthcare facility-onset and community-onset reports have remained fairly consistent throughout the four quarters, along with the overall cumulative percentage for the year.

It should also be noted that LabID Event data do not necessarily indicate infection, but denote a positive lab test result from a specimen collected for clinical purposes. MRSA is known to colonize skin and mucosal membranes without causing infections. LabID data provide a proxy measure for MRSA prevalence.

Table 7.

### Cumulative Aggregate Methicillin-Resistant *Staphylococcus aureus* (MRSA) LabID Data

	October – December 2010 Quarterly Report	January – March 2011 Quarterly Report	April – June 2011 Quarterly Report	July – September 2011 Quarterly Report	Cumulative Data <sup>1</sup> October 2010 – September 2011
<b>Frequency, Number</b>					
<i>Hospitals with a DUA</i> <sup>2</sup>	35	41	47	53	56
<i>Hospitals reporting MRSA LabID</i> <sup>3</sup>	19	14	16	25	25
<i>Aggregated LabID Events</i>	671	675	415	613	2793
<b>Onset, Number (%)</b>					
<i>Healthcare Facility-Onset (HO)</i>	104 (16)	106 (16)	84 (20)	114 (19)	537 (19)
<i>Community-Onset (CO)</i>	567 (84)	569 (84)	331 (80)	499 (81)	2256 (81)
<b>Specimen Source, Number (%HO)<sup>4</sup></b>					
<i>Blood</i>	42 (33)	38 (16)	39 (15)	50 (18)	236 (25)
<i>Sputum</i>	115 (37)	112 (38)	102 (38)	96 (41)	589 (41)
<i>Wound</i>	202 (5)	226 (7)	146 (10)	263 (9)	1175 (7)
<i>Abcess</i>	79 (3)	43 (12)	11 (9)	26 (4)	77 (12)
<i>Urine</i>	59 (8)	72 (7)	26 (12)	47 (4)	206 (10)
<i>Skin</i>	76 (1)	59 (5)	4 (25)	9 (0)	106 (7)
<i>Other</i>	98 (29)	125 (23)	87 (23)	122 (32)	404 (29)
<b>Surveillance Location, Number (% , %HO)<sup>5</sup></b>					
<i>Intensive/Critical Care Unit</i>	130 (19)	117 (17)	123 (30)	158 (26)	747 (27, 39)
<i>Specialty Care Area</i>	-	-	-	-	27 (1, 7)
<i>Wards</i>	184 (27)	217 (32)	228 (55)	278 (46)	1164 (42, 21)
<i>Outpatient</i>	349 (52)	325 (48)	63 (15)	177 (29)	855 (31, 0)
<i>Other</i>	8 (1)	16 (2)	-	-	-

<sup>1</sup>Note: cumulative data were accessed on March 1, 2012

<sup>2</sup>DUA: Data Use Agreement. This is a document signed between the hospital and the Michigan Department of Community Health which outlines how the data will be shared and used, and how confidentiality will be protected.

<sup>3</sup>MRSA Lab ID: Methicillin-Resistant *Staphylococcus aureus* (MRSA) Laboratory-Identified (LabID) Event. This is an option within the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) Module of NHSN for tracking laboratory results without conducting additional surveillance for infections.

<sup>4</sup>The number in parentheses under "Specimen Source" is the percent of isolates obtained from that source which are healthcare-onset.

<sup>5</sup>The numbers in parentheses under "Surveillance Location" are the percent of isolates from each location, followed by the percent of isolates from each location which are healthcare-onset.

Table 8 shows aggregate CDI LabID data by quarter, abstracted from each respective quarterly report, along with cumulative data for the annual time period of October 1, 2010 through September 30, 2011. Again, because of different abstraction dates and different amounts of data being shared during each respective time period, Quarterly Report values may not sum to Annual Report values.

Table 8 displays the number of positive CDI LabID Events entered by facility per quarter following the NHSN definitions. The NHSN definition for a CDI LabID Event is 'all non-duplicate MDRO isolates [in this case, CDI detection on stool culture or a positive CDI assay] from any specimen source, including specimens collected during an Emergency Department or other clinic visit, if collected the same day as patient admission'. For CDI, a duplicate MDRO isolate is defined as 'any MDRO [CDI] isolate [assay] from the same patient and location after an initial isolation [assay] of the specific MDRO [CDI] during a calendar month'. The specimens must be obtained for clinical decision-making purposes to be considered a LabID Event, thus specimens obtained for 'surveillance purposes only' will not be reflected in this data. Additionally, testing protocol and type of test used (i.e. PCR, assay, culture) vary by facility and are not recorded here.

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).' Community-onset healthcare facility-associated (CO-HCFA) is defined as a 'CO LabID Event specimen collected from a patient who was discharged from the facility ≤ 4 weeks prior to specimen collection.'

It should also be noted that LabID Event data do not necessarily indicate infection, but denote a positive lab test result from a specimen collected for clinical purposes. LabID data provide a proxy for CDI prevalence.

**Table 8.**

**Cumulative Aggregate Clostridium difficile Infection (CDI)<sup>1</sup> LabID Data**

	October – December 2010 Quarterly Report	January – March 2011 Quarterly Report	April – June 2011 Quarterly Report	July – September 2011 Quarterly Report	Cumulative Data <sup>2</sup> October 2010 – September 2011
<b>Frequency, Number</b>					
<i>Hospitals with DUA<sup>3</sup></i>	35	41	47	53	<b>56</b>
<i>Hospitals Reporting CDI LabID<sup>4</sup></i>	19	18	22	31	<b>29</b>
<i>Aggregated LabID Events</i>	215	344	290	358	<b>2004</b>
<b>Onset, Number (%)</b>					
<i>Healthcare Facility-Onset (HO)</i>	62 (29)	95 (28)	119 (41)	125 (35)	<b>783 (39)</b>
<i>Community-Onset Healthcare Facility-Associated (CO-HCFA)</i>	53 (25)	77 (22)	70 (24)	94 (26)	<b>421 (21)</b>
<i>Community-Onset (CO)</i>	100 (46)	172 (50)	101 (35)	139 (39)	<b>800 (40)</b>
<b>Previous CDI, Number (%)</b>					
<i>Previously Positive</i>	-	52 (15)	38 (13)	36 (10)	-
<i>CDI assay, recurrent</i>	-	40 (12)	24 (8)	25 (7)	-
<b>Surveillance Location, Number (% , %HO)<sup>5</sup></b>					
<i>Intensive/Critical Care Unit</i>	41 (19)	58 (17)	54 (19)	77 (22)	<b>459 (23, 51)</b>
<i>Specialty Care Area</i>	1 (0)	6 (2)	3 (1)	8 (2)	<b>116 (6, 55)</b>
<i>Wards</i>	85 (40)	165 (48)	208 (72)	205 (57)	<b>1167 (58, 42)</b>
<i>Outpatient</i>	83 (39)	108 (31)	25 (9)	67 (19)	<b>261 (13, 0)</b>
<i>Other</i>	5 (2)	7 (2)	-	1 (0)	<b>1 (0, 0)</b>

<sup>1</sup>The specimen source of all CDI LabID events is stool (100%)

<sup>2</sup>Note: cumulative data were pulled March 1, 2012

<sup>3</sup>DUA: Data Use Agreement. This is a document signed between the hospital and the Michigan Department of Community Health which outlines how the data will be shared and used, and how confidentiality will be protected.

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

<sup>5</sup>The numbers in parentheses under "Surveillance Location" are the percent of isolates from each location, followed by the percent of isolates from each location which are healthcare-onset.

## Cumulative Annual Aggregate Rates

In Table 9, the annual Michigan MRSA LabID rate is 4.38 events per 1,000 patient-days. This number is calculated by dividing the number of inpatient MRSA LabID Events by the number of patient days. The MRSA Prevalence Rate is calculated by dividing the number of inpatient MRSA LabID Events by the number of patient admissions. The annual Michigan MRSA Prevalence Rate is 1.85 per 100 patient admissions. Note that LabID Event data do not necessarily indicate infection, but denote a positive lab test result from a specimen collected for clinical purposes. MRSA is known to colonize skin and mucosal membranes without causing infections. LabID data provide a proxy measure for MRSA prevalence.

In addition to LabID surveillance, hospitals may also conduct MRSA Infection Surveillance via NHSN. The definition for a MRSA Infection Surveillance event includes *S. aureus* cultured from any specimen that tests oxacillin-resistant, ceftaxime-resistant, or methicillin-resistant by standard susceptibility testing methods, or by a laboratory test that is FDA-approved for MRSA detection from isolated colonies; these methods may also include a positive result by any FDA-approved test for MRSA detection from that source. There were 14 hospitals that participated in this option during the time period under study, providing an overall MRSA Infection Surveillance Rate of 0.25 per 1,000 patient days. A MRSA Infection Surveillance Prevalence Rate cannot be calculated because patient admissions are not collected in the infection surveillance module. There are currently no national rates available for MDRO/CDI data.

**Table 9.**

### Cumulative Michigan MRSA Rate

Number of Hospitals	Number of Inpatient MRSA Events	Number of Patient Days	Number of Patient Admits	MRSA Rate <sup>1</sup>	MRSA Prevalence Rate <sup>2</sup>
19	993 LabID <sup>3,4</sup>	226,757	53,793	4.38	1.85
14	23 Infections <sup>5</sup>	92,321	---- <sup>6</sup>	0.25	----

#### Michigan Rate

<sup>1</sup>MRSA Rate: Methicillin-Resistant *Staphylococcus aureus* (MRSA) rate. This is the number of inpatient MRSA LabID Events or surveillance infections per 1,000 patient days.

<sup>2</sup>MRSA Prevalence Rate. This is the number of MRSA LabID Events per 100 patients admitted.

<sup>3</sup>MRSA Lab ID: MRSA Laboratory-Identified (LabID) Event. This is an option within the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) Module of NHSN for tracking laboratory results without conducting additional surveillance for infections.

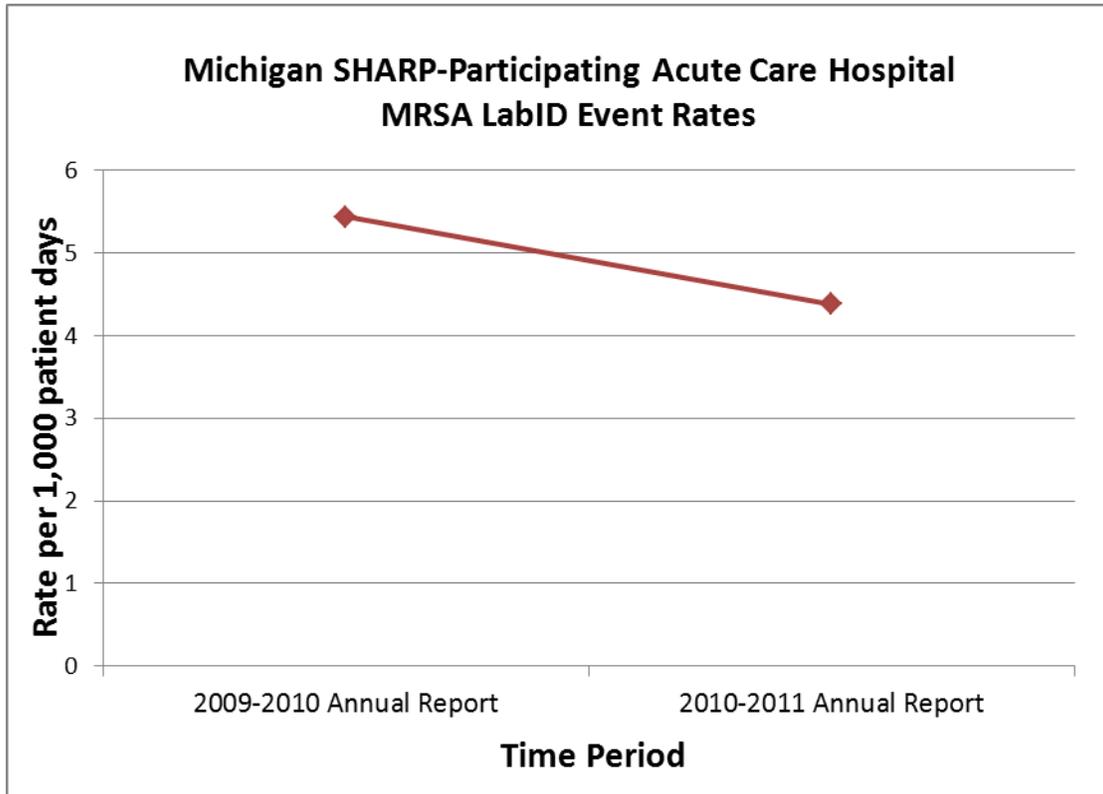
<sup>4</sup>The number of inpatient MRSA LabID Events indicated here is less than the number of MRSA LabID Events indicated in Table 7. This is because events used to calculate a rate required denominator data (patient days and/or admissions). Those without denominator data were excluded from the calculation.

<sup>5</sup>Infection: MRSA event under infection surveillance. This is an option in the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) Module for tracking infections through surveillance.

<sup>6</sup>The infection surveillance module does not collect the number of patient admissions; therefore this number is unavailable and a MRSA Infection Surveillance Prevalence Rate cannot be calculated.

Figure 7 is a graphical demonstration of the Michigan MRSA LabID Event Rates from the 2009-2010 Annual Report to the 2010-2011 Annual Report. The 2010-2011 MRSA LabID Rate was statistically significantly lower than the 2009-2010 LabID Event Rate.

**Figure 7.**



In Table 10 (below), the annual Michigan CDI LabID Event rate is 15.55 events for every 10,000 patient days. The CDI *LabID* Prevalence Rate was 0.51 per 100 patient admissions. CDI LabID Event data do not necessarily indicate infection but denote a positive lab test result from a specimen collected for clinical purposes. *C. difficile* is also known to colonize the intestinal tract without causing infection. LabID Event data provide a proxy measure for *C. difficile* prevalence.

Hospitals may also conduct CDI Infection Surveillance via NHSN. The CDI Infection Surveillance Event definition includes cases of CDI (i.e., *C. difficile* pathogen identified with a positive toxin result) that are not present or incubating at the time of admission (i.e., meets criteria for a healthcare-associated infection). There were 9 hospitals that participated in this option during the time period under study, providing an overall CDI Infection Surveillance rate of 2.48 per 10,000 patient days. As with MRSA Infection Surveillance data, a CDI Infection Surveillance Prevalence Rate cannot be determined because the number of patients admitted is not collected with Infection Surveillance data. And again, there are no national MDRO/CDI rates available to make comparisons with Michigan data.

**Table 10.**

**Cumulative Michigan CDI Rate**

Number of Hospitals	Number of Inpatient CDI Events	Number of Patient Days	Number of Patient Admits	CDI Rate <sup>1</sup>	CDI Prevalence Rate <sup>2</sup>
21	536 LabID <sup>3,4</sup>	344,737	104,751	15.55	0.51
9	14 Infections <sup>5</sup>	56,552	---- <sup>6</sup>	2.48	----

**Michigan Rate**

<sup>1</sup>CDI Rate: *Clostridium difficile* Infection rate. This is the number of inpatient CDI LabID events or surveillance infections per 10,000 patient days.

<sup>2</sup>CDI Prevalence Rate. This is the number of CDI LabID events per 100 patients admitted.

<sup>3</sup>CDI Lab ID: *Clostridium difficile* Infection (CDI) Laboratory-Identified (LabID) Event. This is an option within the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) Module of NHSN for tracking laboratory results without conducting additional surveillance for infections.

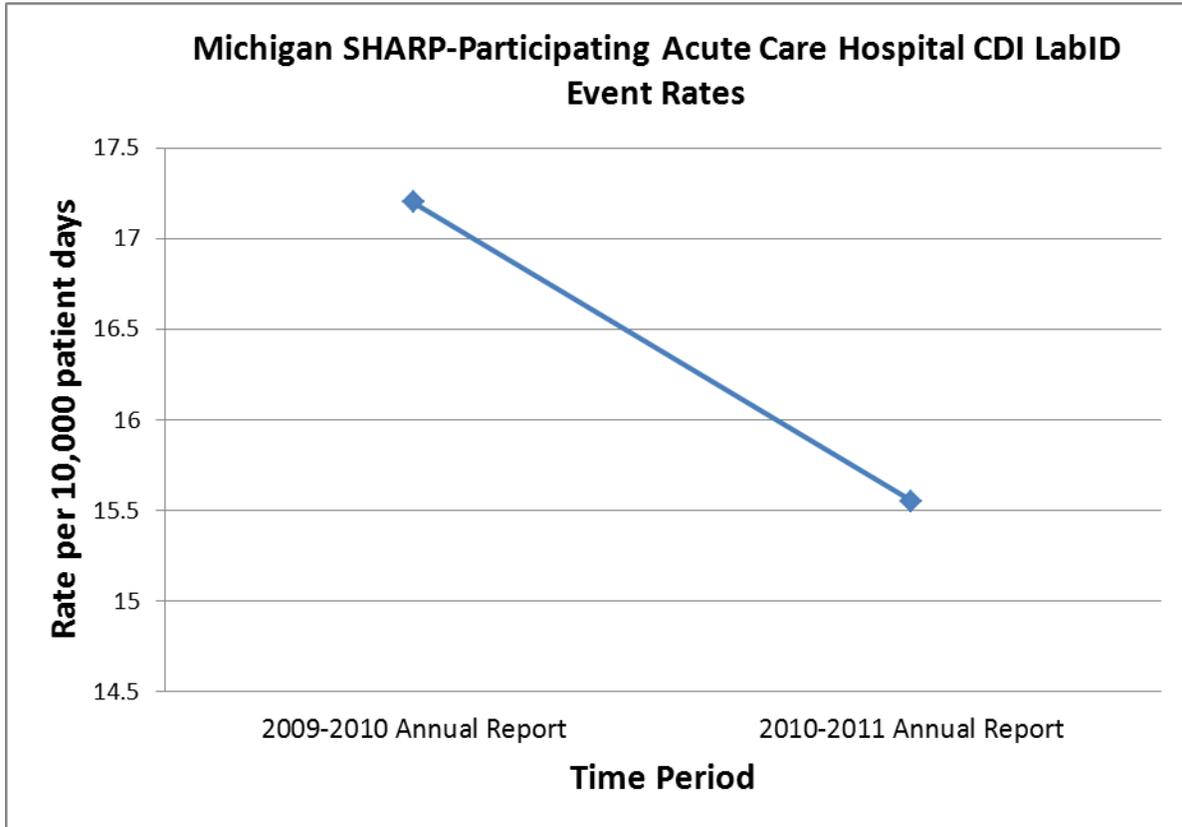
<sup>4</sup>The number of inpatient CDI LabID Events indicated here is less than the number of CDI LabID Events indicated in Table 8. This is because events used to calculate a rate require denominator data (patient days and/or admissions). Events without denominator data were excluded from the calculation.

<sup>5</sup>Infection: CDI event under infection surveillance option of the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) Module.

<sup>6</sup>The infection surveillance module does not collect the number of patient admissions; therefore this number is unavailable and a CDI Infection Surveillance Prevalence Rate cannot be calculated.

Figure 8 represents the CDI LabID Event Rate trend from the 2009-2010 Annual Report to the 2010-2011 Annual Report. Although the 2010-2011 Annual Report CDI LabID Event Rate was lower than the 2009-2010 Annual Report, it was not statistically significantly different.

**Figure 8.**



The present report is the first time the SHARP Unit has had enough participating hospitals to calculate a Prevalence Rate for Vancomycin-Resistant Enterococci (VRE). In order to maintain anonymity, the SHARP Unit requires that five or more hospitals provide data for any module to be published in an aggregated report. In Table 11, the VRE LabID rate was 0.40 per 1,000 patient days for seven hospitals sharing VRE data with the SHARP Unit. The VRE LabID Prevalence Rate was 0.32 per 100 patient admissions. Trend data for VRE will be made available in future reports. As with MRSA and CDI, there is no comparative national rate for VRE.

**Table 11.**

**Cumulative Michigan Vancomycin-Resistant Enterobacteriaceae (VRE) Rate**

Number of Hospitals	Number of Inpatient VRE Events	Number of Patient Days	Number of Patient Admits	VRE Rate <sup>1</sup>	VRE Prevalence Rate <sup>2</sup>
7	93 LabID <sup>3</sup>	115,978	29,000	0.80	0.32
6	0 Infections <sup>4</sup>	23,601	---- <sup>5</sup>	0.00	----

**Michigan Rate**

<sup>1</sup>VRE Rate: Vancomycin-Resistant Enterococci (VRE) rate. This is the number of inpatient VRE LabID Events or surveillance infections per 1,000 patient days.

<sup>2</sup>VRE Prevalence Rate. This is the number of VRE infections per 100 patients admitted.

<sup>3</sup>VRE Lab ID: VRE Laboratory-Identified (LabID) Event. This is an option within the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) Module of NHSN for tracking laboratory results without conducting additional surveillance for infections.

<sup>4</sup>Infection: VRE event under infection surveillance option in the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) Module.

<sup>5</sup>The infection surveillance module does not collect the number of patient admissions; therefore this number is unavailable and a VRE Infection Surveillance Prevalence Rate cannot be calculated.

## Device-Associated Module Annual Aggregated Rates

From the 24 hospitals reporting Catheter-Associated Urinary Tract Infection (CAUTI) data to NHSN and sharing with the MDCH SHARP Unit, there were 122 infections. These infections contributed to the MI CAUTI rate of 1.04 per 1,000 device days, which was statistically significantly lower than the US CAUTI rate of 1.53 per 1,000 device days. However, the Device Utilization (DU) ratio for Michigan was 0.29, which was slightly higher than the US DU ratio of 0.24. This difference was not statistically significant.

**Table 12.**

### *Michigan Catheter-Associated Urinary Tract Infection (CAUTI)<sup>1</sup> Rate*

Number of Hospitals	Number of CAUTIs	Number of Patient Days	Number of Catheter Days	MI CAUTI Rate <sup>2</sup>	US CAUTI Rate <sup>3</sup>	MI DU <sup>4</sup>	US DU <sup>5</sup>
24	122	397,741	117,009	1.04	1.53	0.29	0.24

Michigan Rate
  US Comparative Rate

<sup>1</sup>CAUTIs are defined using symptomatic urinary tract infection (SUTI) criteria or Asymptomatic Bacteremic UTI (ABUTI) criteria. UTIs must be catheter-associated (i.e. patient had an indwelling urinary catheter at the time of or within 48 hours before onset of the event).

<sup>2</sup>MI CAUTI Rate is the number of CAUTIs per 1,000 device days among participating hospitals.

<sup>3</sup>The US comparative rates were calculated using data from the national estimate on the National Healthcare Safety Network (NHSN). This is according to 2010 NHSN data (Am J Infect Control 2011;39:798-816).

<sup>4</sup>DU: Device Utilization. The proportion of days on a device over the total number of patient days reported for the unit. The device could be a catheter, central line, or ventilator. The MI DU is the proportion of patient days that are spent using a device, in this case a urinary catheter.

<sup>5</sup>The US comparative DU was calculated using data from the national estimate on the National Healthcare Safety Network (NHSN). This is according to 2010 NHSN data (Am J Infect Control 2011;39:798-816).

Hospitals in Michigan have been working diligently with MHA Keystone to reduce Central Line-Associated Bloodstream Infection (CLABSI) rates; this is reflected in the data in Table 13 (below). With data collected from 51 hospitals, Michigan’s device utilization ratio is slightly higher than the U.S. ratio (0.34 and 0.26 respectively). However, the Michigan CLABSI rate (0.72) is statistically significantly lower than the national average of 1.12 per 1,000 patient days.

**Table 13.**

**Michigan Central Line-Associated Bloodstream Infection (CLABSI)<sup>1</sup> Rate**

Number of Hospitals	Number of CLABSIs	Number of Patient Days	Number of Central Line Days	MI CLABSI Rate <sup>2</sup>	US CLABSI Rate <sup>3</sup>	MI DU <sup>4</sup>	US DU <sup>5</sup>
51	176	719,983	244,289	0.72	1.12	0.34	0.26

 Michigan Rate  US Comparative Rate

<sup>1</sup>CLABSIs are laboratory-confirmed bloodstream infections (LCBI) that are not secondary to a community-acquired infection, or an HAI meeting CDC/NHSN criteria at another body site. BSIs must be central line associated (i.e., a central line or umbilical catheter was in place at the time of, or within 48 hours before, onset of the event).

<sup>2</sup>MI CLABSI Rate is the number of CLABSIs per 1,000 device days among participating hospitals.

<sup>3</sup>The US comparative rates were calculated using data from the national estimate on the National Healthcare Safety Network (NHSN). This is according to 2009 NHSN data (Am J Infect Control 2011;39:349-67).

<sup>4</sup>DU: Device Utilization. The proportion of days on a device over the total number of patient days reported for the unit. The device could be a catheter, central line, or ventilator. The MI DU is the proportion of patient days that are spent using a device, in this case a central line.

<sup>5</sup>The US comparative DU was calculated using data from the national estimate on the National Healthcare Safety Network (NHSN). This is according to 2009 NHSN data (Am J Infect Control 2011;39:349-67).

The data below indicate that the Michigan ventilator-associated pneumonia (VAP) rate was 0.79 per 1,000 device days within the 31 hospitals participating in this module and sharing data with the MDCH SHARP Unit. This rate is statistically significantly less than the national rate of 1.43 per 1,000 device days. The Michigan average ventilator device utilization (DU) rate is equal to the national average DU rate at 0.30.

**Table 14.**

**Michigan Ventilator-Associated Pneumonia (VAP)<sup>1</sup> Rate**

Number of Hospitals	Number of VAPs	Number of Patient Days	Number of ventilator Days	MI VAP Rate <sup>2</sup>	US VAP Rate <sup>3</sup>	MI DU <sup>4</sup>	US DU <sup>5</sup>
31	61	259,239	76,890	0.79	1.43	0.30	0.30

 Michigan Rate     US Comparative Rate

<sup>1</sup>VAPs can be identified by using a combination of radiologic, clinical and laboratory criteria. PNEUs must be ventilator-associated (i.e., patient was intubated and ventilated at the time of, or within 48 hours before, the onset of the event).

<sup>2</sup>MI VAP Rate is the number of VAPs per 1,000 device days among participating hospitals.

<sup>3</sup>The US comparative rates were calculated using data from the national estimate on the National Healthcare Safety Network (NHSN). This is according to 2009 NHSN data (Am J Infect Control 2011;39:349-67).

<sup>4</sup>DU: Device Utilization. The proportion of days on a device over the total number of patient days reported for the unit. The device could be a catheter, central line, or ventilator. The MI DU is the proportion of patient days that are spent using a device, in this case a ventilator.

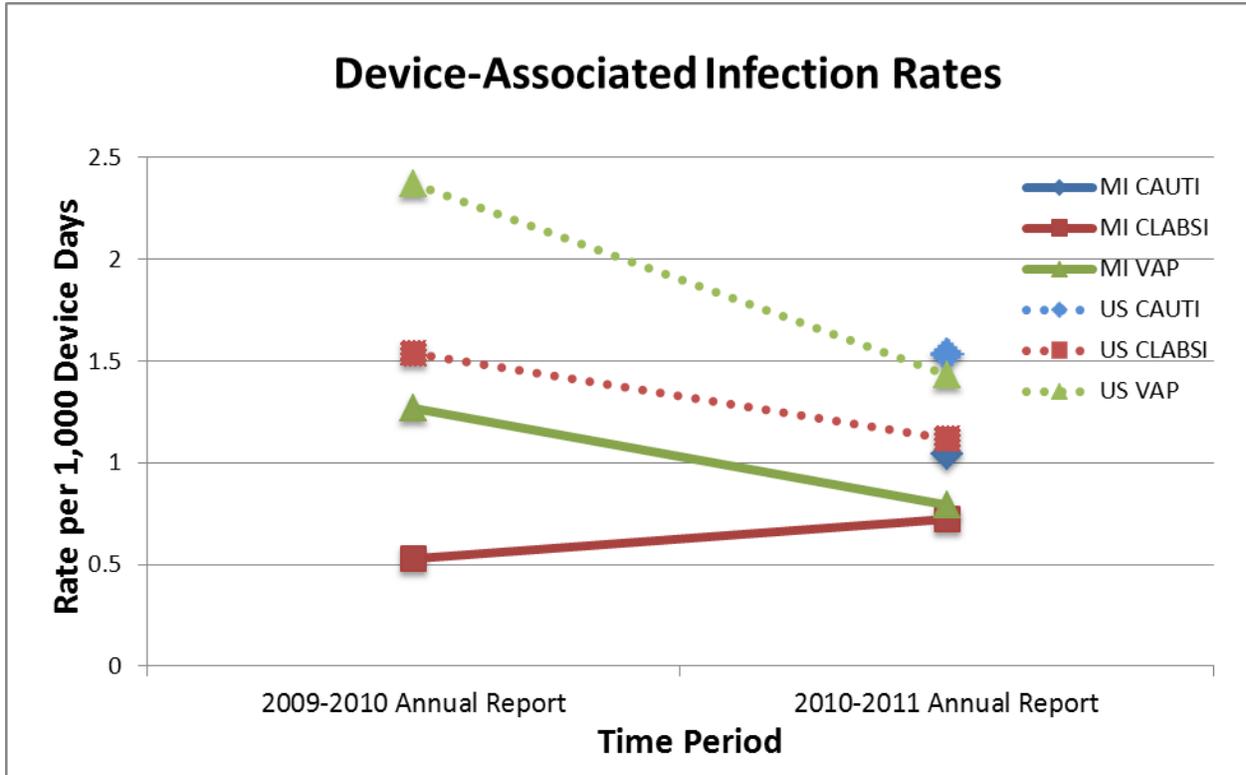
<sup>5</sup>The US comparative DU was calculated using data from the national estimate on the National Healthcare Safety Network (NHSN). This is according to 2009 NHSN data (Am J Infect Control 2011;39:349-67).

Figure 9 (below) is a graphical representation of the Device-Associated Infection Rates from the 2009-2010 Annual Report to the 2010-2011 Annual Report. It should be noted that most rates have a decreasing trend. As future reports are generated, this data will become more of a true representation of the Michigan and US Device-Associated Infection Rates.

From the previous annual report to the present, the Michigan VAP Rate decreased, although this decrease was not statistically significant. The Michigan CLABSI Rate increased at a statistically significant level. Much of this can be explained by the increase in facilities sharing data with MDCH SHARP. In the previous annual report, only 8 hospitals shared CLABSI data with the SHARP Unit. In the present report, 51 hospitals reported CLABSI data. While the rate increase was significant, it can be hypothesized that the previous sample size was too low to provide a completely accurate report. The CLABSI rate for Michigan will be watched closely in future reports.

In the 2009-2010 Annual Report, neither Michigan CAUTI nor US CAUTI rates were available due to the small amount of data available at the time.

Figure 9.



## Procedure-Associated Module Aggregated Rates

As displayed in Table 15, twenty-one hospitals provided Surgical Site Infection (SSI) data to the MDCH SHARP Unit for the included time period. In Michigan, the SSI Rate was 1.90 per 100 procedures among those participating. A national SSI rate has not been calculated, so therefore it cannot be displayed as a comparison. Also, an SSI rate was not calculated in the 2009-2010 Annual Report, so trend data cannot be displayed in graphical form until the next annual report.

**Table 15.**

### *Procedure-Associated Rates*

Type of Infection	Number of Hospitals	Number of Infections	Number of Procedures	MI SSI Rate <sup>1</sup>
SSI <sup>2</sup>	21	368	19,394	1.90
PPP <sup>3</sup>	<5 <sup>4</sup>	unavailable	unavailable	unavailable

#### Michigan Rate

<sup>1</sup>MI Procedure-Associated Rates are the number of infections per 100 procedures among participating hospitals.

<sup>2</sup>SSI: Surgical Site Infection

<sup>3</sup>PPP: Post-Procedure Pneumonia

<sup>4</sup> In order to maintain anonymity, the SHARP Unit requires that five or more hospitals provide data for any module to be published in an aggregated report

Table 16 shows the SSI infection rates by procedure type for the time period included. Only procedure types for which five or more hospitals provided data were included in the present report. This report is the first time the SHARP Unit has had enough data to share SSI Rates by procedure type. This is important to note because, as of January 2012, CMS reporting requires all colon surgery (COLO) and abdominal hysterectomy (HYST) procedures to be reported through NHSN. Therefore, in future reports, we can expect to see more participating hospitals and available data in these procedures.

**Table 16.**

**SSI Rates by Procedure Type**

Procedure Type	Number of Hospitals	Number of SSIs	Number of Procedures	MI SSI Rate <sup>1</sup>
CBGB <sup>2</sup>	5	21	775	2.71
CBGC <sup>3</sup>	5	0	53	0.00
COLO <sup>4</sup>	12	72	934	7.71
FUSN <sup>5</sup>	5	37	1529	2.42
HER <sup>6</sup>	5	16	385	4.16
HPRO <sup>7</sup>	16	53	2874	1.84
HYST <sup>8</sup>	7	12	601	2.00
KPRO <sup>9</sup>	16	35	4149	0.84
LAM <sup>10</sup>	5	25	1296	1.93
VHYS <sup>11</sup>	5	9	367	2.45

 Michigan Rate per 100 procedures

<sup>1</sup> MI SSI Rate is the number of SSIs per 100 procedures among participating hospitals.

<sup>2</sup> CBGB: Coronary artery bypass graft with both chest and donor site incisions

<sup>3</sup> CBGC: Coronary artery bypass graft with chest incision only

<sup>4</sup> COLO: Colon surgery

<sup>5</sup> FUSN: Spinal fusion

<sup>6</sup> HER: Herniorrhaphy

<sup>7</sup> HPRO: Hip prosthesis

<sup>8</sup> HYST: Abdominal hysterectomy

<sup>9</sup> KPRO: Knee prosthesis

<sup>10</sup> LAM: Laminectomy

<sup>11</sup> VHYS: Vaginal hysterectomy

## Standardized Infection Ratios

Table 17.

### Standardized Infection Ratios (SIR)

Type of Infection	Number of Hospitals	Procedures Done	Device Days	Observed <sup>1</sup>	Predicted <sup>2</sup>	MI SIR <sup>3</sup>	MI 95% CI <sup>4</sup>	US SIR <sup>5</sup>	US 95% CI <sup>6</sup>
CAUTI <sup>7</sup>	24	N/A	96,913	115	180.23	0.638	(0.527, 0.766)	n/a	n/a
CLABSI <sup>8</sup>	51	N/A	246,665	186	468.94	0.397	(0.342, 0.458)	0.684	(0.673, 0.696)
SSI <sup>9</sup>	21	20,030	N/A	377	317.56	1.187	(1.068, 1.316)	0.916	(0.890, 0.943)

Michigan Data
  US Data

<sup>1</sup>Observed: Number of infections (CAUTI, CLABSIs or SSIs) reported during the time frame.

<sup>2</sup>Predicted: The number of CAUTIs or 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 2009 national SSI rates by procedure type.

<sup>3</sup>SIR: 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.

<sup>4</sup>95% CI: 95% confidence interval around the SIR estimate. A 95% CI indicates that 95% of the time, the actual SIR will fall within this interval.

<sup>5</sup>US SIR taken from the National and State Healthcare-Associated Infections Standardized Infection Ratio Report, January-December 2010

<sup>6</sup>US 95% CI taken from the Nation and State Healthcare-Associated Infections Standardized Infection Ratio Report, January-December 2010

<sup>7</sup>CAUTI: Catheter-Associated Urinary Tract Infection

<sup>8</sup>CLABSI: Central Line-Associated Blood Stream Infection

<sup>9</sup>SSI: Surgical Site Infection

Michigan's CAUTI Standardized Infection Ratio (SIR) is 0.638 for 24 participating hospitals. This SIR can be interpreted as having 36.2% fewer CAUTIs than expected, as determined by national NHSN data. This is statistically significantly lower than the expected number of infections.

Michigan's CLABSI SIR, using data from 51 participating hospitals, is 0.397, reflecting the excellent work that hospitals have done to reduce CLABSIs, in conjunction with MHA Keystone. This SIR can be interpreted as Michigan having 60.3% fewer CLABSIs than we would expect to have, as determined by national NHSN data. This is statistically significantly lower than the expected value.

Michigan's SSI SIR is 1.187 for 21 participating hospitals. This indicates that Michigan had 18.7% more SSIs than predicted, as determined by national NHSN data; based on the 95% CI, this is a statistically significant finding.

## Cumulative Rates Aggregated by Specifiers

Table 18.

### Rate<sup>1</sup> by Hospital Type

	Teaching	US Rate <sup>2</sup>	Non-Teaching	US Rate
<b>MRSA LabID<sup>3</sup></b>	5.24 (11 hospitals)	----	0.92 (7 hospitals)	----
<b>CDI LabID<sup>4</sup></b>	17.41 (12 hospitals)	----	3.62 (9 hospitals)	----
<b>CAUTI<sup>5</sup></b>	0.91 (11 hospitals)	1.58	1.34 (13 hospitals)	1.48
<b>CLABSI<sup>6</sup></b>	0.81 (25 hospitals)	1.21	0.20 (24 hospitals)	1.03
<b>VAP<sup>7</sup></b>	0.85 (16 hospitals)	1.56	0.76 (14 hospitals)	1.13

Michigan Rate
  US Rate

<sup>1</sup>Rates were calculated using the number of infections/events per 1,000 (or per 10,000 for CDI) patient days or device days according to the same MI rate shown in Tables 9–14 among hospitals that shared data with MDCH SHARP through the NHSN.

<sup>2</sup>US comparative rates were calculated using data from the national estimate on the NHSN. This is according to 2009 NHSN data (Am J Infect Control 2011;39:349-67), and is individually matched to the Michigan data by facility type and unit type, then aggregated into an overall rate. National LabID rates are currently unavailable.

<sup>3</sup>MRSA LabID: Methicillin-Resistant *Staphylococcus aureus* (MRSA) Laboratory-identified (LabID) Event option within the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) Module of NHSN for tracking MRSA laboratory results without conducting additional surveillance for infections.

<sup>4</sup> CDI LabID: *Clostridium difficile* (*C. diff*) Infection (CDI) LabID Event option within the MDRO/CDI Module of NHSN for tracking CDI laboratory results without conducting additional surveillance for infections.

<sup>5</sup>CAUTI: Catheter-Associated Urinary Tract Infection

<sup>6</sup>CLABSI: Central Line-Associated Blood Stream Infection

<sup>7</sup>VAP : Ventilator-Associated Pneumonia

With the exception of CAUTIs, Michigan teaching hospitals had higher rates of HAIs than non-teaching hospitals. This was especially apparent in MRSA and CDI LabID events. Where the US rates were available, all Michigan rates were lower than their respective US rate.

Table 19.

*Rate<sup>1</sup> by Michigan Region*

	Southeast	US Rate <sup>2</sup>	Mid/Western	US Rate	Northern	US Rate
<b>MRSA LabID<sup>3</sup></b>	6.12 (9 hospitals)	----	2.01 (7 hospitals)	----	n/a (3 hospitals) <sup>4</sup>	----
<b>CDI<sup>5</sup> LabID<sup>6</sup></b>	19.08 (9 hospitals)	----	10.52 (9 hospitals)	----	n/a (3 hospitals)	----
<b>CAUTI<sup>6</sup></b>	0.71 (7 hospitals)	1.62	1.12 (14 hospitals)	1.51	n/a (3 hospitals)	n/a
<b>CLABSI<sup>7</sup></b>	0.82 (18 hospitals)	1.19	0.66 (29 hospitals)	1.10	n/a (4 hospitals)	n/a
<b>VAP<sup>8</sup></b>	0.77 (14 hospitals)	1.67	0.84 (14 hospitals)	1.22	n/a (3 hospitals)	n/a

 Michigan Rate
  US Rate

<sup>1</sup>Rates were calculated using the number of infections/events per 1,000 (or per 10,000 for CDI) patient days or device days according to the same MI rate shown in Tables 9–14 among hospitals that shared data with MDCH SHARP through the NHSN.

<sup>2</sup>US comparative rates were calculated using data from the national estimate on NHSN. This is according to 2009 NHSN data (Am J Infect Control 2011;39:349-67), and is individually matched to the Michigan data by facility type and unit type, then aggregated into an overall rate. National LabID rates are currently unavailable.

<sup>3</sup>MRSA LabID: Methicillin-Resistant *Staphylococcus aureus* (MRSA) Laboratory-identified (LabID) Event. This is an option within the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) Module of NHSN for tracking MRSA laboratory results without conducting additional surveillance for infections.

<sup>4</sup>In order to protect hospital identity, data will only be published for groups of five or more hospitals.

<sup>5</sup>CDI LabID: *Clostridium difficile* (*C. diff*) Infection (CDI) LabID Event. This is an option within the MDRO/CDI Module of NHSN for tracking CDI laboratory results without conducting additional surveillance for infections.

<sup>6</sup>CAUTI: Catheter-Associated Urinary Tract Infection

<sup>7</sup>CLABSI: Central Line-Associated Blood Stream Infection

<sup>8</sup>VAP : Ventilator-Associated Pneumonia

MRSA and CDI LabID Event rates were higher in the Southeast region of Michigan compared to the Mid/Western region. Not enough data were available to display an aggregated Northern rate.

For device-associated rates, CLABSI and VAP were fairly similar when comparing the Michigan rates between regions, but the CAUTI rate for the Mid/Western region was quite a bit higher than the Southeast region. It should also be noted that the US Rates were higher than each of their respective Michigan counterparts.

Table 20.

*Rate<sup>1</sup> by Hospital Bed Size*

	≤200 Beds	US Rate <sup>2</sup>	>200 Beds	US Rate
<b>MRSA LabID<sup>3</sup></b>	1.39 (10 hospitals)	----	4.48 (8 hospitals)	----
<b>CDI LabID<sup>4</sup></b>	6.35 (12 hospitals)	----	15.62 (9 hospitals)	----
<b>CAUTI<sup>5</sup></b>	1.25 (13 hospitals)	1.46	0.97 (11 hospitals)	1.58
<b>CLABSI<sup>6</sup></b>	0.26 (24 hospitals)	1.04	0.80 (25 hospitals)	1.19
<b>VAP<sup>7</sup></b>	0.83 (15 hospitals)	1.29	0.84 (15 hospitals)	1.46

Michigan Rate
  US Rate

<sup>1</sup>Rates were calculated using the number of infections/events per 1,000 patient days or device days according to the same MI rate shown in Tables 9–14 among hospitals that shared data with MDCH SHARP through the NHSN.

<sup>2</sup>US comparative rates were calculated using data from the national estimate on NHSN. This is according to 2009 NHSN data (Am J Infect Control 2011;39:349-67), and is individually matched to the Michigan data by facility type and unit type, then aggregated into an overall rate. National LabID rates are currently unavailable.

<sup>3</sup>MRSA LabID: Methicillin-Resistant *Staphylococcus aureus* (MRSA) Laboratory-identified (LabID) Event. This is an option within the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) Module of NHSN for tracking MRSA laboratory results without conducting additional surveillance for infections.

<sup>4</sup>CDI LabID: *Clostridium difficile* (*C. diff*) Infection (CDI) LabID Event. This is an option within the MDRO/CDI Module of NHSN for tracking CDI laboratory results without conducting additional surveillance for infections.

<sup>5</sup>CAUTI: Catheter-Associated Urinary Tract Infection

<sup>6</sup>CLABSI: Central Line-Associated Blood Stream Infection

<sup>7</sup>VAP : Ventilator-Associated Pneumonia

All HAI rates in Michigan (except for CAUTIs) are higher in facilities with more than 200 beds than hospitals with 200 or less beds. This difference was particularly noticeable when looking at the MRSA and CDI LabID Event rates. Facilities with 200 beds or fewer had a MRSA LabID Event rate of 1.39 per 1,000 patient days, compared to facilities with more than 200 beds, with a rate of 4.48 per 1,000 patient days. Facilities with 200 or fewer beds had a CDI rate of 6.35 per 10,000, compared to 15.62 per 10,000 for those with more than 200 beds.

The comparison of rates between Michigan and the US demonstrated that, for all device-related modules, Michigan had a lower rate of infection compared to each related US rate.

Table 21.

Rate<sup>1</sup> by Unit Type

	ICU/CCU <sup>2</sup>	US Rate <sup>3</sup>	Wards <sup>4</sup>	US Rate	SCA/STEP <sup>5</sup>	US Rate
MRSA LabID <sup>6</sup>	6.43 (15 hospitals)	----	3.69 (11 hospitals)	----	n/a (3 hospitals) <sup>8</sup>	----
CDI LabID <sup>8</sup>	23.01 (16 hospitals)	----	14.49 (13 hospitals)	----	9.22 (5 hospitals)	----
CAUTI <sup>9</sup>	0.87 (22 hospitals)	1.51	1.15 (16 hospitals)	1.52	n/a (4 hospitals)	n/a
CLABSI <sup>10</sup>	0.81 (49 hospitals)	1.21	0.22 (19 hospitals)	0.96	1.50 (7 hospitals)	1.56
VAP <sup>11</sup>	0.81 (31 hospitals)	1.43	n/a (3 hospitals)	n/a	n/a (2 hospitals)	n/a

Michigan Rate
  US Rate

<sup>1</sup>Rates were calculated using the number of infections/events per 1,000 patient days or device days according to the same MI rate shown in Tables 9–14 among hospitals that shared data with MDCH SHARP through the NHSN.

<sup>2</sup>ICU/CCU: Intensive Care Unit/Critical Care Unit

<sup>3</sup>US comparative rates were calculated using data from the national estimate on NHSN. This is according to 2009 NHSN data (Am J Infect Control 2011;39:349-67), and is individually matched to the Michigan data by facility type and unit type, then aggregated into an overall rate. National LabID rates are currently unavailable.

<sup>4</sup>Wards: Include inpatient units denoted as wards

<sup>5</sup>SCA/STEP: Specialty Care Area/Step-Down Unit

<sup>6</sup>MRSA LabID: Methicillin-Resistant *Staphylococcus aureus* (MRSA) Laboratory-identified (LabID) Event. This is an option within the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) Module of NHSN for tracking MRSA laboratory results without conducting additional surveillance for infections.

<sup>7</sup>Data will only be published for groups of five or more hospitals in order to protect hospital confidentiality.

<sup>8</sup>CDI LabID: *Clostridium difficile* (*C. diff*) Infection (CDI) LabID Event. This is an option within the MDRO/CDI Module of NHSN for tracking CDI laboratory results without conducting additional surveillance for infections.

<sup>9</sup>CAUTI: Catheter-Associated Urinary Tract Infection

<sup>10</sup>CLABSI: Central Line-Associated Blood Stream Infection

<sup>11</sup>VAP : Ventilator-Associated Pneumonia

For the included time period, MRSA LabID Event rates were higher in ICU/CCUs than in Wards. CDI LabID Event rates were highest in ICU/CCUs, followed by Wards. The SCA/STEP locations had the lowest CDI LabID Event rates. CAUTI rates were higher in Wards than in ICU/CCU; CLABSI rates were highest in SCA/STEP locations. There weren't enough hospitals reporting VAP data from wards or SCA/STEP to compare to their ICU/CCU rate. All Michigan rates were lower than their respective US counterpart rates.

## Conclusions

HAIs continue to be a problem in Michigan healthcare facilities and throughout the U.S. Although the numbers and rates of CLABSIs have dropped significantly in Michigan since the introduction of the CLABSI checklist by the MHA Keystone Center for Patient Safety & Quality, all HAIs remain a concern. The future holds many challenges related to infection prevention and control – challenges that will continue to affect patient safety and healthcare quality, as well as patient morbidity and mortality.

This annual report compiled Michigan HAI data voluntarily shared via NHSN with the MDCH SHARP Unit. This report followed the same structure as the previous 2010-2011 Semi-Annual Report and includes data from each of the inclusive quarters. Note that this data from participating hospitals has not been validated. Validation studies will be conducted as additional funding becomes available. This report contains data from many more facilities than in previous reports. Data will continue to become more reliable as additional Michigan hospitals participate in this surveillance initiative.

## Acronyms

Below is a list of commonly used acronyms throughout this report to facilitate ease in reading.

APIC	Association for Professionals in Infection Control & Epidemiology, Inc.
ARRA	American Recovery and Reinvestment Act
CAUTI	Catheter-Associated Urinary Tract Infection
CCU	Critical Care Unit
CDC	Centers for Disease Control & Prevention
CDI	<i>Clostridium difficile</i> Infection
CI	Confidence Interval
CLABSI	Central Line-Associated Bloodstream Infection
CO	Community-Onset
CO-HCFA	Community-Onset Healthcare Facility-Associated
DU	Device Utilization
DUA	Data Use Agreement
HAI	Healthcare-Associated Infection
HHS	U.S. Department of Health & Human Services
HO	Healthcare Facility-Onset
ICU	Intensive Care Unit
LabID	Laboratory-Identified Event
MDCH	Michigan Department of Community Health
MDRO	Multidrug-Resistant Organism
MHA	Michigan Health & Hospital Association
MRSA	Methicillin-Resistant <i>Staphylococcus aureus</i>
NHSN	National Healthcare Safety Network
SCA	Specialty Care Area
SHARP	Surveillance of Healthcare-Associated & Resistant Pathogens
SIR	Standardized Infection Ratio
SSI	Surgical Site Infection
VAP	Ventilator-Associated Pneumonia



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