

HEALTHCARE-ASSOCIATED INFECTIONS IN MICHIGAN HOSPITALS

2012 QUARTER 1 REPORT

Michigan Department of Community Health

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

January 1, 2012 – March 31, 2012

Data Access Date: August 15, 2012

January – March 2012

Introduction

The Surveillance for Healthcare-Associated & Resistant Pathogens (SHARP) Unit within the Bureau of Disease Control, Prevention, and Epidemiology at the Michigan Department of Community Health (MDCH) provides a quarterly update on healthcare-associated infection (HAI) surveillance activities. This report includes the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) data from Michigan hospitals who have volunteered to share their data with MDCH SHARP. The main surveillance foci for the SHARP Unit were originally methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* (*C. difficile*, *C. diff*, or CDI) reports collected through the laboratory-identified (LabID) event option of the multidrug-resistant organism and *Clostridium difficile* infection (MDRO/CDI) module of NHSN. The SHARP Unit has also been actively reviewing device-associated data for Central Line Bloodstream Infections (CLABSIs), Catheter-Associated Urinary Tract Infections (CAUTIs), and Surgical Site Infections (SSIs).

Aggregated data from participating hospitals are used to show infection rates and trends in the incidence of specific HAIs and MDROs. Previous quarterly, semi-annual, and annual SHARP NHSN reports are posted on the Michigan HAI website at www.michigan.gov/hai. Additional HAI background information, pertinent HAI definitions, Michigan's HAI Surveillance and Prevention Plan, Michigan's HAI Prevention Advisory Group roster, and MDCH SHARP's prevention collaboratives can also be found at this website.

Surveillance Initiative Statistics

Between January 1 and March 31, 2012, a cumulative total of 73 Michigan hospitals voluntarily participated in the SHARP Unit HAI surveillance initiative, as demonstrated by signed data use agreements as of August 15, 2012. Thirty-three of these hospitals used the LabID Event option of the MDRO/CDI module to monitor MRSA in their reporting plan; twenty-eight of the 33 shared this data with SHARP. Note that during this period of time, reporting of MRSA and CDI LabID Events was not considered mandatory by the Centers for Medicare and Medicaid Services (CMS). Forty-two hospitals monitored and 37 shared *C. difficile* LabID Events. Areas of surveillance within the hospital varied by participating hospital and included the intensive care/critical care unit (ICU/CCU), specialty care areas (SCA), medical/surgical wards, or other, dependent upon individual hospital choice. Data from this quarter, 2011 quarterly report data, and the 2010-2011 Annual Report were used in this report to establish aggregate infection rates among participating Michigan hospitals and to monitor quarterly trends.

Of the 73 hospitals participating this quarter, most collected additional NHSN module data as indicated in Table 1. This is largely due to the CMS mandate for HAI reporting by acute care hospitals participating in the Inpatient Prospective Payment System (IPPS) which began in 2010. For example, 68 of the 73 hospitals during this quarter utilized the CAUTI module; of these, 67 shared this data with the SHARP Unit. As more hospitals participate with the SHARP Unit and confer rights to these modules, analysis of the data is becoming more complete and accurate.

Table 1.

NHSN Modules in use

NHSN Module	Number of Hospitals Using Module¹	Number of Hospitals Sharing Data²
Catheter-Associated Urinary Tract Infection (CAUTI)	68	67
Central Line-Associated Bloodstream Infection (CLABSI)	67	67
Surgical Site Infection (SSI)	67	63
Ventilator-Associated Pneumonia (VAP)	44	49 ³
Clostridium difficile Infection (CDI) Laboratory-identified (LabID) Event	42	37
Methicillin-Resistant Staphylococcus aureus (MRSA) Laboratory-identified (LabID)	33	28
Methicillin-Resistant Staphylococcus aureus (MRSA) Infection Surveillance	14	15
Vancomycin-Resistant Enterococci (VRE) LabID	10	<5 ⁴
Clostridium difficile Infection (CDI) Surveillance	7	13
Post-Procedure Pneumonia (PPP)	8	<5
Vancomycin-Resistant Enterococci (VRE) Infection Surveillance	6	<5
Acinetobacter LabID	6	<5
Carbapenem-resistant Enterobacteriaceae LabID	5	<5
Cephalosporin Resistant Klebsiella LabID	5	<5
Methicillin-sensitive Staphylococcus aureus (MSSA) LabID	<5	<5
Acinetobacter Infection Surveillance	<5	<5
Carbapenem-resistant Enterobacteriaceae Infection Surveillance	<5	<5
Cephalosporin Resistant Klebsiella Infection Surveillance	<5	<5
Methicillin-sensitive Staphylococcus aureus (MSSA) Infection Surveillance	<5	<5

¹This is the number of hospitals that have indicated module use in each of their reporting plans, for at least one month within the three month time period, as of August 24, 2012 (the reporting plan observation date).

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

³In 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. Also, some hospitals are sharing data out-of-plan.

⁴To maintain confidentiality, aggregate data are not displayed when less than 5 hospitals contribute.

Figure 1. Number of Facilities with Module Use in Reporting Plan by Quarter

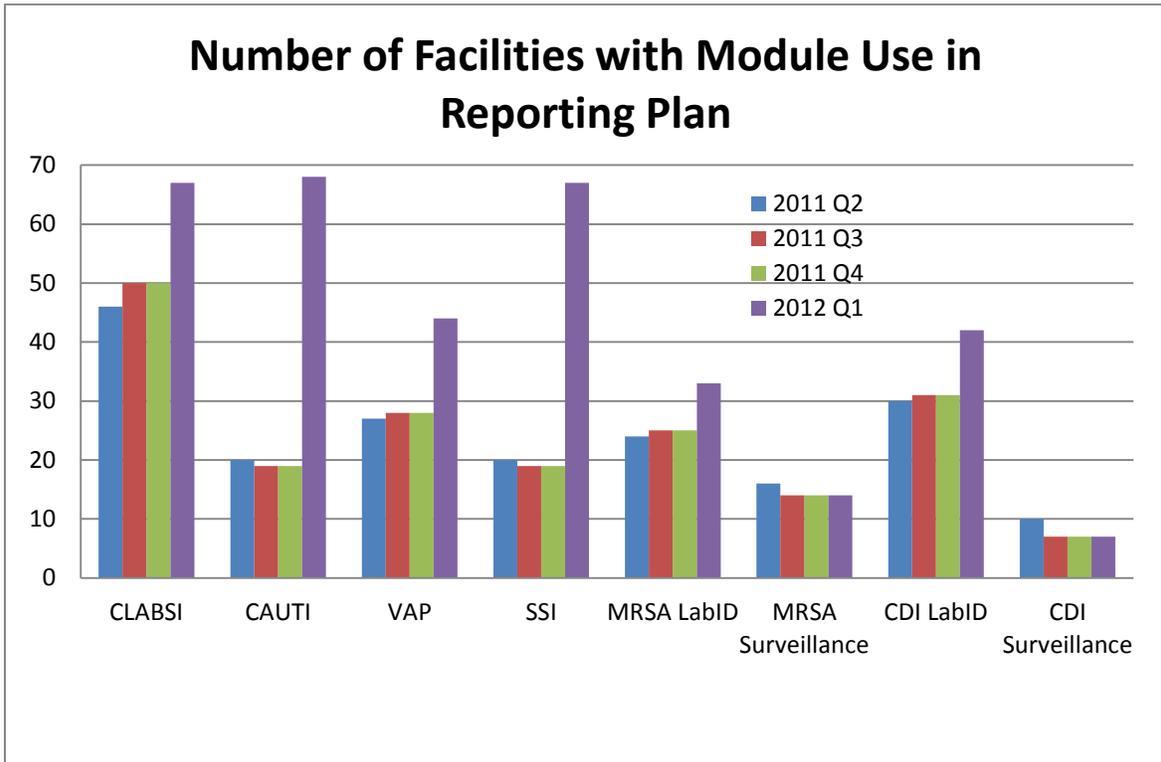
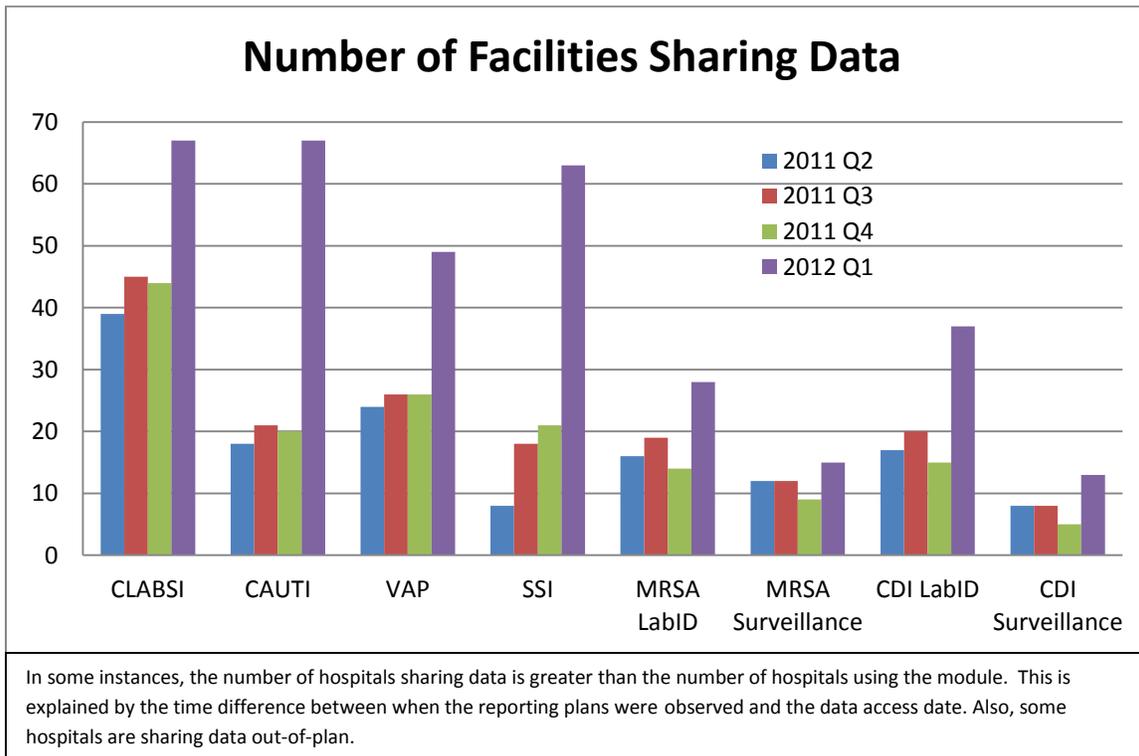


Figure 2. Number of Facilities Sharing Data by Quarter



Methicillin-Resistant *Staphylococcus aureus* (MRSA) Data

Table 2 (below) indicates that between January 1 and March 31, 2012, 1142 isolates of MRSA were reported from twenty-eight participating hospitals using the MDRO/CDI module, LabID Event option. The NHSN definition for MRSA LabID Event includes the first positive MRSA isolate from any specimen per calendar month per patient, or a positive MRSA isolate from a blood source when there haven't been any other positive blood specimens in the previous 2 weeks from that patient. Specimens must be collected for clinical purposes and not for the purpose of active surveillance testing or screening. Note that testing protocol and type of test used (i.e. PCR, assay, culture) vary by facility. Additionally, data from the LabID Event option of the MDRO/CDI module are considered proxy measures of MRSA exposure burden, and do not distinguish between patient colonization and infection.

Sixteen percent of the MRSA LabID Events this quarter were determined to be healthcare facility-onset (HO), and the remaining 84% were determined to be community-onset (CO). NHSN defines 'healthcare facility-onset' as a 'LabID Event specimen collected greater than 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 less than or equal to 3 days after admission to the facility (i.e. days 1, 2, or 3 of admission)'.

This quarter, the percent of events which were healthcare facility-onset varied by specimen source, however, the distribution of this variation appears to have remained stable from the previous quarterly and annual report. The distribution of MRSA LabID specimen sources also remained fairly stable from the previous annual report to the present quarterly report. Therefore, even though the number of facilities and events per quarter are increasing, the distributions are remaining fairly consistent.

Table 2.

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

	Cumulative Data October 2010 – September 2011	October – December 2011 Quarterly Report	January – March 2012 Quarterly Report
Frequency, Number			
<i>Hospitals with a signed DUA</i> ¹	56	54	73
<i>Hospitals reporting MRSA LabID</i> ²	27	25	33
<i>Hospitals sharing MRSA LabID</i>	19	14	28
<i>Aggregated LabID Events</i>	2793	371	1142
Onset, Number (%)			
<i>Healthcare Facility-Onset (HO)</i>	537 (19)	86 (23)	188 (16)
<i>Community-Onset (CO)</i>	2256 (81)	285 (77)	954 (84)
Specimen Source, Number (%HO)³			
<i>Blood</i>	236 (25)	49 (14)	96 (18)
<i>Sputum</i>	589 (41)	84 (42)	163 (42)
<i>Wound</i>	1175 (7)	91 (5)	345 (8)
<i>Abcess</i>	77 (12)	13 (0)	44 (9)
<i>Urine</i>	206 (10)	18 (22)	116 (11)
<i>Skin</i>	106 (7)	3 (0)	16 (6)
<i>Other</i>	404 (29)	113 (31)	362 (16)
Surveillance Location, Number (% , %HO)⁴			
<i>Intensive/Critical Care Unit</i>	747 (27, 39)	143 (39) ⁵	244 (21, 39)
<i>Specialty Care Area</i>	27 (1,7)	-----	14 (1, 29)
<i>Wards</i>	1164 (42, 21)	192 (52)	487 (43, 18)
<i>Outpatient</i>	855 (31, 0)	36 (10)	397 (35, 0)
<i>Other</i>	-----	-----	-----

¹DUA: 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. This is as of the data access date.

²MRSA 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.

³The number in parentheses under "Specimen Source" is the percent of isolates obtained from that source which are healthcare-onset.

⁴The 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.

⁵The 2011 Quarter 4 report only displays percent (not percent HO)

Clostridium difficile Infection (CDI) Data

As shown in Table 3 (below), this quarter there were 991 reports of CDI from 37 hospitals which shared MDRO/CDI LabID Event data with the SHARP Unit. The NHSN definition for CDI LabID Event includes the first positive *C. diff* test result without a prior positive in the previous 2 weeks. 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. Testing protocol and type of test used (i.e. PCR, assay, culture) may vary by facility. *C. difficile* LabID Event data are considered proxy measures of exposure burden, and do not distinguish between patient colonization and infection.

Thirty-six percent of CDI LabID Events were considered healthcare facility-onset (HO). Eighteen percent were considered community-onset healthcare facility-associated (CO-HCFA), and forty-five percent were reported as community-onset (CO). Community-onset healthcare facility-associated is defined as a 'community-onset LabID Event collected from a patient who was discharged from the facility less than or equal to 4 weeks prior to the date the stool specimen was collected.' (Healthcare facility-onset and community-onset are defined under the MRSA LabID Event data heading).

Eleven percent of CDI LabID Events occurred in patients who had a prior CDI LabID Event entered in a previous month. In addition, 7% of LabID Events were recurrent 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.'

As with the MRSA module, the percentages of isolates from each location, as well as the percentages of hospital onset within each location, were distributed very consistently compared to the previous annual report.

Table 3.

Cumulative Aggregate *Clostridium difficile* Infection (CDI)¹ LabID Data

	Cumulative Data October 2010 – September 2011	October – December 2011 Quarterly Report	January – March 2012 Quarterly Report
Frequency, Number			
<i>Hospitals with a signed DUA</i> ²	56	54	73
<i>Hospitals Reporting CDI LabID</i> ³	32	31	42
<i>Hospitals Sharing CDI LabID</i>	29	15	37
<i>Aggregated LabID Events</i>	2004	291	991
Onset, Number (%)			
<i>Healthcare Facility-Onset (HO)</i>	783 (39)	87 (30)	359 (36)
<i>Community-Onset Healthcare Facility-Associated (CO-HCFA)</i>	421 (21)	45 (15)	183 (18)
<i>Community-Onset (CO)</i>	800 (40)	159 (55)	449 (45)
Previous CDI, Number (%)			
<i>Previously Positive</i>	-----	36 (12)	110 (11)
<i>CDI assay, recurrent</i>	-----	19 (7)	67 (7)
Surveillance Location, Number (% , %HO)⁴			
<i>Intensive/Critical Care Unit</i>	459 (23, 51)	71 (24) ⁵	196 (20, 56)
<i>Specialty Care Area</i>	116 (6, 55)	5 (2)	61 (6, 57)
<i>Wards</i>	1167 (58, 42)	159 (55)	548 (55, 39)
<i>Outpatient</i>	261 (13, 0)	59 (19)	186 (19, 0)
<i>Other</i>	1 (0,0)	-----	-----

¹The specimen source of all *C.difficile* isolates is stool (100%)

²DUA: Data Use Agreement. This is a document signed between the facility and the Michigan Department of Community Health which outlines how the data will be shared and used. This is as of the data access date.

³CDI 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.

⁴The 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.

⁵The 2011 Quarter 4 report only displays percent (not percent HO)

Multidrug-Resistant Organisms (MDRO) Summary Data

Tables 4 and 5 (below) provide an overview of the rates of MRSA LabID and Infection Surveillance Events for multidrug-resistant organisms (MDROs). Table 4 provides overall LabID data, and Table 5 displays data stratified by onset. Data are shown for organisms where five or more facilities are conducting surveillance for that particular organism.

Table 4.

Cumulative Michigan MRSA Rate

	Number of Hospitals	Number of MRSA Events	Number of Patient Days/Encounters	Number of Patient Admits	MRSA Rate ¹	MRSA Prevalence Rate ²
MRSA Inpatient LabID	27	539 LabID ^{3,4}	240,238 Patient Days	57,585	2.2436	0.9360
MRSA Surveillance	15	5 Infection ⁵	26,766 Patient Days	---- ⁶	0.1868	----
MRSA Outpatient LabID	8	296 LabID	160,330 Encounters	----	1.8462	----

Michigan Rate

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

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

³MRSA 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.

⁴The number of inpatient MRSA LabID Events indicated here is less than the number of MRSA LabID Events indicated in Table 2. Events used to calculate a rate require denominator data (patient days and/or admissions). Those without denominator data were excluded from the calculation.

⁵Infection Surveillance: MRSA event under infection surveillance activity. This is an option in the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) Module for conducting infection surveillance.

⁶The 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.

MRSA LabID Event Rate trends are displayed in Figure 3. The MRSA LabID Event rate decreased this quarter, from 2.54 to 2.24 per 1,000 patient days. However, this decrease was not statistically significant. There was a significant decrease in the MRSA prevalence rate, from 2.30 to 0.94 per 100 admissions (p<0.0001). The MRSA infection surveillance rate increased from 0.07 to 0.19 per 1,000 patient days; this increase was not statistically significant.

For the first time, there were enough reporting facilities to calculate an outpatient MRSA Rate. This LabID Rate was 1.85 per 1,000 patient encounters. As this is calculated in future reports, we will begin monitoring outpatient MRSA trends over time.

Figure 3. Inpatient MRSA LabID Rate Trends by Quarter

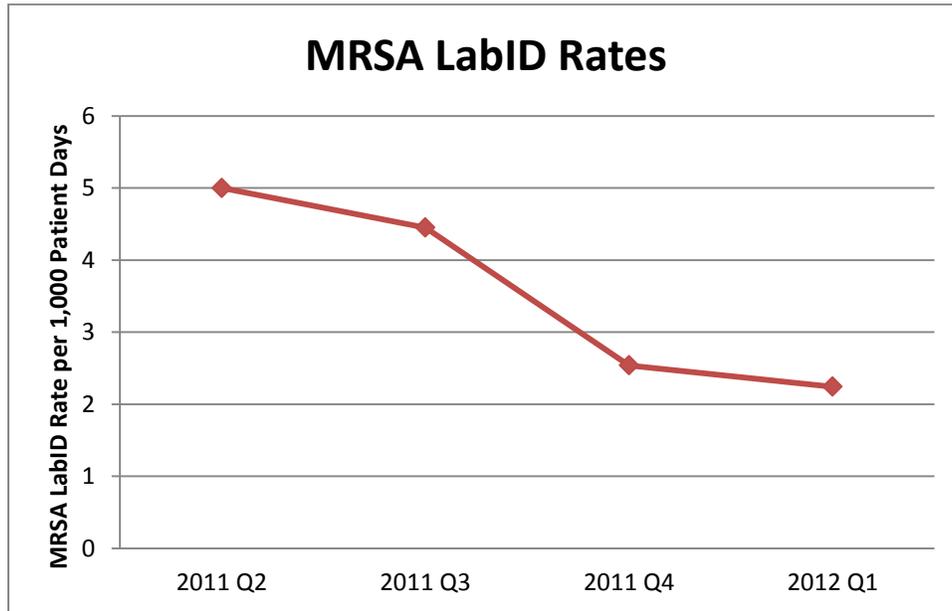


Table 5 (below) provides inpatient MRSA LabID rates stratified by onset. This is the first time SHARP has received enough data to stratify MRSA LabID rates by community-onset and healthcare facility-onset.

Table 5.							
Michigan MRSA LabID Rate by Onset							
Number of Hospitals	Onset	Number of Inpatient MRSA Events	Number of Patient Days	Number of Patient Admits	HO MRSA Rate ¹	CO MRSA Prevalence Rate ²	Percentage of Total
27	HO ³	123 LabID ⁴	240,238	----	0.5120	----	23%
27	CO ⁵	416 LabID	----	57,585	----	0.7224	77%

Michigan Rate

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

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

³HO: Healthcare facility-onset

⁴MRSA 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.

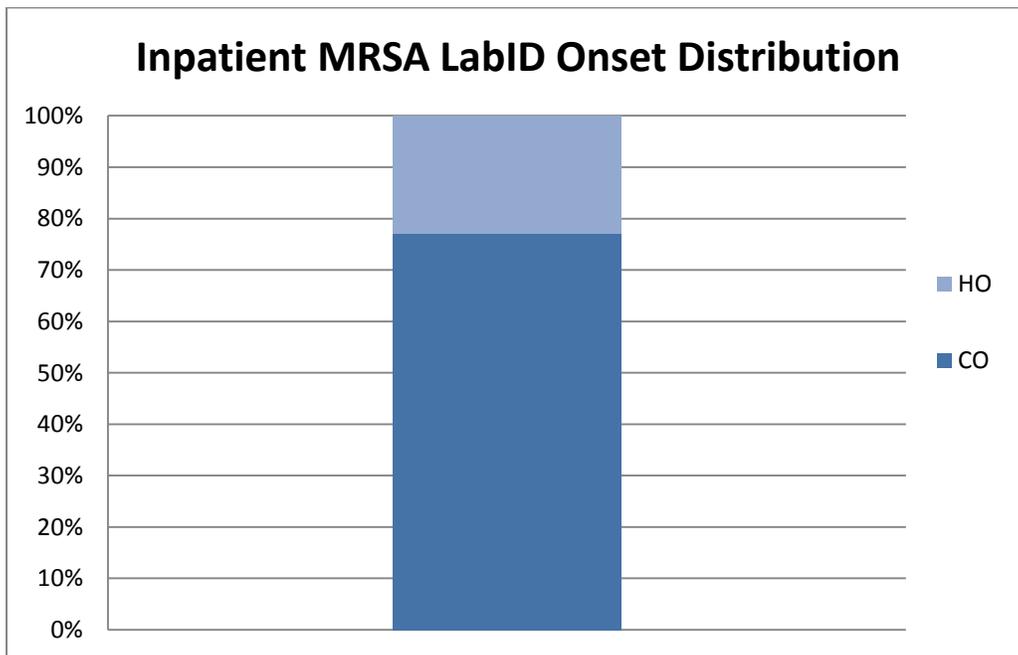
⁵CO: Community-onset

Healthcare facility-onset infections occur when the LabID specimen was collected on or after day 4 of admission to the facility. Because they are incident infections, only a MRSA incidence rate can be calculated. The HO MRSA incidence rate is 0.5120 per 1,000 patient days. Community-onset infections occur when the LabID specimen was collected 3 days or less after admission to the facility. These are prevalent infections, so a MRSA prevalence rate is calculated. The MRSA prevalence rate is 0.7224 per 100 admissions.

The majority (77%) of inpatient MRSA LabID events were community-onset. The remaining 23% were healthcare facility-onset. The graphical display of this can be seen below in Figure 4. As this is the first time this has been reported, there is only one bar in Figure 4. In future reports, we are hoping to provide trends for LabID onset distributions.

The percentage distributions of CO and HO LabID Events in Table 5 are slightly different from the percentage distributions in Table 2. This can be explained by the greater number of overall LabID events in Table 2. The numbers of LabID events in Tables 4 and 5 are lower than in Table 2 because only LabID events which had corresponding denominators (i.e. patient days or admits) were included in the rate table.

Figure 4. Inpatient MRSA LabID Onset Distribution (percentages)



Tables 6 and 7 (below) provide an overview of the rates of CDI LabID and Infection Surveillance Events for multidrug-resistant organisms (MDROs). Table 6 provides overall CDI Infection Surveillance data as well as inpatient and outpatient LabID event data, and Table 7 displays data stratified by onset. Data are shown where five or more facilities are conducting CDI surveillance.

Table 6.

Cumulative Michigan CDI Rate

	Number of Hospitals	Number of CDI Events	Number of Patient Days	Number of Patient Admits	CDI Rate ¹	CDI Prevalence Rate ²
CDI Inpatient LabID	32	535 LabID ^{3,4}	309,078 Patient Days	80,533	17.3095	0.6643
CDI Surveillance	13	9 Infection ⁵	16,941 Patient Days	---- ⁶	5.3126	----
CDI Outpatient LabID	9	114 LabID	211,220 Encounters	----	5.3972	----

Michigan Rate

¹CDI Rate: *Clostridium difficile* rate. This is the number of CDI LabID events or surveillance infections per 10,000 patient days or encounters.

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

³CDI 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.

⁴The number of inpatient CDI LabID Events indicated here is less than the number of CDI LabID Events indicated in Table 3. Events used to calculate a rate require denominator data (patient days and/or admissions). Those without denominator data are excluded from the calculation.

⁵Infection: CDI event under infection surveillance. This is an option in the Multidrug-Resistant Organism / *Clostridium difficile* Infection (MDRO/CDI) Module for conducting infection surveillance.

⁶The infection surveillance module does not currently provide the number of patient admissions; therefore this number is unavailable and a CDI Prevalence Rate cannot be calculated.

The CDI LabID Event rate increased significantly this quarter, from 13.54 to 17.31 per 10,000 patient days (p=0.0058). CDI LabID Event rate trends can be seen in Figure 5. The CDI Prevalence Rate remained fairly stable, from 0.64 per 100 admissions last quarter to 0.66 per 100 admissions this quarter. The CDI Infection Surveillance rate increased slightly from 4.29 per 10,000 patient days to 5.40 per 10,000 patient days; this was not statistically significant.

As with the MRSA data, an outpatient CDI LabID Event Rate was calculated for the first time. Nine facilities provided data that contributed to a rate of 5.40 per 10,000 patient encounters.

Figure 5. Inpatient CDI LabID Rate Trends by Quarter

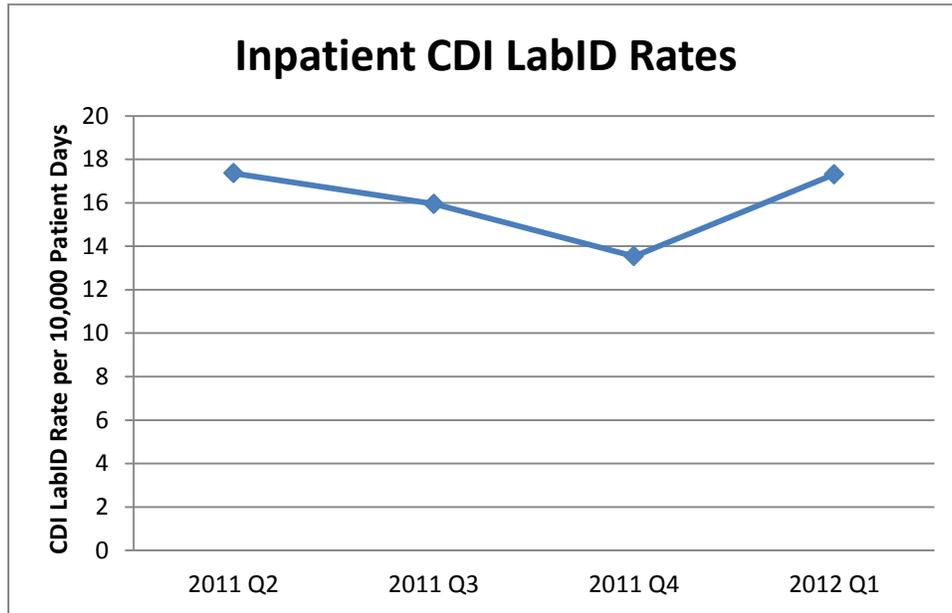


Table 7 (below) provides inpatient CDI LabID Rates stratified by onset. This is the first time SHARP has received enough data from reporting hospitals to stratify CDI LabID Rates by healthcare facility-onset, community-onset, and community-onset healthcare facility-associated.

Table 7.							
Michigan CDI LabID Rate by Onset							
Number of Hospitals	Onset	Number of Inpatient LabID CDI Events	Number of Patient Days	Number of Patient Admits	HO CDI Rate ¹	CO-HCFA or CO CDI Prevalence Rate ²	Percentage of Total
32	HO ³	212 LabID ⁴	309,078	----	6.8591	----	40%
32	CO-HCFA ⁵	95 LabID	----	80,533	----	0.1180	18%
32	CO ⁶	228 LabID	----	80,533	----	0.2831	43%

Michigan Rate

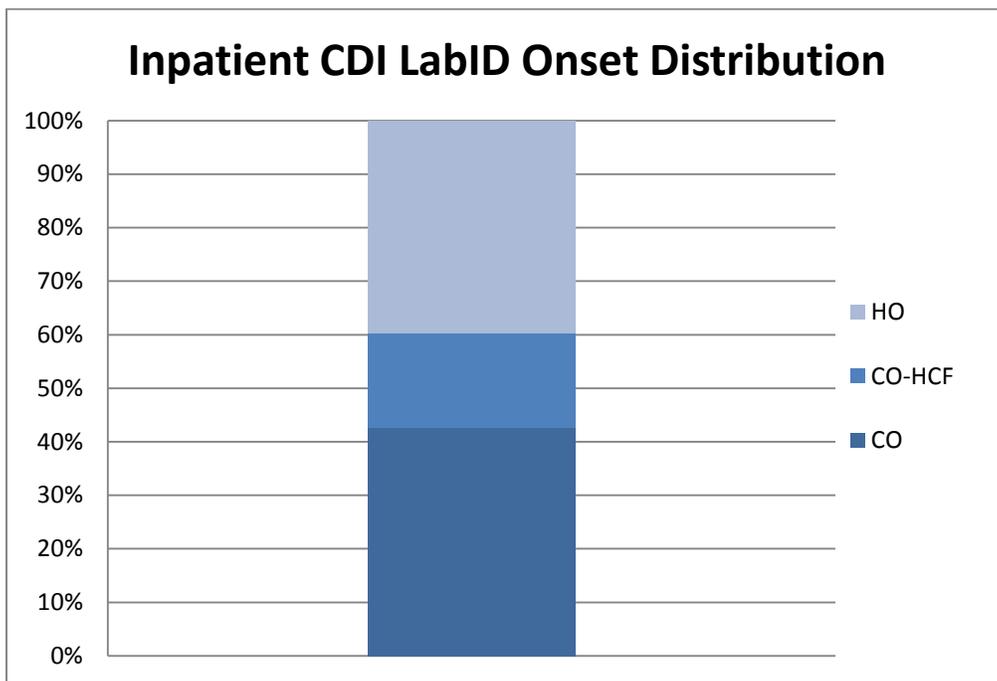
¹CDI Rate: *Clostridium difficile* rate. This is the number of CDI LabID events or surveillance infections per 10,000 patient days.
²CDI Prevalence Rate. This is the number of CDI LabID events per 100 patients admitted.
³HO: Healthcare facility-onset
⁴CDI Lab ID: *Clostridium difficile* Infection (CDI) 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.
⁵CO-HCFA: Community-onset healthcare facility-associated
⁶CO:Community-onset

Healthcare facility-onset infections occur when the LabID specimen was collected on or after day 4 of admission to the facility. Because they are incident infections, only a CDI incidence rate can be calculated. The HO CDI incidence rate is 6.8591 per 10,000 patient days. Community-onset infections occur when the LabID specimen was collected 3 days or less after admission to the facility. These are prevalent infections, so a CDI prevalence rate is calculated. The CO CDI prevalence rate is 0.2831 per 100 admissions. Community-onset healthcare facility-associated infections occur when the LabID specimen was collected from a patient who was discharged from the facility 4 weeks or less prior to the date the current stool specimen was collected. The CO-HCFA prevalence rate is 0.1180 per 100 admissions.

The majority (43%) of inpatient CDI LabID events were community-onset, followed closely by healthcare facility-onset (40%). The remaining infections were community-onset healthcare facility-associated (18%). The graphical display of this can be seen in Figure 6.

The percentage distributions of CO, CO-HCFA, and HO LabID Events in Table 7 are slightly different from the distributions in Table 3. This can be explained by the greater number of overall LabID events in Table 3. The number of LabID events in Tables 6 and 7 are lower than in Table 3 because only LabID events which had corresponding denominators (i.e. patient days) were included in the rate table.

Figure 6. Inpatient CDI LabID Onset Distribution



Device-Associated Summary Data

Table 8 (below) provides a summary of the Device-Associated Infection Rates as well as the Device Utilization (DU) Ratios for each device: urinary catheters, central lines, and ventilators. Data are shown for infections where five or more facilities collected and shared data for that particular infection.

Of the 68 hospitals with CAUTI in their reporting plans, 67 shared data. All 67 hospitals with CLABSI in their reporting plan for at least one month shared data. Although there were only 44 hospitals that had VAP in their reporting plan, 49 shared data. The five additional facilities were either reporting data out of plan or changed their reporting plan between the data pull date and when reporting plans were observed.

Table 8.

Michigan Device-Associated Rates

Type of Infection	Number of Hospitals	Number of Infections	Number of Patient Days	Number of Device Days	MI Rate ¹	US Rate ²	MI DU ³	US DU ⁴
CAUTI ⁵	67	203	243,995	95,128	2.1340	1.5962	0.3899	0.3084
CLABSI ⁶	67	66	246,229	81,997	0.8049	1.0801	0.3330	0.2513
VAP ⁷	49	22	90,451	25,030	0.8789	1.3928	0.2767	0.3009

Michigan Rate
 US Comparative Rate

¹MI Rates are the number of device-associated infections per 1,000 device days among participating hospitals.
²The 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).
³DU: 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 Michigan facilities.
⁴The 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).
⁵CAUTIs 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).
⁶CLABSIs 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).
⁷VAPs 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).

There was an increase in Michigan rates for all three device-associated modules. The CAUTI rate increase (1.07 to 2.13 per 1,000 device days) was highly significant (p<0.0001). The CLABSI rate increase (0.59 to 0.80 per 1,000 device days) was slightly significant (p=0.0369). The VAP rate increase (0.53 to 0.88 per 1,000 device days) was not statistically significant.

The Michigan DU ratio increased for both CAUTI and CLABSI modules, but decreased in the VAP module. Figures 7 and 8 below demonstrate the Michigan and U.S. Device-Associated Infection Rates and Device Utilization Ratios, respectively, for the past year.

Figure 7. Device-Associated Infection Rate Trends by Quarter

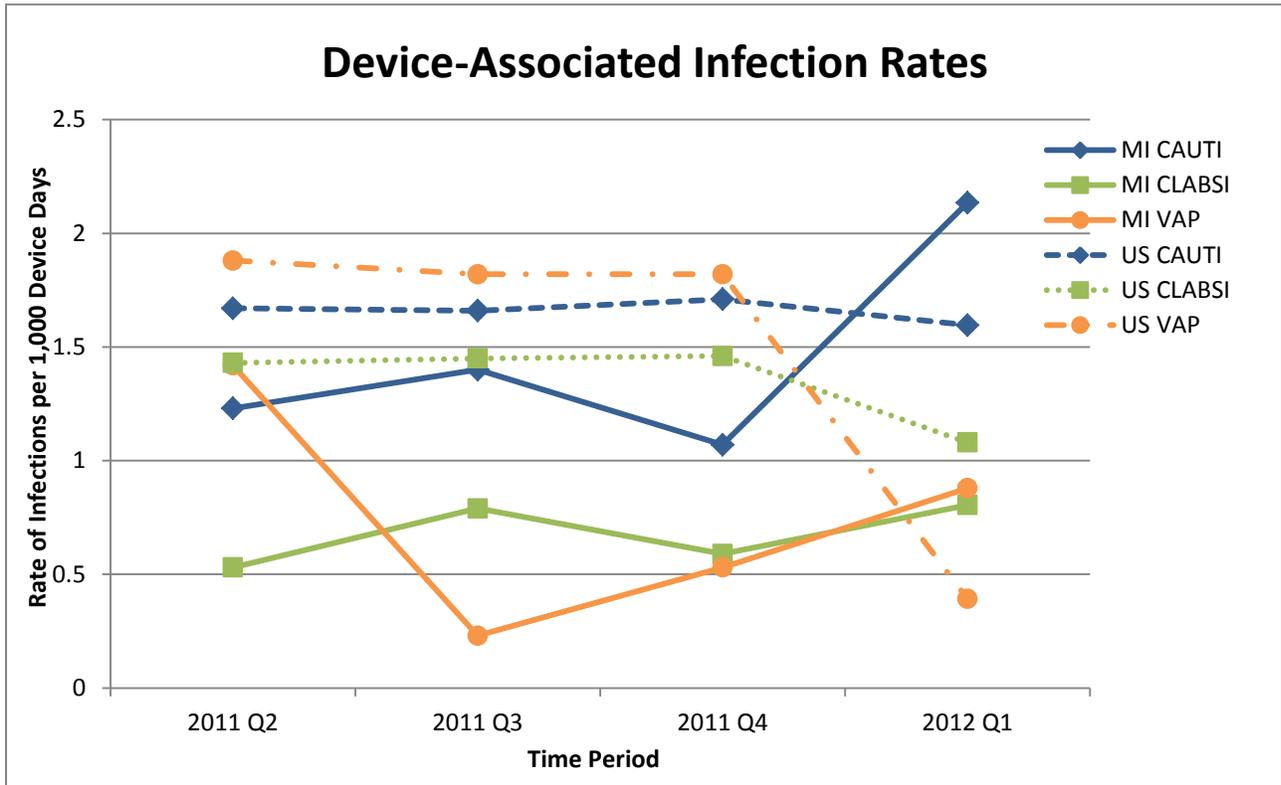
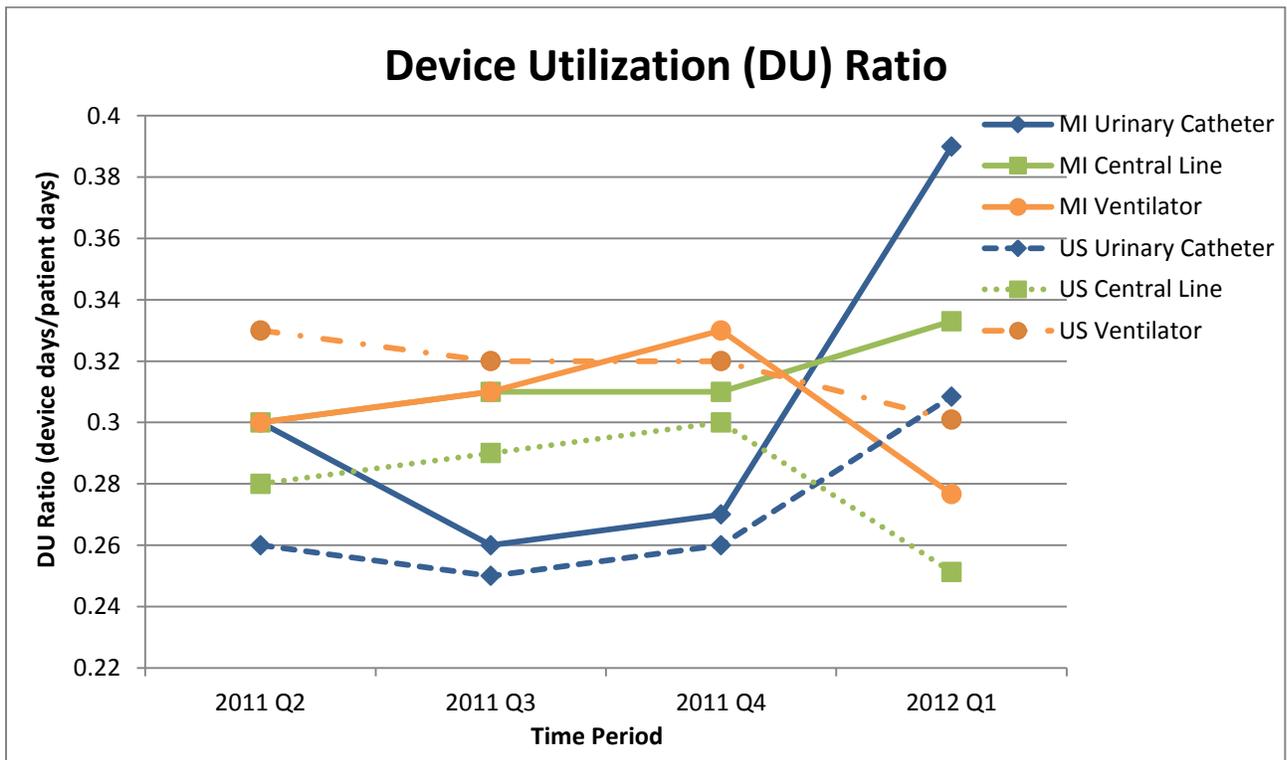


Figure 8. Device Utilization Ratio Trends by Quarter



For the first time, there were enough data to provide NICU device-associated rates stratified by birth weight. Previously, these data had been excluded because of the low number of participating facilities. This information can be seen in Table 9 (below). In future reports, trends will be determined from this data.

Table 9.

Michigan NICU Device-Associated Rates by Birth Weight

Type of Infection	Birth weight Code	Number of Reporting Hospitals	Number of Infections	Number of Patient Days	Number of Device Days	MI Rate ¹	US Rate ²	MI DU ³	US DU ⁴
CLABSI⁵	A ⁶	15	5	4555	1614	3.0979	2.6791	0.3543	0.4255
	B ⁷	15	0	3592	1049	0.0000	2.2149	0.2920	0.3829
	C ⁸	15	3	6871	1584	1.8939	1.2960	0.2305	0.2912
	D ⁹	15	2	9983	1332	1.5015	0.9910	0.1334	0.1888
	E ¹⁰	15	1	6471	1058	0.9452	0.8142	0.1635	0.2478
VAP¹¹	A	8	0	1834	810	0.0000	1.3821	0.4417	0.3898
	B	8	1	1433	318	3.1447	0.9354	0.2219	0.2423
	C	8	0	3513	181	0.0000	0.8867	0.0515	0.1086
	D	7	0	5059	121	0.0000	0.4295	0.0239	0.0824
	E	7	0	3304	202	0.0000	0.4359	0.0611	0.1380

Michigan Rate
US Comparative Rate

¹MI Rates are the number of device-associated infections per 1,000 device days among participating hospitals.

²The 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).

³DU: 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.

⁴The 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).

⁵CLABSIs 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).

⁶A: ≤750g

⁷B: 751 – 1000g

⁸C: 1001 – 1500g

⁹D: 1501 – 2500g

¹⁰E: >2500g

¹¹VAPs 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).

Standardized Infection Ratios

Table 10 (below) provides information on the Standardized Infection Ratio (SIR) for CAUTIs, CLABSIs and SSIs in the first quarter of 2012. An SIR is defined as the ratio of observed events compared to the number of predicted events, while accounting for unit type or procedure. Of the 68 hospitals participating in the CAUTI reporting module, 67 provided data to the SHARP Unit. All 67 of the hospitals participating in the CLABSI reporting module shared data. Of the 67 hospitals participating in the SSI module, 63 shared data with the SHARP Unit.

Table 10.

Standardized Infection Ratios (SIR)

Type of Infection	Number of Hospitals	Procedures Done	Device Days	Observed ¹	Predicted ²	MI SIR ³	MI 95% CI ⁴
CAUTI ⁵	67	N/A	87,183	198	182.926	1.082	0.937, 1.244
CLABSI ⁶	67	N/A	84,297	73	164.740	0.443	0.347, 0.557
SSI ⁷	63	9435	N/A	242	227.221	1.065	0.933, 1.211

Michigan Data
 US Data

¹Observed: Number of infections (CAUTI, CLABSI or SSI) reported during the time frame.

²Predicted: 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.

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. A 95% CI indicates that 95% of the time, the actual SIR will fall within this interval.

⁵CAUTI: Catheter-Associated Urinary Tract Infection

⁶CLABSI: Central Line-Associated Blood Stream Infection

⁷SSI: Surgical Site Infection

The CAUTI SIR this quarter was 1.082, which was higher (but not significantly higher) than expected. This quarter's CLABSI SIR demonstrates that Michigan facilities had significantly fewer CLABSIs than predicted based on national averages. An SIR of 0.443 indicates that Michigan had 55.7% fewer CLABSIs than expected. This was not significantly different than the previous quarter's MI CLABSI SIR of 0.31. The SSI SIR was 1.065, which is not significantly higher than expected. Compared to the previous quarter's MI SSI SIR of 1.064, it is not significantly different.

Figures 9 and 10 (below) display the SIR for the CLABSI and SSI modules for the previous year. There were not enough historical data to create a CAUTI figure. The center dot on each point represents the calculated SIR for the respective time period. The upper and lower marks represent the upper and lower ends of the 95% Confidence Interval (CI) surrounding the SIR. A 95% CI means that 95% of the time, the true SIR will be located within this interval. If the interval does not surround 1, then the calculated SIR is statistically significantly different from the predicted value. The number 1, or the null value, is indicated by the dashed line.

Figure 9. CLABSI Standardized Infection Ratios

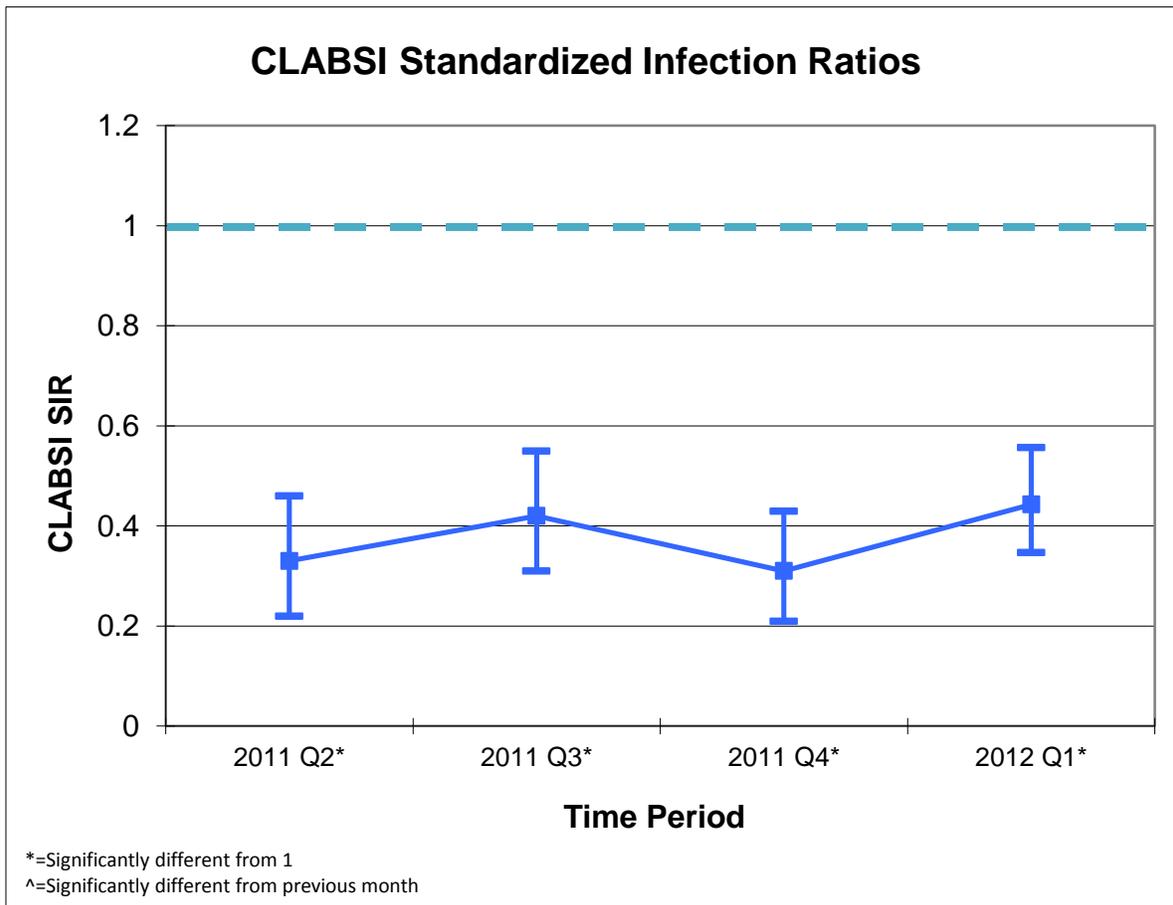
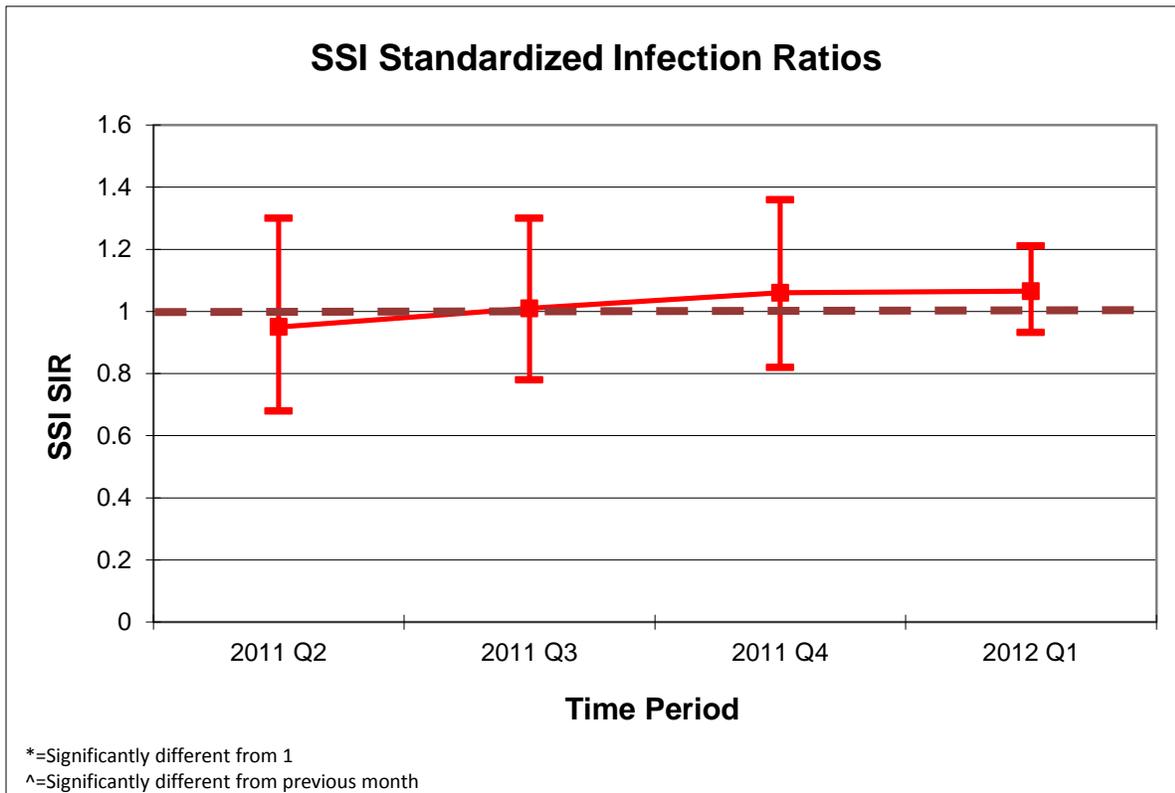


Figure 10. SSI Standardized Infection Ratios



While the SSI SIR is not significantly different from expected or the previous quarter, it is important to note the width of the 95% confidence interval. Because there are so many more hospitals providing data than previously, this range has decreased substantially. A smaller confidence interval means that there is more certainty in the results.

Conclusions

This quarter, there was a substantial increase in hospital participation, from 54 in the fourth quarter of 2011 to 73 in the first quarter of 2012. In addition to more hospitals participating, many also increased their module usage and shared more data than before. The onset and location distributions within the MDRO/CDI module were similar for both MRSA and CDI LabID Events compared to previous distributions. However, there was a large increase in overall LabID events, due to more hospitals contributing data and current hospitals contributing more data.

Overall MRSA LabID event rates and MRSA LabID prevalence rates both decreased; the latter decreased significantly. Unfortunately, all other rates increased from the previous quarter (CDI, CAUTI, CLABSI, and VAP). Of these, the overall CDI LabID event rate, CAUTI rate, and CLABSI rate increases were statistically significant. Due to the increase in participating facilities this quarter, the facility- and patient-types may be different than previous quarters. That is why a rate measurement is not as reliable as an SIR. Unfortunately, at this time, there are only SIRs available for CAUTI, CLABSI, and SSI. Although both the CLABSI and SSI SIRs increased, the CLABSI SIR still remained significantly lower than expected; neither the CAUTI nor SSI SIRs were significantly greater than expected. It is expected that SIRs will be made available for MRSA bacteremia LabID events and CDI LabID events in February 2013.

We are investigating any other possible reasons for the rate increases in order to provide future prevention recommendations. As future reports are generated with a larger population, these trends will hopefully stabilize or decrease.

Acronyms Used in Quarterly Reports

ARRA	American Recovery and Reinvestment Act
CAUTI	Catheter-Associated Urinary Tract Infection
CDC	Centers for Disease Control & Prevention
CDI	<i>Clostridium difficile</i> Infection
CLABSI	Central Line-Associated Bloodstream Infection
CMS	Centers for Medicare & Medicaid Services
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 for Healthcare-Associated & Resistant Pathogens Unit
SSI	Surgical Site Infection
VAP	Ventilator-Associated Pneumonia



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

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