
**ANNUAL REPORT:
HEALTHCARE-ASSOCIATED INFECTION
SURVEILLANCE AND PREVENTION
ACTIVITIES IN MICHIGAN**

October 1, 2009–September 30, 2010

Michigan Department of Community Health

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

Table of Contents

Executive Summary	3
Introduction.....	4
Activities.....	4
Coordination and Reporting of State HAI Prevention Efforts.....	4
Detection and Reporting of HAI Data (HAI Surveillance)	4
Partnership with Prevention Collaboratives.....	5
Analysis of Data from Participating Hospitals	5
Hospital Descriptives and Surveillance	6
Number of Hospitals sharing NHSN Data.....	6
Hospital Affiliation	6
Number of Facilities by Region.....	6
Michigan Counties and Preparedness Regions.....	7
Number of Facilities by Bed Size	8
Types of Units under Surveillance.....	8
NHSN Modules in Use	9
Cumulative Annual Aggregate MRSA and <i>Clostridium difficile</i> Reports.....	10
MRSA Data.....	10
<i>Clostridium difficile</i> Data.....	11
Cumulative Annual Aggregate Rates.....	12
Cumulative Annual <i>Clostridium difficile</i> Rate	13
Annual Catheter-Associated Urinary Tract Infection (CAUTI) Rate.....	14
Annual Central Line-Associated Bloodstream Infection (CLABSI) Rate.....	14
CLABSI Standardized Infection Ratio (SIR)	15
Annual Ventilator-Associated Pneumonia (VAP) Rate.....	15
Cumulative Rates Aggregated by Specifiers	16
Facility Type	16
Region.....	17
Facility Size	18
Unit Type	19
Conclusions.....	20
Appendices.....	21
Acronyms.....	21
MPRO Data.....	22
MPRO Baseline Data.....	23
MHA Keystone Center for Patient Safety & Quality Data.....	24
Central Line-Associated Bloodstream Infection (CLABSI).....	25
Ventilator-Associated Pneumonia (VAP) Rate	26
Weaning Assessment Adherence.....	27
Deep Vein Thrombosis (DVT) Prophylaxis Adherence.....	28
Ability to Follow Commands Assessment Adherence	29
Glucose Level Assessment Adherence	30
Head of Bed Elevation Adherence.....	31
Peptic Ulcer Disease (PUD) Prophylaxis Adherence	32
Nonessential Urinary Catheters	33

Executive Summary

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

The following report contains the first glimpse of annual statewide healthcare-associated infection (HAI) counts and rates in Michigan. These surveillance data were collected from acute care hospitals who have voluntarily agreed to share their data with the MDCH SHARP Unit. HAI data from hospitals are reported to the National Healthcare Safety Network (NHSN), a secure online surveillance system developed by the Centers for Disease Control & Prevention (CDC). Hospitals agreeing to share their NHSN data with the MDCH SHARP Unit have signed a MDCH SHARP data use agreement and have conferred rights to MDCH SHARP to view their online HAI data. All NHSN data collected from participating hospitals have been aggregated and de-identified in this report. In addition, the aggregated data have been analyzed for trends and compared with national data where appropriate.

In this first 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, with a special emphasis on MRSA and *C. difficile* data collected through the Multidrug-Resistant Organism/ *Clostridium difficile*-associated disease (MDRO/CDAD) module of NHSN. Aggregate infection rates for other NHSN modules are also presented. This annual report, along with quarterly reports, is published on the MDCH HAI website at www.michigan.gov/hai. This data will become more accurate and reliable as additional facilities participate in surveillance activities, thus increasing the sample size.

Surveillance efforts are ongoing. Acute care hospitals interested in contributing HAI data are encouraged to contact the MDCH SHARP Unit to participate in surveillance activities. As additional funds become available, MDCH SHARP plans to expand surveillance initiatives to include other types of HAIs, as well as long-term care facilities, ambulatory care centers, and other healthcare facilities, and validation studies will be conducted to ensure the accuracy of data reported. Lastly, MDCH SHARP will continue to work with partner agencies such as the Michigan Health & Hospital Association (MHA) Keystone Center for Patient Safety & Quality and MPRO, (Michigan's Quality Improvement Organization), as well as state professional societies and consumer groups, to educate the public and healthcare providers about HAIs and the roles each can play to prevent these infections, ultimately reducing healthcare costs and unnecessary deaths.

Introduction

With American Recovery and Reinvestment Act (ARRA) funding awarded to the MDCH SHARP Unit in 2009, Michigan has been able to expand its infrastructure and increase state activities related to the surveillance and prevention of healthcare-associated infections (HAIs). Initial activities in 2009 and 2010 have been directed toward 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, 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 Practitioners in Infection Control & Epidemiology (APIC-GD), and other professional groups. Activities initiated have been directly related to the U.S. Department of Health and Human Services (HHS) *Action Plan to Prevent Healthcare-Associated Infections* (<http://www.hhs.gov/ophs/initiatives/hai>), which was also released in 2009.

Primary HAI activities funded under ARRA include 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 these activities in Michigan hospitals might result in dramatic reductions in HAIs, which will not only save lives and reduce suffering but will also result in healthcare cost savings.

Activities

Coordination and Reporting of State HAI Prevention Efforts

During the summer of 2009, the SHARP Unit formed the Michigan HAI Prevention Advisory Group to coordinate and oversee activities related to HAI surveillance and prevention activities. A multidisciplinary group of individuals was gathered with representatives from the Michigan Department of Community Health, Michigan Health & Hospital Association (MHA) Keystone Center for Patient Safety & Quality, MPRO, acute care hospitals, professional infection control and infectious disease societies, and consumers. This group has held monthly meetings throughout the 2009-10 fiscal year 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 HHS in December 2009, and is posted on Michigan's HAI website at www.michigan.gov/hai.

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 CDC using the National Healthcare Safety Network (NHSN) with MDCH. The SHARP Unit's initial focus is 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*-Associated Disease (MDRO/CDAD) module of NHSN. Additional HAI data collected through other NHSN modules were and continue to be welcomed.

To ensure confidentiality of the HAI data shared by hospitals, SHARP developed a data use 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 routine public health surveillance and was deemed exempt from review by the MDCH IRB Committee.

In 2009 and 2010, announcements regarding this surveillance initiative were distributed to hospitals through newsletters and emails from the MHA Keystone Center for Patient Safety & Quality (MHA Keystone Center) 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 will be awarded \$750 each.

This document contains MRSA and *C. difficile* data by quarter, as well as cumulatively for the 2009–2010 fiscal year. Additional HAI data is reported cumulatively.

Establishment or Partnership with Prevention Collaboratives

As part of the third activity area under ARRA funding, MDCH SHARP is partnering with both MPRO and the MHA Keystone Center to build on their established HAI prevention efforts. MPRO is collecting MRSA data from 22 participating hospitals to demonstrate reductions in MRSA infections over time. The MHA Keystone Center has many quality improvement initiatives in place, including their nationally-known successes working with Michigan hospitals to reduce central line-associated bloodstream infections (CLABSIs) in intensive care units (ICUs) through use of a checklist. The MDCH SHARP Unit is supporting the MHA Keystone HAI Initiative to reduce catheter-associated urinary tract infections (CAUTIs) through the use of a “bladder bundle” checklist. An annual report of activity from both of these prevention collaboratives is included in the appendices of this report.

Analysis of Data from Participating Hospitals

Between October 1, 2009 and September 30, 2010, 26 hospitals had signed data use agreements with MDCH SHARP. Data from NHSN was pulled for the annual report on November 18, 2010. At that time, 24 hospitals had completed the process of conferring rights to SHARP and had a reporting plan for their facility in place for at least one month. The data from these 24 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 their data with MDCH SHARP. For example, although a maximum of 24 hospitals had conferred rights to their data between October 1, 2009 and September 30, 2010 (see *Table 1* below), only 10 hospitals were using the Multidrug-Resistant Organism/*Clostridium difficile*-Associated Disease (MDRO/CDAD) module and reporting data for MRSA LabID events.

Hospital Descriptives and Surveillance

Table 1.

Number of Hospitals sharing National Healthcare Safety Network (NHSN) Data with MDCH SHARP by Month

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Number of Hospitals	22	21	21	24	24	24	24	24	24	23	23	24

The above data reflects the number of hospitals who have conferred rights and entered a monthly reporting plan on NHSN. 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 vary for each hospital, hospitals may not report to NHSN each month. The SHARP Unit has requested three consecutive months of data for their surveillance initiative.

Table 2.

Hospital Affiliation

Hospital Type	Teaching ¹	Non-teaching	Unknown	Total
Number of Facilities	3	4	17	24

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

The above data was obtained from the 2009 NHSN Annual Facility Survey completed by participating hospitals. No conclusions or comments can be made from this data because of the low number of facilities which provided complete information. Seventeen participating hospitals did not complete their 2009 Annual Facility Survey.

Table 3.

Number of Facilities by Region

Geographic region	Mid/Western	Southeast	Northern
Number of Facilities	9	11	4

To characterize the geographic distribution of the 24 participating hospitals, hospital locations were categorized according to Public Health Preparedness Regions, and then grouped into the three categories above. The Mid/Western Region includes Public Health Preparedness Regions 1, 3, 5, and 6. The Southeast Region includes Public Health Preparedness Regions 2N and 2S. The Northern Region includes Public Health Preparedness Regions 7 and 8. As additional hospitals participate, the three categories will be expanded to individual Public Health Preparedness Regions. As expected, the majority of current participating hospitals are located in southeastern Michigan, where the greatest proportion of

residents and hospitals exist. The Public Health Preparedness Regions and the counties they include can be seen on the map in Figure 1.

Figure 1. Michigan Counties and Preparedness Regions

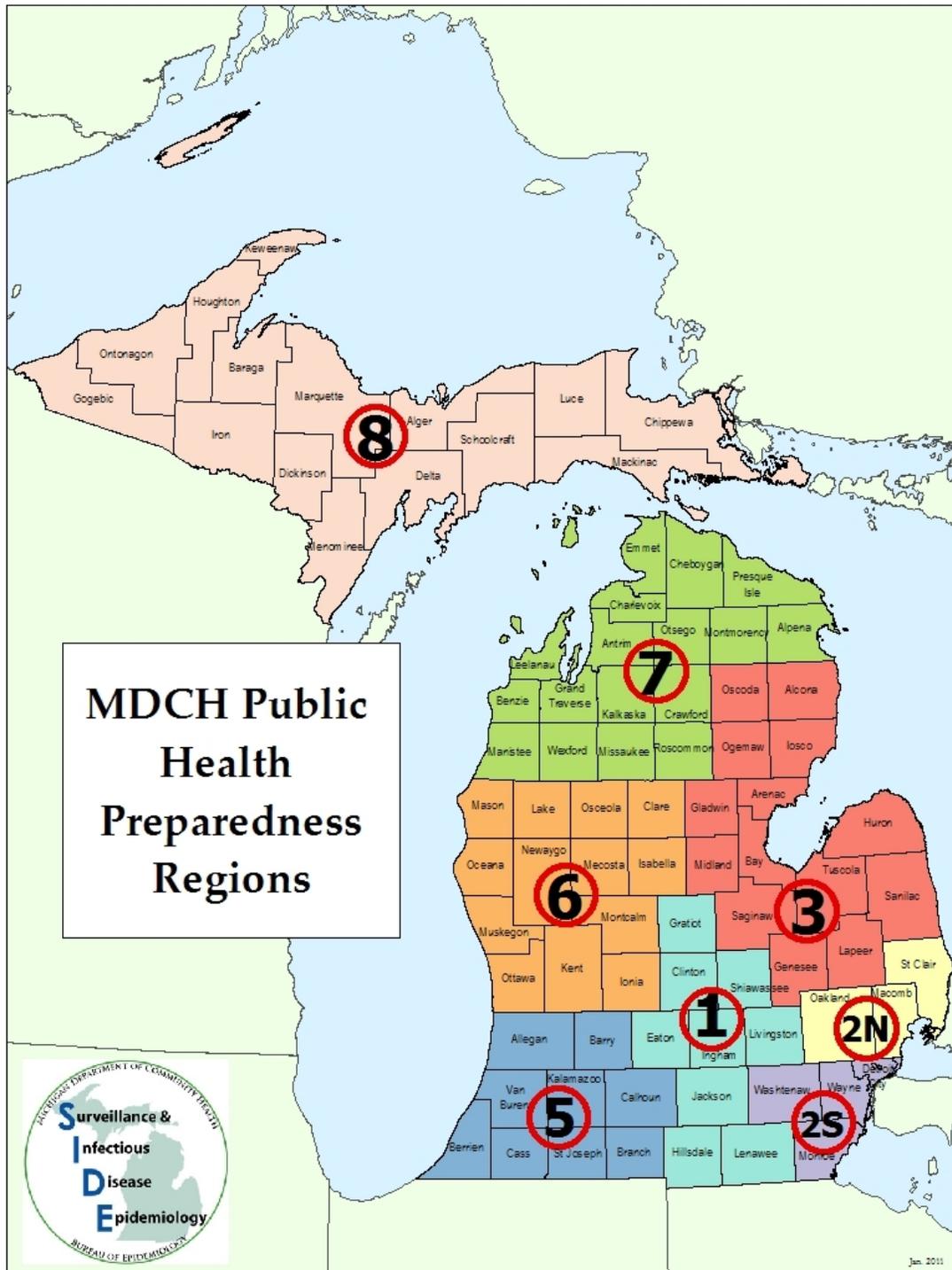


Table 4.

Number of Facilities by Bed Size

Number of Beds in Facility	≤100	101 - 200	201 - 500	501 - 1000	≥1001
Number of Facilities Participating with MDCH SHARP	4	5	10	5	0
Number of Facilities in Michigan	112	22	43	8	1

Hospital licensure data, including the number of beds in each hospital, were obtained from the 2008 MDCH Certificate of Need Annual Survey. The Certificate of Need Survey includes data from long term acute care, psychiatric, rehabilitation, children's, and veterans affairs hospitals, in addition to acute care and critical access hospitals. According to MHA, there are 143 acute care hospitals in Michigan. Twenty of 24 (83%) hospitals participating with MDCH SHARP have more than 100 licensed beds in their facility. This is in direct contrast to the proportion of all Michigan hospitals with 101 or more licensed beds (74 of 186, or 40%). Of the 74 MI hospitals with 101 or more beds, 20 (27%) of them have enrolled in the SHARP surveillance initiative versus 4 (4%) of the hospitals with 100 or fewer beds. Data indicate that hospitals over 100 beds are more likely to participate with SHARP in this surveillance initiative.

Table 5.

Types of Units under Surveillance

Unit Type	ICU	SCA	Wards	Facility-wide
Number of Facilities Participating	13	1	8	1

These data indicate that the majority of participating hospitals are using intensive care units (ICUs, although the ICU type is not specified in this report) to conduct their NHSN surveillance for MRSA, *Clostridium difficile*, CLABSI, ventilator-associated pneumonia (VAP), and CAUTI. Many hospitals are also conducting surveillance on one or more patient wards. Only one hospital is conducting surveillance in a Specialty Care Area (SCA). 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. Note that although 24 hospitals provided data regarding units under surveillance, not all hospitals provided patient- or event-level data for this report and will therefore not appear in all of the following infection- or event-specific tables.

Table 6.

National Healthcare Safety Network (NHSN) Modules in Use

NHSN Module	Number of Facilities using NHSN Module, as Reported by Facility	Number of Facilities sharing NHSN Data with MDCH SHARP
Central Line-Associated Bloodstream Infection (CLABSI)	20	8
Ventilator-Associated Pneumonia (VAP)	17	8
Methicillin-Resistant <i>Staphylococcus aureus</i> (MRSA) Laboratory-identified (LabID) Event	13	10
Methicillin-Resistant <i>Staphylococcus aureus</i> (MRSA) Infection Surveillance	13	4
Surgical Site Infection (SSI)	13	3
<i>Clostridium difficile</i> -Associated Disease (CDAD) Laboratory-identified (LabID) Event	10	8
Catheter-Associated Urinary Tract Infection (CAUTI)	8	4
<i>Clostridium difficile</i> -Associated Disease (CDAD) Infection Surveillance	6	3

The above table indicates the NHSN module(s) in use, as reported by participating hospitals. A hospital may use a module within NHSN and choose not to share their data with MDCH SHARP. From month to month, the type of module(s) being used can change as some modules require varying periods of use. According to MDCH SHARP data, the most commonly used module is the CLABSI module. This is not surprising because of the previous work done by hospitals in conjunction with the MHA Keystone Center to reduce these types of infections. Use of the CLABSI module is also consistent with the new Centers for Medicare & Medicaid Services (CMS) rule. Beginning January 1, 2011, hospitals are required to use NHSN to report CLABSIs in adult, pediatric, and neonatal ICUs in order to receive full reimbursements in 2013. VAP is the second most commonly used module, with CDAD surveillance and the surgical site infection (SSI) module following closely behind. SHARP currently focuses on MRSA and *C. difficile* using the LabID option of the MDRO/CDAD module, but intends to look closer at the device-associated modules (CLABSI, VAP, and CAUTI) in 2011.

Although there were 13 facilities that indicated monitoring for SSIs, not all facilities shared their SSI data with MDCH SHARP, therefore no summary of SSI data is provided in this report. Because data provided to MDCH SHARP covered over 3,000 procedures from just three facilities (four additional facilities provided incomplete procedure reports) aggregation and summary would be quite difficult. As more facilities share data, SSI data and a SSI standardized infection ratio (SIR) will be analyzed and included in future reports.

Cumulative Annual Aggregate Methicillin-Resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* (*C. diff*) Reports

Table 7.

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

	Oct – Dec 2009	Jan – March 2010	Apr – June 2010	July – Sept 2010	Cumulative Data
Frequency, Number					
<i>Hospitals with DUA</i> ¹	6	10	15	26	26
<i>Hospitals Reporting MRSA Lab ID</i> ²	4	8	8	10	10
Aggregated LabID Events ²	99	172	198	237	706
Onset, Number (%)					
<i>Healthcare-Onset (HO)</i>	19 (19)	34 (19)	31 (16)	39 (16)	123 (17)
<i>Community-Onset (CO)</i>	80 (81)	138 (80)	167 (84)	198 (84)	583 (83)
Specimen Source, Number (%HO)					
<i>Wound</i>	44 (5)	73 (7)	72 (10)	115 (3)	304 (6)
<i>Sputum</i>	37 (38)	48 (46)	52 (29)	50 (52)	187 (41)
<i>Blood</i>	6 (33)	16 (25)	11 (27)	10 (10)	43 (23)
<i>Skin</i>	2 (0)	3 (0)	5 (0)	14 (0)	24 (0)
<i>Abscess</i>	0 (0)	4 (0)	17 (0)	6 (0)	27 (0)
<i>Urine</i>	3 (0)	8 (13)	14 (0)	12 (0)	37 (3)
<i>Other</i>	7 (14)	20 (10)	27 (22)	30 (27)	84 (20)
Surveillance Location, Number					
<i>Intensive/Critical Care Unit</i>	37	68	75	73	253
<i>Specialty Care Area</i>	-	-	-	-	-
<i>Wards</i>	24	28	43	47	142
<i>Outpatient</i>	38	76	80	117	311

¹DUA: 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.

²MRSA Lab ID: Methicillin-Resistant *Staphylococcus aureus* (MRSA) Laboratory-Identified (LabID) Event. This is an option within the Multidrug-Resistant Organism / *Clostridium difficile*-Associated Disease (MDRO/CDAD) Module of NHSN for tracking laboratory results without conducting additional surveillance for infections.

The above table shows updated aggregate data by quarter in fiscal year 2009-10 (October 1, 2009–September 30, 2010), along with cumulative data for the year. As additional hospitals have joined the SHARP surveillance initiative, the numbers of MRSA reports have increased. The number of isolates reported reflects the number of positive LabID events entered by facility per quarter following the NHSN definitions. The NHSN definition for MRSA LabID event includes the first positive MRSA LabID event per calendar month per patient. Thus, multiple positive lab results will not be entered for the same patient in the same month; however, by aggregating the data by quarter, the same patient may be counted up to three times if he or she had a positive lab sample each 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. 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).’ Note that the proportion of healthcare-onset (HO) and community-onset (CO) reports have remained fairly consistent throughout the four quarters, along with the overall cumulative percentage for the year. Additionally, please note that the number in parentheses under “**Specimen Source**” is the percent of LabID event specimens obtained from that source that were HO. In previously published quarterly reports this percent HO represented the percent of HO samples that were obtained from that specimen source. The percent HO in this report reveals more information about trends in onset by sample source and will be used in future quarterly and annual reports.

Table 8.

Cumulative Aggregate *Clostridium difficile*¹ Data

	Sept – Dec 2009	Jan – Mar 2010	Apr – June 2010	July - Sept 2010	Cumulative Data
Frequency, Number					
<i>Hospitals with DUA</i> ²	6	10	15	26	26
<i>Hospitals Reporting CDAD Lab ID</i> ³	2	5	7	8	8
<i>Aggregated LabID Events</i> ³	7	28	58	91	184
Onset, Number (%)					
<i>Healthcare-Onset (HO)</i>	1 (14)	11 (39)	19 (33)	45 (49)	76 (41)
<i>Community-Onset Healthcare-Assoc (COHA)</i>	3 (43)	5 (18)	15 (26)	11 (12)	34 (19)
<i>Community-Onset (CO)</i>	3 (43)	12 (43)	24 (41)	35 (39)	74 (40)
Surveillance Location, Number					
<i>Intensive/Critical Care Unit</i>	1	7	18	34	60
<i>Specialty Care Area</i>	-	-	-	8	8
<i>Wards</i>	4	12	20	42	78
<i>Outpatient</i>	2	9	20	7	38

¹The specimen source for all *C.difficile* laboratory tests 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.

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

As with reports of MRSA, the number of *C. difficile* reports has increased with the number of participating hospitals. The number of LabID events reported reflects the number of positive laboratory test results entered by facility per quarter following the NHSN definitions. The NHSN definition for CDAD LabID event includes the first positive *C. diff* Lab ID event per calendar month per patient. Thus, multiple positive lab results will not be entered for the same patient in the same month; however, by aggregating the data by quarter, the same patient may be counted up to three times if he or she had a positive lab sample each 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. Testing for *C. difficile* is highly variable and the number of positive tests may increase with improved methods. 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).' With the exception of the 1st quarter when there were very few participating hospitals, the proportion of healthcare-onset (HO), community-onset healthcare-associated (COHA), and community-onset (CO) events has also remained fairly consistent throughout the four quarters and for the year.

Cumulative Annual Aggregate Rates

Table 9.

Cumulative Annual Methicillin-Resistant *Staphylococcus aureus* (MRSA) Rate

Number of Facilities	Number of Inpatient MRSA Events	Number of Patient Days	Number of Patient Admits	MRSA Rate ¹	MRSA Prevalence Rate ²
10	416 LabID ³	76,446	-	5.44	-
9	226 LabID ⁴	-	10126	-	2.23
4	- Infections ⁵	-	-	-	-

Michigan Rate

¹MRSA Rate: Methicillin-Resistant *Staphylococcus aureus* (MRSA) rate. This is the number of MRSA events per 1,000 patient days.

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*-Associated Disease (MDRO/CDAD) Module of NHSN for tracking laboratory results without conducting additional surveillance for infections.

⁴Differences in the number of facilities or events used for calculating the prevalence rate are due to exclusions necessary for lack of denominators associated with the data, specifically when number of patient admissions or encounters is unavailable.

⁵Infection: MRSA event under infection surveillance. This is an option in the MDRO/CDAD module for tracking infections through surveillance.

The Michigan overall annual MRSA rate according to MRSA LabID events is 5.4 events per every 1,000 patient-days. This number is calculated by dividing the number of inpatient MRSA LabID events by the number of patient days. There is currently no national rate to compare with the Michigan MRSA LabID rate. Note that LabID event data do not necessarily indicate infection, but denote a positive lab test from a specimen collected for clinical purposes (not surveillance purposes only). MRSA is known to colonize skin and mucosal membranes without causing infections. LabID surveillance data provide a proxy measure for MRSA prevalence in Michigan hospitals.

In addition to LabID surveillance, there is also the option to conduct MRSA Infection Surveillance activities at facilities, using infection definitions rather than LabID events. There were 4 facilities that participated in this option during the time period under study. As more facilities participate in this activity, their data will be included in future reports. Although no national rates exist for the MRSA LabID Rate, the MRSA LabID Prevalence Rate, or the MRSA Infection Rate, we anticipate tracking Michigan rates over time to demonstrate a reduction in the occurrence of MRSA.

Table 10.

Cumulative Annual *Clostridium difficile* (*C. diff*) Rate

Number of Facilities	Number of CDAD Events	Number of Patient Days	Number of Patient Admits	<i>C.diff</i> Rate ¹	<i>C. diff</i> Prevalence Rate ²
8	130 LabID ³	75,561	-	17.20	-
7	112 LabID ⁴	-	20,452	-	0.55
3	- Infection ⁵	-	-	-	-

Michigan Rate

¹*C.diff* Rate: *Clostridium difficile* rate. This is the number of *C. diff* events per 10,000 patient days.

²*C.diff* Prevalence Rate. This is the number of *C. diff* LabID events per 100 patients admitted.

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

⁴Differences in the number of facilities or events used for calculating the prevalence rate are due to exclusions necessary for lack of denominators associated with the data, specifically when number of patient admissions or encounters is unavailable.

⁵Infection: *C. diff* event under infection surveillance. This is an option in the MDRO/CDAD module for tracking infections through surveillance.

The Michigan overall annual *C. difficile* rate according to CDAD LabID events is 17.20 events for every 10,000 patient-days. Again, there is no national rate to make comparisons with Michigan data. *C. difficile* LabID event data do not necessarily indicate infection but denote a positive lab test from a specimen collected for clinical purposes (not surveillance purposes only). *C. difficile* is also known to colonize the intestinal tract without causing infection. These surveillance data provide a proxy measure for *C. difficile* prevalence in Michigan hospitals.

There is also the option to conduct *C. difficile* Infection Surveillance activities at facilities, using infection definitions rather than LabID events. There were 3 facilities that participated in this option during the time period under study. As more facilities participate in this activity, their data will be included in future reports. Although no national rates exist for the *C.diff* LabID Rate, the *C.diff* LabID Prevalence Rate, or the *C.diff* Infection Rate, we anticipate tracking Michigan rates over time to demonstrate a reduction in the occurrence of *Clostridium difficile*.

Table 11.

Annual Catheter-Associated Urinary Tract Infection (CAUTI) Rate

Number of Facilities	Number of CAUTIs	Number of Patient Days	Number of Catheter Days	MI CAUTI Rate ¹	MI DU ²	US DU ³
4	--	--	--	--	--	--

Michigan Rate
 Comparative National Rate

¹MI CAUTI Rate is the number of CAUTIs per 1,000 patient days among participating facilities.

²DU = 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.

³The US comparative DU was calculated using a pooled mean from the national estimate on the National Healthcare Safety Network (NHSN). This estimate varies by unit type and with the proportion of patient days reported in the unit.

Between October 1, 2009 and September 30, 2010, four hospitals participating with SHARP were using the CAUTI module to collect infection data. Because of the low numbers of participating facilities and the low numbers of CAUTI events during this time period, rates listed above for Michigan cannot be considered reliable. As additional hospitals participate with SHARP, this data will become more significant.

Table 12.

Annual Central Line-Associated Bloodstream Infection (CLABSI) Rate

Number of Facilities	Number of CLABSIs	Number of Patient Days	Number of Central Line Days	MI CLABSI Rate ¹	US CLABSI Rate ²	MI DU ³	US DU
8	14	97,472	26,337	0.53	1.54	0.27	0.28

Michigan Rate
 Comparative National Rate

¹MI CLABSI Rate is the number of CLABSIs per 1,000 patient days among participating facilities.

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

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 this case a central line.

Hospitals in Michigan have been working diligently with the MHA Keystone Center to reduce CLABSI infection rates; this is reflected in the data above. With data collected from 8 hospitals, Michigan's device utilization ratio approximates the U.S. ratio (0.27 and 0.28

respectively). Noteworthy, however, is the fact that the Michigan CLABSI rate per 1,000 patient days (0.53) is much lower than the national average of 1.54.

Table 13.

Central Line-Associated Blood Stream Infection (CLABSI) Standardized Infection Ratio (SIR)

Number of Facilities	Observed ¹	Predicted ²	SIR ³	95% CI ⁴
8	14	49.93	0.28	(0.17, 0.44)

Michigan Rate Comparative National Rate

¹Observed = Number of CLABSIs reported during the time frame.

²Predicted = This is the number of CLABSIs predicted for the same MI hospitals and units based upon national CLABSI rates by unit type.

³SIR = Standardized Infection Ratio = Ratio of how many observed events we have compared to the number of predicted events, accounting for type of unit. 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 having **fewer** CLABSI events than were predicted, while an SIR of greater than 1 represents **more** CLABSI events than expected.

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

Michigan's CLABSI SIR, using data from 8 participating hospitals, is 0.28, reflecting the excellent work that hospitals have done to reduce CLABSIs, in conjunction with the MHA Keystone Center. This can be interpreted as Michigan hospitals having 28% of the national rate, or 72% fewer CLABSIs than we would expect to have. This is statistically significantly lower than the national average.

Table 14.

Annual Ventilator-Associated Pneumonia (VAP) Rate

Number of Facilities	Number of VAPs	Number of Patient Days	Number of Ventilator Days	MI VAP Rate ¹	US VAP Rate ²	MI DU ³	US DU
8	17	53,100	13,423	1.27	2.37	0.25	0.28

Michigan Rate Comparative National Rate

¹MI VAP Rate is the number of VAPs per 1,000 device days among participating facilities.

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

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 this case a ventilator.

Hospitals in Michigan have also partnered with the MHA Keystone Center to reduce VAP infection rates. The above data indicate that the ventilator-associated pneumonia (VAP) infection rate (1.27) for the eight Michigan hospitals participating with SHARP initiatives is less than the national rate of 2.37. The Michigan average ventilator device utilization (DU)

rate is also lower than the national average DU rate (0.25 versus 0.28 respectively). These numbers, however, may be misleading because of the low number of hospitals providing VAP data. The data will become more reliable as the number of participating hospitals utilizing the VAP module increases.

Cumulative Rates Aggregated by Specifiers

Table 15.

Rate¹ by Facility Type

	Teaching	US Rate ²	Non-teaching	US Rate
MRSA LabID ³	---- (0 facilities) ⁴	unavailable	---- (2 facilities)	unavailable
<i>C. diff</i> LabID ⁵	---- (0 facilities)	unavailable	---- (2 facilities)	unavailable
CLABSI ⁶	----	----	---- (2 facilities)	----
CAUTI ⁷	----	----	----	----
VAP ⁸	----	----	---- (2 facilities)	----

Michigan Rate Comparative National Rate

¹Rates were calculated using the number of infections/events per 1,000 Patient/Device Days (per 10,000 patient days for *C. difficile*) according to the same MI rate shown in Tables 9–14 among facilities that shared data with the Michigan Department of Community Health through the National Healthcare Safety Network.

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

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

⁴Although MDCH SHARP was able to calculate a rate for each infection/event and facility type combination, there were insufficient data to report all. Data will only be published for groups of five or more hospitals in order to protect hospital identity and data. National rates by facility type are currently unavailable for comparison purposes.

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

⁶CLABSI: Central Line-Associated Blood Stream Infection

⁷CAUTI: Catheter-Associated Urinary Tract Infection

⁸VAP : Ventilator-Associated Pneumonia

Because of the low numbers of hospitals which provided data regarding facility type, no conclusions regarding this data can be made at this time. As additional hospitals participate, these data will become more complete.

Table 16.

Rate¹ by Region

	Mid/Western	US Rate ²	Southeast	US Rate	Northern	US Rate
MRSA LabID ³	---- (1 facility) ⁴	unavailable	7.07 (7 facilities)	unavailable	---- (3 facilities)	unavailable
<i>C. diff</i> LabID ⁵	---- (1 facility)	unavailable	18.00 (5 facilities)	unavailable	---- (2 facilities)	unavailable
CLABSI ⁶	---- (1 facility)	----	0.66 (5 facilities)	1.83	---- (2 facilities)	----
CAUTI ⁷	---- (0 facilities)	----	---- (1 facility)	----	---- (3 facilities)	----
VAP ⁸	---- (1 facility)	----	1.49 (5 facilities)	3.47	---- (2 facilities)	----

Michigan Rate
 Comparative National Rate

¹Rates were calculated using the number of infections/events per 1,000 Patient/Device Days (per 10,000 patient days for *C. difficile*) according to the same MI rate shown in Tables 9–14 among facilities that shared data with the Michigan Department of Community Health through the National Healthcare Safety Network.

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

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

⁴Although MDCH SHARP was able to calculate a rate for each infection/event and facility type combination, there were insufficient data to report all. Data will only be published for groups of five or more hospitals in order to protect hospital identity and data. National rates by facility type are currently unavailable for comparison purposes.

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

⁶CLABSI: Central Line-Associated Blood Stream Infection

⁷CAUTI: Catheter-Associated Urinary Tract Infection

⁸VAP : Ventilator-Associated Pneumonia

In analyzing the above data, there are too few facilities participating from regions in Michigan other than the southeast region to make comparisons to national data at this time. Increased participation from facilities in various regions across the state will allow more accurate and reliable rates by region. Of note, the CLABSI and VAP rates in the southeast region of Michigan are lower than the comparative national rate.

Table 17.

Rate¹ by Facility Size

	<100 Beds	US Rate	≥ 100 Beds	US Rate ²
MRSA LabID ³	---- (2 facilities) ⁴	unavailable	6.53 (8 facilities)	unavailable
<i>C. diff</i> LabID ⁵	---- (2 facilities)	unavailable	18.14 (6 facilities)	unavailable
CLABSI ⁶	---- (1 facility)	----	0.54 (7 facilities)	1.56
CAUTI ⁷	---- (1 facility)	----	---- (3 facilities)	----
VAP ⁸	---- (1 facility)	----	1.27 (7 facilities)	2.37

Michigan Rate
 Comparative National Rate

¹Rates were calculated using the number of infections/events per 1,000 Patient/Device Days (per 10,000 patient days for *C. difficile*) according to the same MI rate shown in Tables 9–14 among facilities that shared data with the Michigan Department of Community Health through the National Healthcare Safety Network.

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

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

⁴Although MDCH SHARP was able to calculate a rate for each infection/event and facility type combination, there were insufficient data to report all. Data will only be published for groups of five or more hospitals in order to protect hospital identity and data. National rates by facility type are currently unavailable for comparison purposes.

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

⁶CLABSI: Central Line-Associated Blood Stream Infection

⁷CAUTI: Catheter-Associated Urinary Tract Infection

⁸VAP : Ventilator-Associated Pneumonia

Because the numbers of participating hospitals with less than 100 beds are low, no conclusions regarding their infection rates can be made at this time. Among larger (100 beds or more) Michigan facilities, the CLABSI and VAP rates were lower than among comparable national facilities (0.54 versus 1.56, and 1.27 versus 2.37 respectively). As more facilities conduct surveillance and share their rates, more comparisons will be able to be made.

Table 18.

Rate¹ by Unit Type

	ICU/CCU ²	US Rate ³	SCA ⁴	US Rate	Wards ⁵	US Rate
MRSA LabID ⁶	8.98 (8 facs)	unavailable	---- (0 facs) ⁷	unavailable	---- (4 facs)	unavailable
<i>C. diff</i> LabID ⁸	22.54 (6 facs)	unavailable	---- (1 fac)	unavailable	14.58 (5 facs)	unavailable
CLABSI ⁹	0.65 (8 facs)	2.01	---- (0 fac)	----	0.16 (5 facs)	1.232
CAUTI ¹⁰	---- (4 facs)	----	---- (0 fac)	----	---- (3 facs)	----
VAP ¹¹	1.27 (8 facs)	3.22	---- (0 fac)	----	---- (1 facs)	----

Michigan Rate Comparative National Rate

¹Rates were calculated using the number of infections/events per 1,000 Patient/Device Days (per 10,000 patient days for *C. difficile*) according to the same MI rate shown in Tables 9–14 among facilities that shared data with the Michigan Department of Community Health through the National Healthcare Safety Network.

²ICU/CCU: Intensive Care Unit/Critical Care Unit

³US comparative rates were calculated using a pooled mean from the national estimate on the National Healthcare Safety Network (NHSN). This estimate varies by unit type and with the proportion of patient days reported in unit.

⁴SCA: Specialty Care Area

⁵Wards: Include inpatient units denoted as wards

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

⁷Although MDCH SHARP was able to calculate a rate for each infection/event and unit combination, there were insufficient data to report all. Data will only be published for groups of five or more hospitals in order to protect hospital identity and their data.

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

⁹CLABSI: Central Line-Associated Blood Stream Infection

¹⁰CAUTI: Catheter-Associated Urinary Tract Infection

¹¹VAP : Ventilator-Associated Pneumonia

Due to low numbers in some instances, rates listed above are not considered reliable for those unit and infection/event combinations with less than five facilities contributing data. There are no national rates for MRSA or *C. diff* LabID Events available at this time. Michigan ICU/CCU CLABSI and VAP rates are much lower than national rates for the same unit type (0.65 versus 1.01 for CLABSIs, and 1.27 versus 3.22 for VAPs, respectively). In this table, ICU/CCU units were not further characterized but were grouped together as one type of unit. The Michigan Wards CLABSI rate is also much lower than the national rate (0.16 versus 1.232). The data will become more reliable as additional hospitals participate in surveillance activities with MDCH SHARP.

Conclusions

HAIs continue to be a problem in Michigan healthcare facilities and throughout the U.S. Although the numbers and rates of CLABSIs and VAPs have dropped significantly in Michigan since the introduction of interventions 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 is an initial look at Michigan HAIs using NHSN data voluntarily shared with the MDCH SHARP Unit. This data will be used as a baseline to which future quarterly and annual NHSN comparisons will be made. Note that this data from participating hospitals has not been validated. Validation studies will be conducted as additional funding becomes available. The data will also become more reliable as additional Michigan hospitals participate in this surveillance initiative.

Appendices

Acronyms

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

AHRQ	Agency for Healthcare Quality and Research
APIC	Association for Professionals in Infection Control & Epidemiology, Inc.
ARRA	American Recovery and Reinvestment Act
BCBSM	Blue Cross Blue Shield of Michigan
CAUTI	Catheter-Associated Urinary Tract Infection
CDC	Centers for Disease Control & Prevention
CDAD	<i>Clostridium difficile</i> -Associated Disease
CLABSI	Central Line-Associated Bloodstream Infection
CUSP	Comprehensive Unit-based Safety Program
DUA	Data Use Agreement
DVT	Deep Vein Thrombosis
HAI	Healthcare-Associated Infection
HHS	U.S. Department of Health & Human Services
HOB	Head of Bed
ICU	Intensive Care Unit
IRB	Internal Review Board
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
PUD	Peptic Ulcer Disease
QIO	Quality Improvement Organization
QIOSC	Quality Improvement Organization Support Center
RSBI	Rapid-Shallow Breathing Index
SCA	Specialty Care Area
SHARP	Surveillance of Healthcare-Associated & Resistant Pathogens
SOW	Scopes of Work
SSI	Surgical Site Infection
VAP	Ventilator-Associated Pneumonia

MPRO Data

MPRO holds the Centers for Medicare & Medicaid Services (CMS) contract as the Medicare Quality Improvement Agency (QIO) for the State of Michigan. CMS improves health care for all Americans through a network of 53 QIOs; one in each U.S. state, as well as the District of Columbia, Puerto Rico, and the Virgin Islands. The Quality Improvement Organization Support Center (QIOSC) supports the efforts of each of these QIOs. CMS contracts work in 3 year cycles called Scopes of Work (SOW). The 9th SOW began Aug 1, 2008 and ends July 31, 2011. Incorporated in the 9th SOW under the Patient Safety portion of the CMS contract is the MRSA/MDRO initiative.

As part of the MRSA/MDRO Initiative, MPRO has contracted with 22 hospitals of various sizes throughout the state. Each hospital was asked to pick one unit in which they would report MRSA infections for that unit using the NHSN MDRO/CDAD Module. The chosen units included medical units, medical/surgical units, and various ICUs. Participating facilities also agree to have their data viewed and analyzed by the QIOSC. The QIOSC, therefore, has the ability to gather and analyze NHSN MRSA/MDRO data from QIOs all over the nation.

Within the MDRO/CDAD Module, hospitals were asked to conduct both MRSA Infection Surveillance and Laboratory-Identified (LabID) Event Reporting for their chosen unit. Entering data in both Infection Surveillance and LabID provides participating facilities with two main metrics. Metric #1: MRSA Infection Rate and Metric #2: Hospital Onset MRSA Incidence Rate based on clinical cultures. Metric #1 is a measure of MRSA healthcare-associated infections that are not present or incubating on admission to the identified unit. Metric #2 is a proxy measure of MRSA infections based on clinical cultures that have a hospital-onset.

Participating hospitals entered MRSA Infection Surveillance and LabID Event data into NHSN monthly according to the specifications defined within the MDRO/CDAD Module protocol. Baseline data for each hospital were the first 4 months of data collected and entered in the MDRO/CDAD Module between February 1, 2009 and December 31, 2009. The state and national baseline data are reflected in Figure 2 on the next page. Re-measurement data will be the last 4 months of data entered in the MDRO/CDAD Module between January 1, 2010 and September 30, 2010. A summary of MPRO re-measurement data was not available at the time of this report.

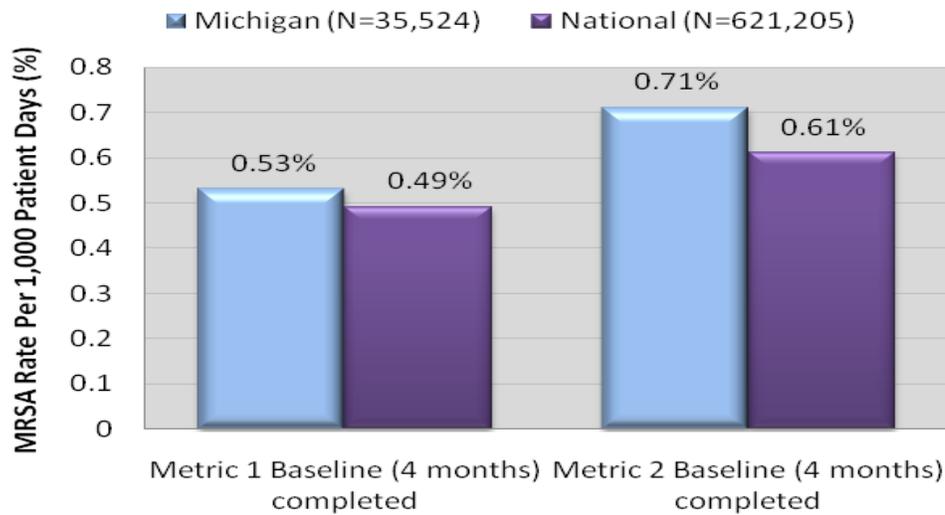
Figure 2. MPRO Baseline Data

Figure 2. MPRO works with various hospitals in Michigan on its MRSA/MDRO initiative. Figure 2 displays the Michigan and National NHSN Metric 1 and Metric 2 baselines. Baseline MRSA data was the first four months collected from February through December 2009 and did not need to be collected in consecutive months. Michigan's metrics 1 and 2 MRSA rates were 8% and 16%, respectively, greater than the national metric rates. However, the absolute differences in the rates were small (less than 1%) indicating Michigan's MRSA rates were slightly greater than the national averages.

MHA Keystone Center for Patient Safety & Quality Data

The Michigan Health & Hospital Association's (MHA) Keystone Center was created by Michigan hospitals in March 2003 and brings together hospitals, state, and national patient safety experts, and evidence-based best practices to improve patient safety. These collaborative efforts reduce costs by enhancing the quality of care delivered at the bedside. The MHA Keystone Center is unique in its ability to bring large numbers of hospitals together in a single improvement initiative by allowing unprecedented collaboration and expedited results.

Through the MHA Keystone Center, Michigan hospitals are gaining national and international prominence for their leadership and willingness to voluntarily collaborate and effectively improve patient safety and quality of care. During the past year, the MHA Keystone Center recorded nearly 3,000 member-hospital contacts through face-to-face workshops, conference calls and individual conversations. It is through these interactions that Michigan hospitals are creating and sustaining a statewide culture of patient safety.

The MHA Keystone Center is a nonprofit organization and has to date been funded by MHA-member hospitals, the Agency for Healthcare Research and Quality (AHRQ), Blue Cross Blue Shield of Michigan (BCBSM), the Centers for Disease Control and Prevention (CDC), and the Michigan Department of Community Health (MDCH). The MHA Keystone Center is based at the MHA headquarters in Lansing, Michigan.

At the heart of each collaborative is a focus on improving organizational culture using change principles and behavioral science. This intervention, called the Comprehensive Unit-based Safety Program (CUSP), integrates communication, teamwork and leadership to create and support a "harm-free" patient care culture.

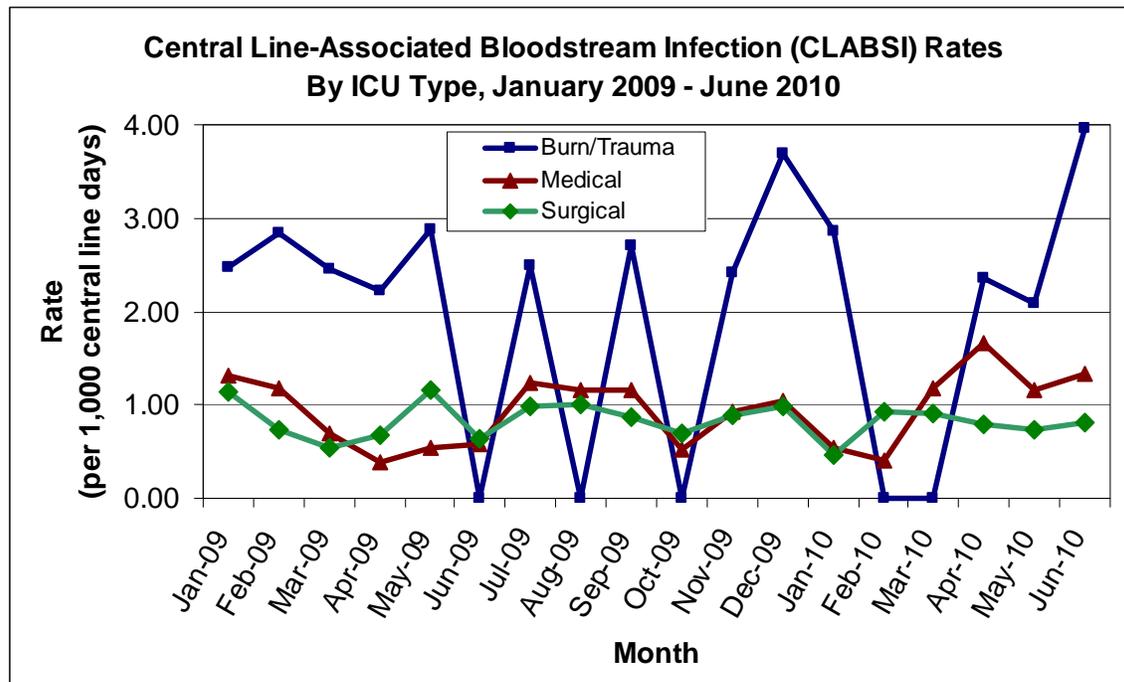
Currently, the MHA Keystone Center operates six collaboratives and is engaged in several special projects to improve patient safety and the quality of health care delivered at the bedside. The ongoing collaboratives — *MHA Keystone: ICU*, *Keystone: Gift of Life*, *Keystone: HAI*, *Keystone: Emergency Room*, *Keystone: Surgery and Keystone: Obstetrics* — have demonstrated with certainty that lives and dollars are being saved and that quality and safety are improving as a direct result of the initiatives. The success of some of the collaboratives has generated national activities seeking to replicate the results. The remaining MHA Keystone Center collaboratives, as well as additional activities currently under way with allied health care quality and safety groups, are in various phases of implementation with results to be released in the future.

MHA KEYSTONE: INTENSIVE CARE UNIT (ICU)

Launched in October 2003, *MHA Keystone: ICU* reduces central-line-associated bloodstream infections (CLABSIs) and ventilator-associated pneumonia (VAP) that occur in ICU patients. According to the federal CDC, an estimated 250,000 to 500,000 CLABSIs occur in U.S. hospitals each year, leading to longer hospital stays, increased health care costs, and a greater risk of patient death.

In most participating hospitals, the implementation team includes a senior hospital administrator, an ICU director, ICU nurse manager, ICU physician, ICU nurse, pharmacist, and department administrator. Each team commits to collecting required data, participating in regular project conference calls and attending meetings annually. Each team also agrees to implement the interventions as directed and to share what they have learned with other hospital teams.

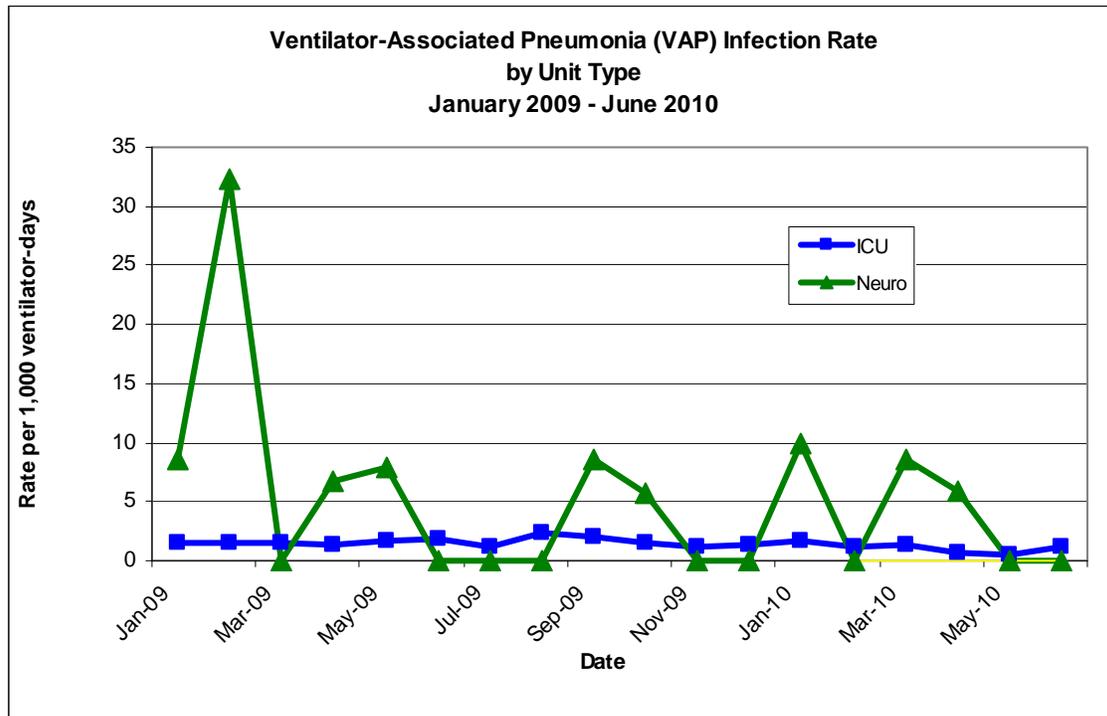
Figure 3. Central Line-Associated Bloodstream Infection (CLABSI)



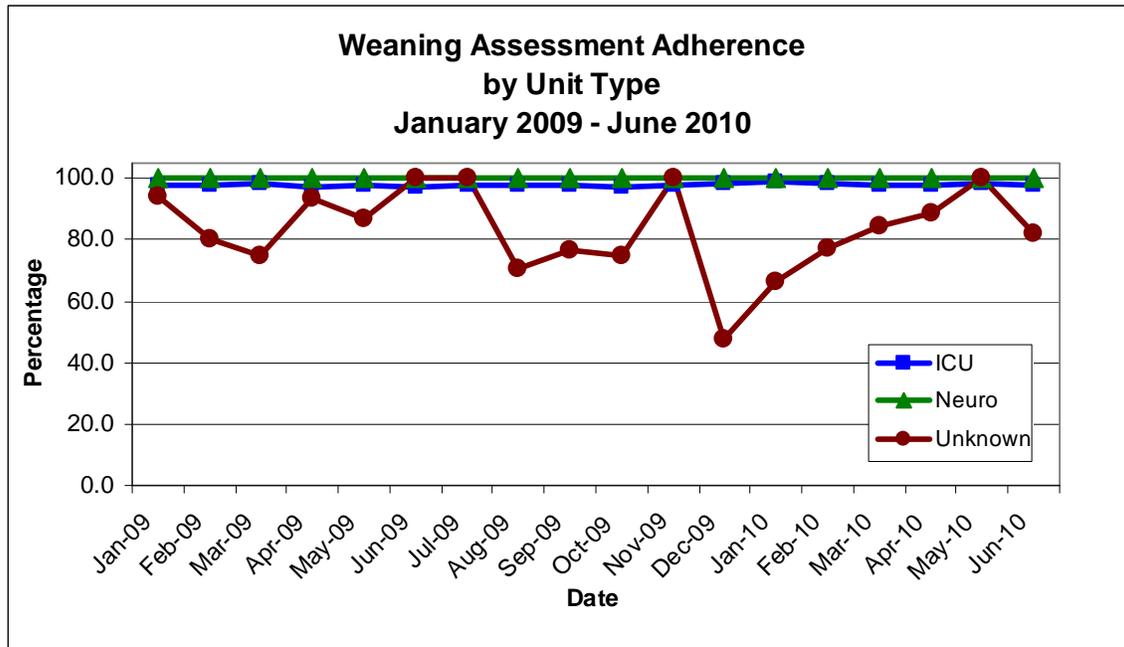
The central line-associated bloodstream infection (CLABSI) rate is reported as a rate per 1,000 central line days and is calculated by dividing the number of CLABSIs by the number of central line days and multiplying the result by 1,000. Lower rates signify better outcomes. In the above figure, Burn/Trauma includes Trauma and Burn ICUs; Medical includes Medical, Coronary, and Other ICUs (noncoded); and Surgical includes Surgical, Surgical Cardiothoracic, Neurosurgical, and Medical/Surgical ICUs. Although the CLABSI rate in the Burn/Trauma ICUs fluctuates much more than that in the Medical and Surgical ICUs, the median number of Burn/Trauma CLABSIs reported per month during January 2009 through June 2010 was one, with a maximum of two infections reported in any month.

Ventilator-associated pneumonia (VAP) prevention includes many different steps including, but not limited to: weaning assessments every 24 hours; deep vein thrombosis (DVT) prophylaxis; assessment for ability to follow commands; assessment of glucose level; patient's head of bed (HOB) elevated to at least 30°; and peptic ulcer disease (PUD) prophylaxis. Figure 4 displays the ventilator-associated pneumonia (VAP) rate per 1,000 ventilator days and Figures 5–10 show percentage adherence to prevention measures.

Figure 4. Ventilator-Associated Pneumonia (VAP) Rate

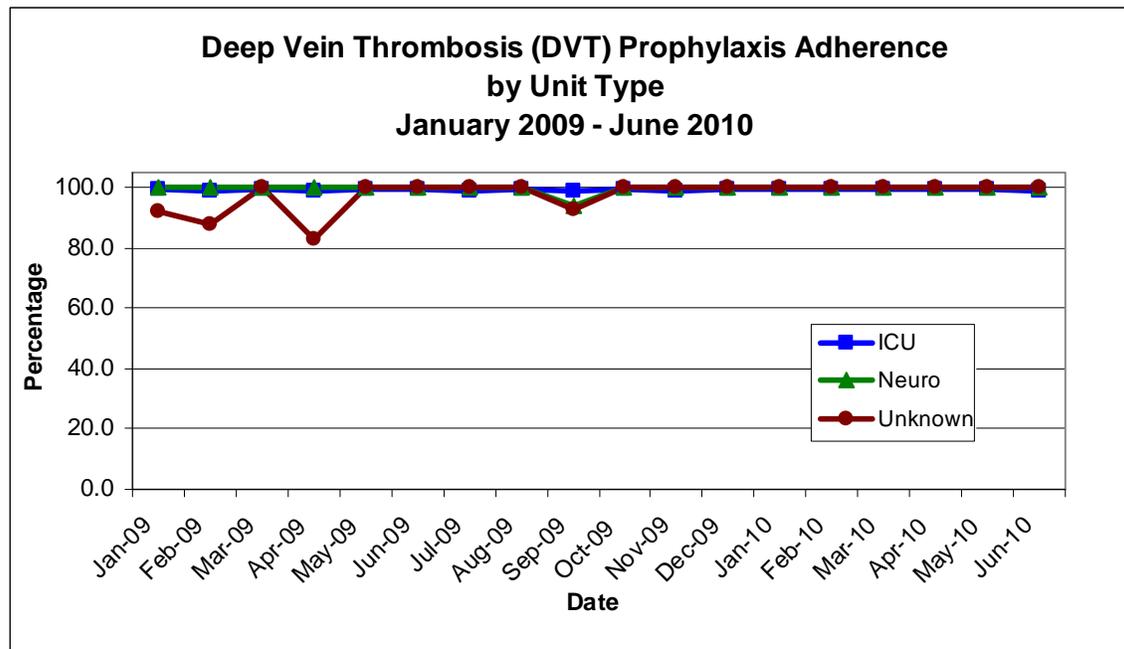


The ventilator-associated pneumonia (VAP) rate is reported as a rate per 1,000 ventilator days and is calculated by dividing the number of VAP infections by the number of ventilator days and multiplying by 1,000. Lower rates signify better outcomes. Although the VAP rate appears to fluctuate for neurologic units, the maximum number of infections reported in any month was three; all other months for which any infection was reported had only one infection. Wards where the unit type is unknown provided data during February–June, 2010 but had zero infections and, therefore, do not appear on this figure.

Figure 5. Weaning Assessment Adherence

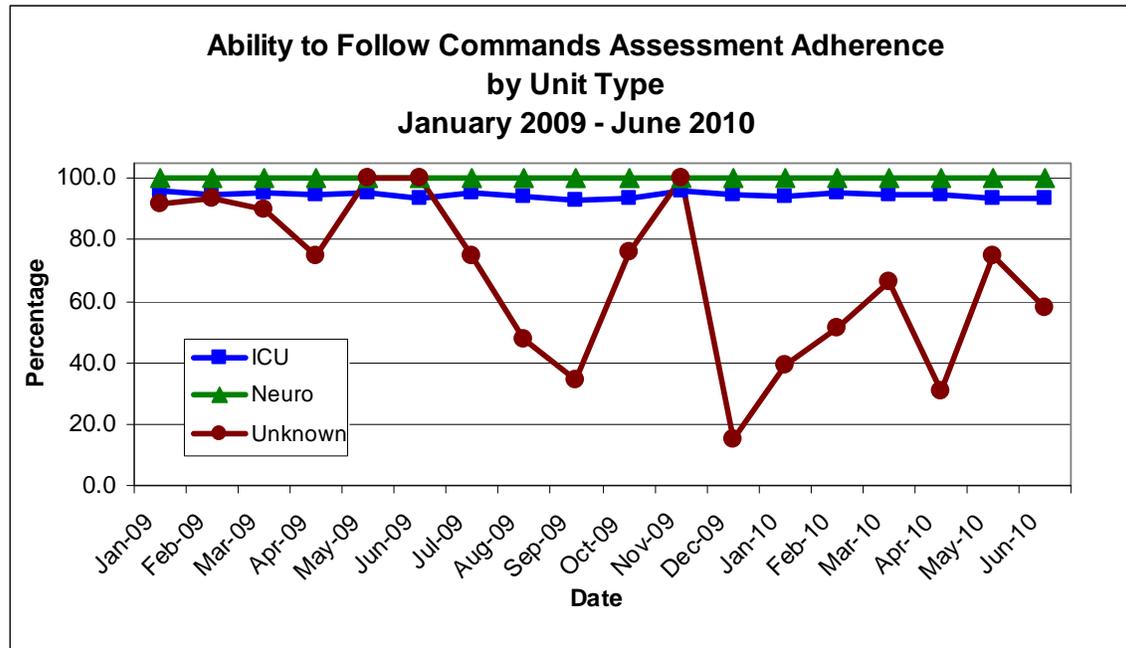
This data element intends to capture whether a weaning assessment was performed by the health care team (unless medically contraindicated) in order to determine the patient's readiness for extubation. Adherence for this element is expressed as the percentage of patients eligible for weaning assessment who received it. For the purposes of this measure, a weaning assessment is defined as either a rapid-shallow breathing index (RSBI) or trial of spontaneous breathing assessment within the last 24 hours. Neurologic wards were 100% adherent. The median ICU adherence was high at nearly 98%, while in wards where the unit type was unknown, adherence ranged from 47–100%, with a median of 83% adherence during January 2009–June 2010.

Figure 6. Deep Vein Thrombosis (DVT) Prophylaxis Adherence



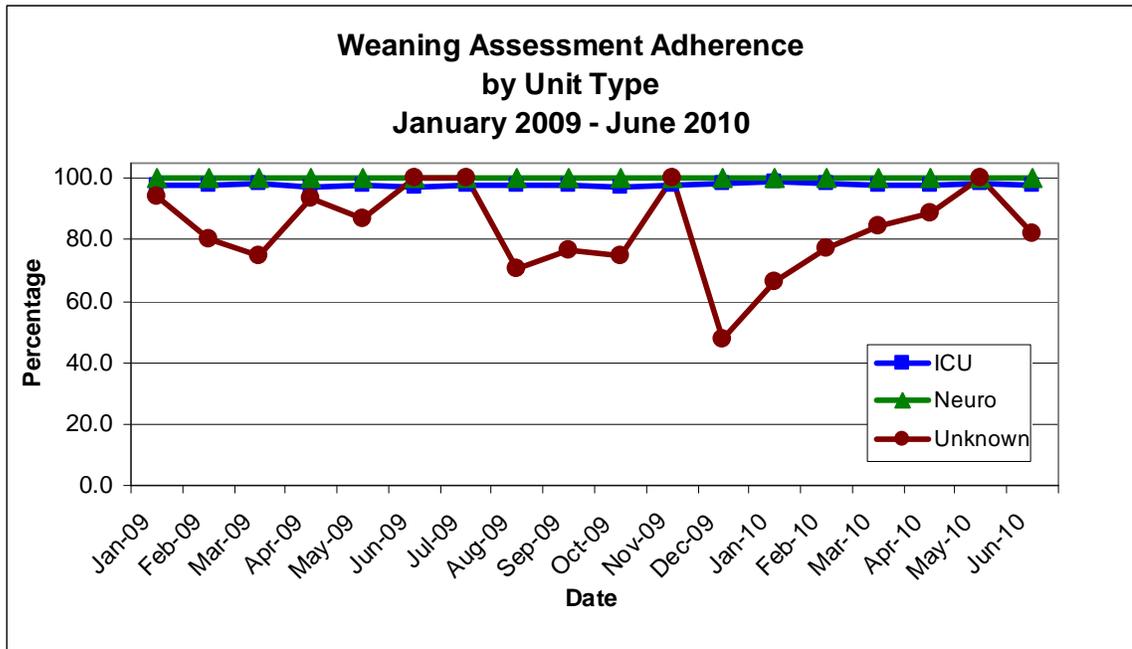
This data element intends to capture whether the patient was receiving prophylaxis for deep vein thrombosis (DVT). Adherence for this element is expressed as the percentage of patients eligible for DVT prophylaxis who received it. For the purposes of this measure pharmacological DVT prophylaxis is defined as the use of any of the following drugs: subcutaneous Heparin infusion, Ardeparin (*Normoflo*), Dalteparin (*Fragmin*), Enoxaparin (*Lovenox*), Tinzapirin (*Innohep*), Argatroban, Bivalirudin (*Angiomax*), Lepirudin (*Refludan*), Fondaparinux (*Arixtra*), Danaparoid (*Orgaran*), and Warfarin (*Coumadin*). It should be noted that to meet the intent of this measure, the use of listed drugs is not dose or regimen dependent. Therapeutic anticoagulation would meet (and exceed) the requirements for DVT prophylaxis. Neurologic wards were 100% adherent except in September 2009 when they fell to 94%. In wards where the unit type was unknown, adherence was 100% after October 2009. The median ICU adherence was quite stable at 99% during the period.

Figure 7. Ability to Follow Commands Assessment Adherence

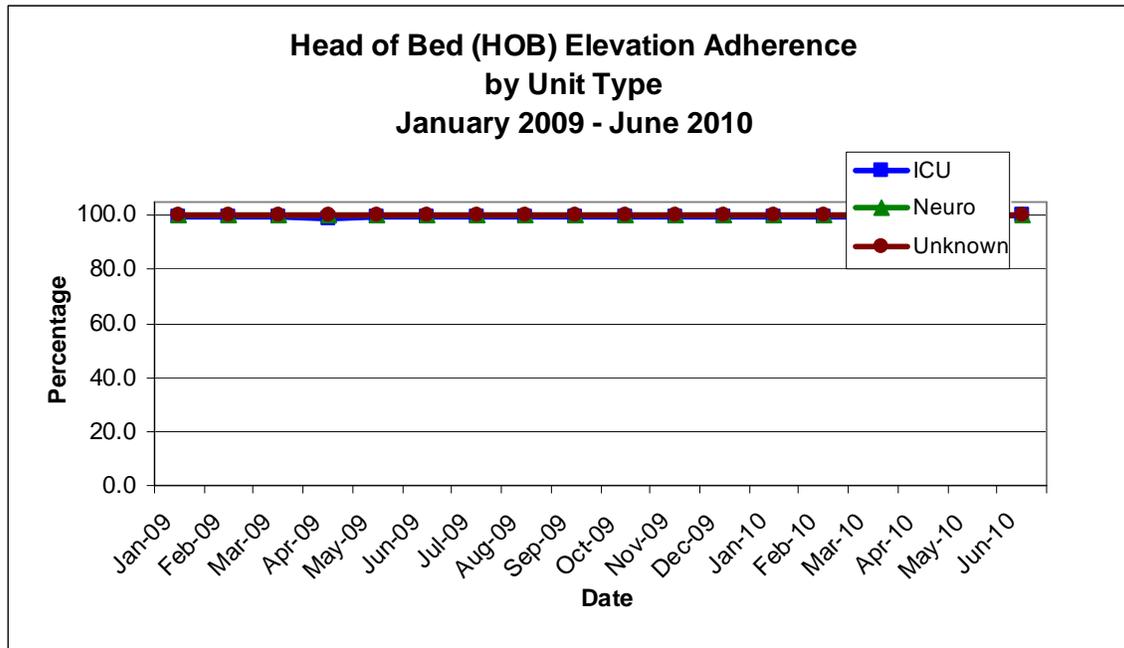


This data element intends to capture whether the patient received an opportunity to follow commands (i.e., patient received a sedation holiday or had sedation lightened), not whether the patient was able to follow commands when prompted. Adherence for this element is expressed as the percentage of patients assessed. For the purposes of this measure, “following commands” is defined as the patient being awake enough such that he/she was able to respond to simple commands. Neurologic wards were 100% adherent. The median ICU adherence was high at nearly 95%, while in wards where the unit type was unknown, adherence ranged from 14–100%, with a median of 75% adherence.

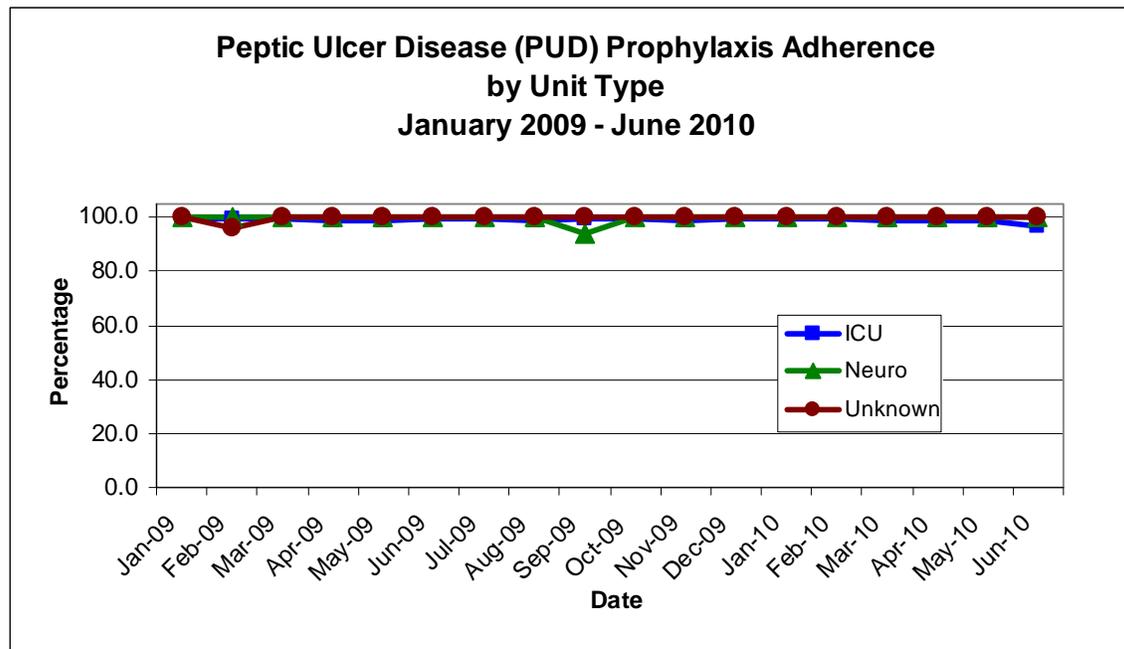
Figure 8. Glucose Level Assessment Adherence



This data element intends to capture whether the patient's glucose level was checked. Adherence for this element is expressed as the percentage of patients whose glucose level was checked in the previous 24 hours. Neurologic wards were 100% adherent. The median ICU adherence was high at nearly 98%, while in wards where the unit type was unknown, adherence ranged from 71–100%, with a median of 96% adherence during January 2009–June 2010.

Figure 9. Head of Bed Elevation Adherence

This data element intends to capture whether the patient's head of bed was elevated at the time of rounding to at least 30°, unless medically contraindicated. Contraindications to elevating the head of the bed include the following: spinal fractures, recent (during this hospitalization and prior to ICU admission) back surgery/procedure with an order to be flat, acute onset hypotension, patients on balloon pumps, pelvic fractures, patients in any bed where the head of the bed cannot be physically elevated (including a rotating pulmonary bed), or other reasons documented by the physician, nurse practitioner, and/or physician assistant. Adherence is expressed as the percentage of patients eligible for head of bed elevation whose head of bed was appropriately elevated. Neurologic wards and wards with unknown unit type both reported 100% adherence, although neuro cannot be seen in the figure because it overlaps with unknown unit types. The adherence rate among ICUs was greater than 99% and rose fairly steadily over the period analyzed.

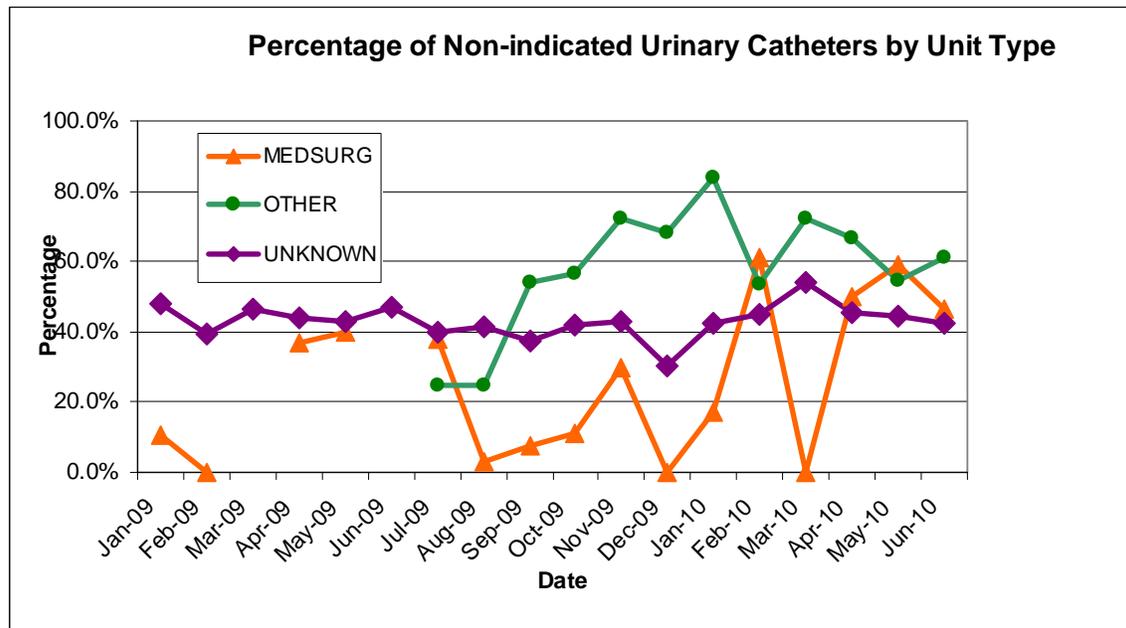
Figure 10. Peptic Ulcer Disease (PUD) Prophylaxis Adherence

This data element intends to capture whether the patient was receiving prophylaxis for peptic ulcer disease (PUD). Adherence for this element is expressed as the percentage of patients eligible for PUD prophylaxis who received it. For the purposes of this measure, PUD prophylaxis is defined as the use of any of the following drugs: Cimetidine (*Tagamet*), Famotidine (*Pepcid*), Nizatidine (*Axid*), Ranitidine (*Zantac*), Rabendazole (*Aciphex*), Esomeprazole (*Nexium*), Lansoprazole (*Prevacid*), Omeprazole (*Prilosec*), Pantoprazole (*Protonix*), and Sucralfate (*Carafate*). It should be noted that to meet the intent of this measure, the use of the listed drugs is not dose or regimen dependent. Neurologic wards were 100% adherent except in September 2009 when they decreased to 94%. In wards where the unit type was unknown, adherence was 100% except in February 2009 when it was 96%. The median ICU adherence was 99% during the period, but declined slightly in May and June 2010.

MHA KEYSTONE: HOSPITAL-ASSOCIATED INFECTION (HAI)

MHA *Keystone: HAI* launched statewide in 2007 to prevent HAIs, starting with a strategic and manageable list of targeted infections. Only interventions feasible at the bedside and consistent with evidence for scientific merit are used in this program. Interventions include a focus on reducing catheter-associated urinary tract infections (CAUTI) and avoiding CLABSIs.

The CAUTI interventions have now been divided into two separate prevention bundles. The first bundle involves the timely removal of nonessential catheters and appropriate care of necessary catheters. A second bundle of interventions addresses the insertion of catheters, including both appropriate placement and proper insertion technique. Figure 11 displays the percentage of nonessential, or unnecessary, urinary catheters over time.

Figure 11. Nonessential Urinary Catheters

Nonessential urinary catheters are expressed as a percentage of patients with indwelling urinary catheters whose catheters were not indicated for medical care. Indicated reasons for an indwelling urinary catheter are: acute urinary retention or obstruction, perioperative use in selected surgeries, assistance with healing of perineal and sacral wounds in incontinent patients, hospice/comfort/ palliative care, required immobilization for trauma or surgery, chronic indwelling urinary catheter on admission, and accurate measurement of urinary output in the critically ill patient. In the above figure, Medsurg includes Surgical, Medical/Surgical, and Medical/Neurosurgical; Other includes Other, Telemetry, and Rehabilitation; Unknown indicates that the unit type is unknown.

According to the MHA Keystone Center protocol, pre-intervention data are collected for 5 working days during weeks 1–3 (15 days total), intervention data for 10 working days during weeks 5 and 6, post-intervention data are collected one day weekly for weeks 7–12, and sustainability data are collected for 5 consecutive working days quarterly for 5 quarters. This protocol accounts for the sporadic data visible above (e.g., non-continuous lines). Medsurg units have the lowest percentages of nonessential urinary catheters, while Other units appear to have the highest percentages.