



# Hospital Compare Quality Measure Results for Michigan CAHs, 2018

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## KEY FINDINGS

- Compared to all other CAHs nationally, Michigan's CAHs reported at a rate that was higher for inpatient measures (97.2% of CAHs vs. 92.9% nationally) and higher for outpatient measures (100.0% of CAHs vs. 87.4% nationally).
- Michigan's CAHs rank #22 for inpatient measure reporting and #1 for outpatient measure reporting among the 45 states participating in the Flex Program.
- Compared to scores on inpatient and outpatient measures for all other CAHs nationally in 2018, Michigan's CAHs scored significantly higher on 4 measures, significantly lower on 3 measures, did not have significantly different performance on 6 measures, and had insufficient data to compare 1 measure.

## BACKGROUND

Since 2004, acute care hospitals paid under the Medicare Prospective Payment System (PPS) have had a financial incentive to publicly report quality measure data on the Centers for Medicare & Medicaid Services' (CMS) Hospital Compare website. Although Critical Access Hospitals (CAHs) do not have the same financial incentives as PPS hospitals to participate, the Hospital Compare initiative provides an important opportunity for CAHs to publicly report, assess and improve their performance on national standards of care. The Flex Monitoring Team's (FMT) annual reports summarize CAH reporting and performance for these quality improvement measures.

In 2018, the Federal Office of Rural Health Policy (FORHP) began requiring CAHs to report antibiotic stewardship measure data as a part of their Medicare Beneficiary Quality Improvement Project (MBQIP). Antibiotic stewardship data are reported to the Centers for Disease Control and Prevention's (CDC's) National Healthcare Safety Network (NHSN) and not to Hospital Compare. Antibiotic stewardship can be a critical component of hospital quality improvement strategy and these NHSN data are now included as an inpatient measure in the Flex Monitoring Team's annual reports and analysis.

This report is part of a series of 45 annual state-level reports that examine CAH participation in Hospital Compare, quality measure results, and trends.<sup>1</sup> This set of state reports focus on data for inpatient, outpatient, and structural measures for calendar year 2018. State reports on Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) data for the same time period were previously released.<sup>2</sup>



## DATA AND APPROACH

Data from the following sources were included in this report:

- Publicly-available Hospital Compare data downloaded from the CMS Hospital Compare website on inpatient and outpatient process of care measures, healthcare-associated infection (HAI) measures, and structural measures for 2018.
- Suppressed Hospital Compare data for 2018 for which CAHs reported ten or fewer cases, made available by FORHP for this aggregate analysis.
- Antibiotic stewardship measures data for 2018 from the CDC's NHSN Patient Safety Component—Annual Hospital Survey, made available by FORHP.

Since the last set of CAH state reports, one inpatient measure, four outpatient measures, and three structural measures were removed from Hospital Compare. Reports this year have added HAI data that have been reported in Hospital Compare previously, and antibiotic stewardship data from the CDC. This report includes 13 process of care measures, six HAI measures, two structural measures, and one antibiotic stewardship measure that are potentially relevant to CAHs and for which some CAHs nationally have reported data; some states do not have any CAHs reporting some of these measures. Definitions of the measures used in the report are provided on pages 8–10.

### Reporting

The number of CAHs reporting any inpatient quality measure, any outpatient quality measure, and each individual quality improvement measure were assessed. CAHs were considered reporting for inpatient or outpatient process of care measures or HAI measures if they reported data for that measure with a denominator of one or more. Data submitted with a zero or null response were not considered reporting. To be included as reporting for antibiotic stewardship, CAHs had to respond yes to one or more questions in the

NHSN survey related to antibiotic stewardship. CAHs that answered no or left all of the antibiotic stewardship questions blank were not counted for antibiotic stewardship. Antibiotic stewardship and HAI measure data were included in inpatient reporting calculations for the first time in this report.

### Performance

For the inpatient and outpatient process of care measures (except the median time process of care measures), performance was measured as the percentage of patients that received recommended care for each measure, which was calculated by dividing the total number of patients in all CAHs in the state who received the recommended care by the total number of eligible patients in all CAHs in the state. Performance for all other CAHs was calculated by dividing the total number of patients in all CAHs outside of the state who received recommended care by the total number of eligible patients in all other CAHs.

State performance was then compared to the performance for all other CAHs using Chi-square tests ( $p < 0.05$ ). The results of the state performance comparisons were classified as: 1) insufficient data (less than 25 total patients); 2) not significantly different than CAHs in all other states; 3) significantly better than all other CAHs; or 4) significantly worse than all other CAHs. The percent of CAH patients receiving recommended care was not reported when the total number of CAH patients in a state (or all other CAHs) with data on a measure was less than 25.

Antibiotic stewardship performance was measured as the percentage of CAHs that fulfilled all seven core elements of an antibiotic stewardship program. The questions in the NHSN address different activities CAHs can participate in to fulfill the core elements. The state-level performance on antibiotic stewardship was compared to the performance of all other CAHs nationally using Fisher's exact test.

Median scores were calculated for median time process measures by first arranging the median time from



all available quarterly data together from all CAHs nationally. Then, the middle value was selected. On the median time measures, lower scores, indicating shorter median times, are better. Wilcoxon-Mann-Whitney tests were used to compare the median times for CAHs in each state and all other CAHs.

For each structural measure, the percentages of CAHs in Michigan and all other states that reported no data, and those that reported yes or no on each measure, were calculated.

Performance for each HAI measure was calculated using Standardized Infection Ratios (SIRs). SIRs are a ratio of the total number of infections observed in 2018 divided by the predicted number of annual infections. Predicted number of infections data are calculated and made available by the CDC. SIRs can only be calculated when there are one or more predicted infections for the time period. A lower SIR indicates better performance.

Significance tests comparing state HAI performance to the performance of all other CAHs were not performed because the majority of states did not meet the conditions for statistical comparisons: at least one predicted infection and the state's predicted number of infections multiplied by the SIR of all other CAHs must be equal to or greater than one.

The quality improvement data in this report include several measures that are also measures for MBQIP. Although the majority of CAHs report data on these measures to both Hospital Compare and MBQIP, the data in this report may differ from MBQIP reports because some CAHs only report data to one of these programs.

## RESULTS

### Reporting

As in previous years, the percent of CAHs reporting inpatient and outpatient quality data varied considerably across states. In Michigan, 97.2% of the 36 CAHs reported data on at least one inpatient quality measure

for discharges in 2018. 100.0% of the 36 CAHs in Michigan reported data on at least one outpatient quality measure for discharges in 2018 (Figure 1).

Figure 2 compares the respective inpatient and outpatient reporting rates over time (2015 through 2018) among CAHs in four groups: those in Michigan, all CAHs nationally, other states with a similar number of CAHs as Michigan, and other states located in the same HRSA geographic region as Michigan.

Tables 1 and 2 compare the respective inpatient and outpatient reporting rates of CAHs in Michigan to those located in the other 44 states participating in the Flex Program as well as the rate for all CAHs nationally. The Michigan CAH inpatient reporting rate of 97.2% ranks #22 nationally; the Michigan CAH outpatient reporting rate of 100.0% ranks #1 nationally.

The number of CAHs reporting individual inpatient and outpatient quality measures may differ by measure for several reasons. Some measures only apply to a portion of patients; others exclude patients with contraindications, or only apply to conditions not treated or procedures not performed in some CAHs.

### Performance

Table 3 displays the results for inpatient and outpatient process of care results, as well as antibiotic stewardship data, for 2018 for CAHs in Michigan and all other CAHs. Table 4 displays results for median time measures (lower scores, indicating shorter median times, are better). Table 5 provides structural quality measure results for CAHs in Michigan and all other CAHs nationally that reported data for 2017. Nationally, at least 65% of CAHs did not report structural quality measure data.

Finally, SIR performance 2018 results for the six HAI measures are shown in Table 6 for Michigan. Comparisons to other states are not provided because the majority of states did not meet the conditions for statistical comparisons.



### TOOLS AND RESOURCES

The FMT provides free access to all publications on our website, [www.flexmonitoring.org](http://www.flexmonitoring.org), including a series of policy briefs on evidence-based QI programs and strategies that could be implemented by CAHs.

The Technical Assistance and Services Center (TASC) provides resources for State Flex Programs and CAHs on their website. Previous state-level quality measures and HCAHPS reports are also available on the FMT website.

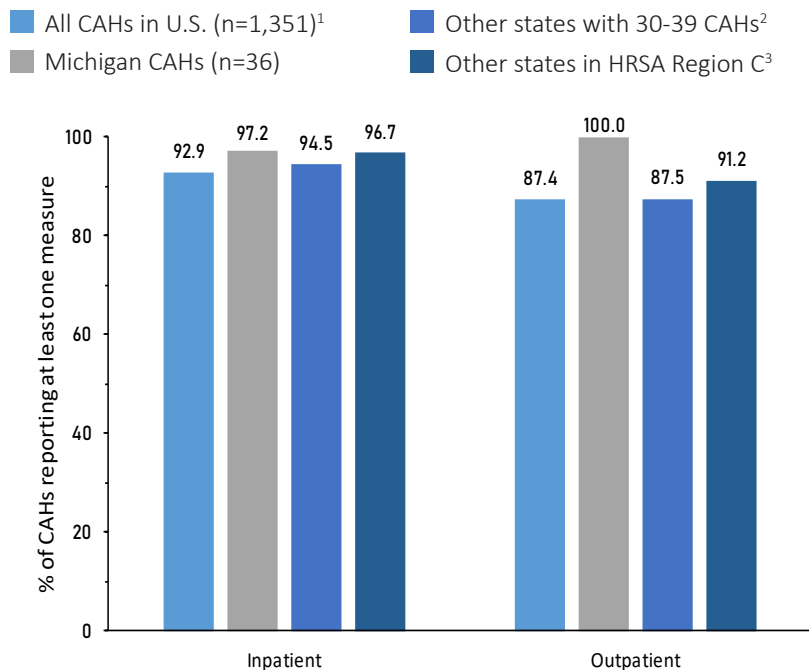
TASC also provides resources for State Flex Programs and CAHs on their website. For profiles of State Flex Programs, State Contacts, and examples of Flex activities to support quality improvement, visit [www.ruralcenter.org/tasc/flexprofile](http://www.ruralcenter.org/tasc/flexprofile).

For resources focused on the Medicare Beneficiary Quality Improvement Program (MBQIP), visit [www.rural-center.org/tasc/mbqip](http://www.rural-center.org/tasc/mbqip).

### REFERENCES

1. The Flex Monitoring Team has published national Hospital Compare reports since 2006. All are available for download at [www.flexmonitoring.org/publications/annual-hospital-compare-results/](http://www.flexmonitoring.org/publications/annual-hospital-compare-results/).
2. Quick M, Lahr M, Chantarat T, Moscovice IS. Patients’ experiences in CAHs: HCAHPS results, 2018. [www.flexmonitoring.org/publications/patients-experienes-in-cahs-hcahps-results-2018/](http://www.flexmonitoring.org/publications/patients-experienes-in-cahs-hcahps-results-2018/). Published January 2020. Accessed March 1, 2020.

**FIGURE 1.** CAH Participation in Hospital Compare, 2018<sup>1</sup>



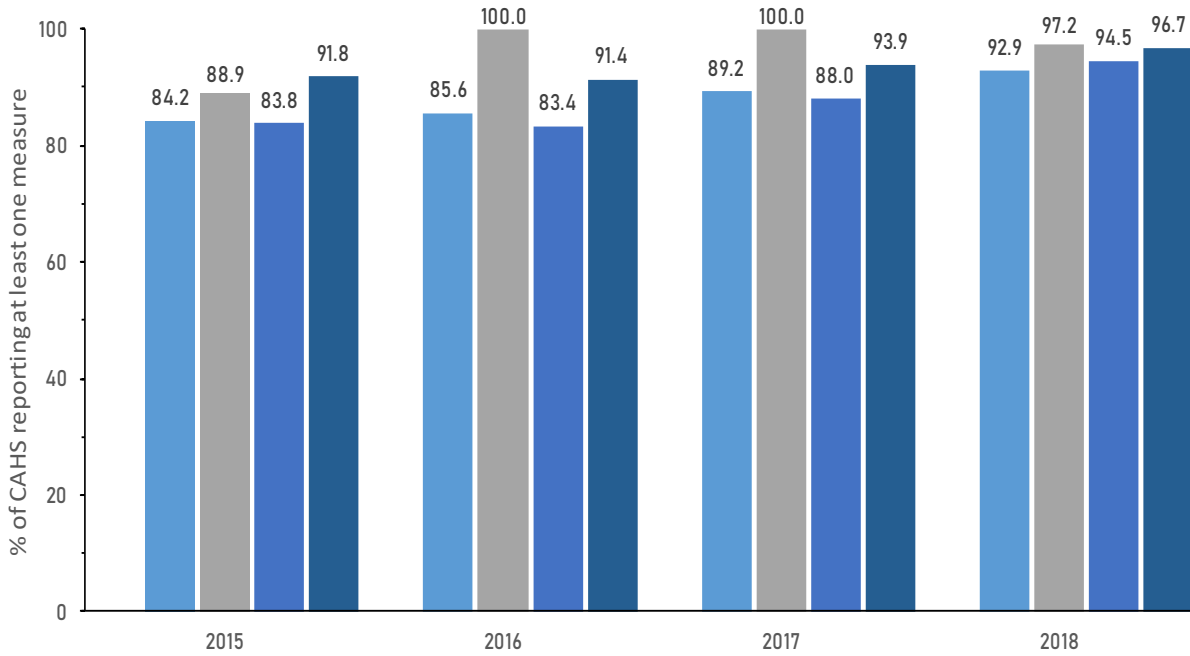
1. Percentage of CAHs in each state or group of states reporting data to Hospital Compare on at least one measure.  
 2. Group includes states with 30-39 CAHs: CA (34), CO (32), GA (30), IN (35), MO (36), MS (31), ND (36), OH (33), SD (38), WA (39).  
 3. HRSA Region C include: IA (82), IL (51), IN (35), KS (84), MN (78), MO (36), NE (64), OH (33), WI (58).



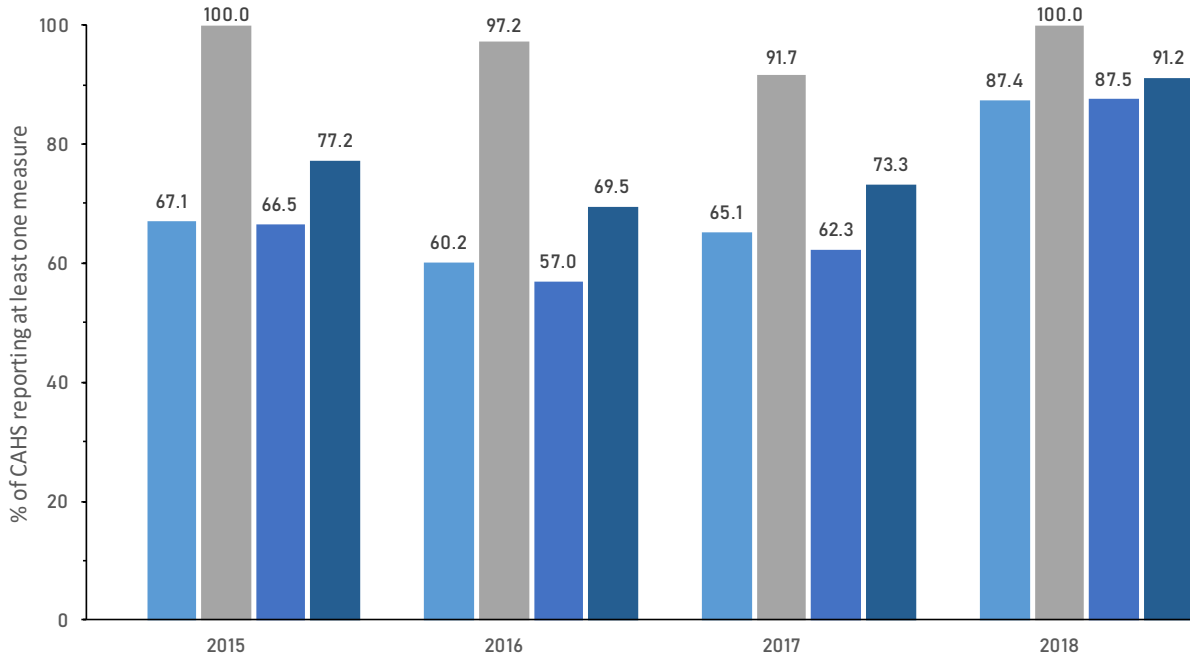
**FIGURE 2.** CAH Participation in Hospital Compare for Inpatient and Outpatient Discharges, 2018

■ All CAHs in U.S. (n=1,351)<sup>1</sup>      ■ Other states with 30-39 CAHs<sup>2</sup> (n=344)  
■ Michigan CAHs (n=36)            ■ Other states in HRSA Region C<sup>3</sup> (n=521)

**Inpatient Discharges**



**Outpatient Discharges**



1. Listed N values refer to most recent data (2018) only.  
 2. Group includes states with 30-39 CAHs: CA (34), CO (32), GA (30), IN (35), MO (36), MS (31), ND (36), OH (33), SD (38), WA (39).  
 3. HRSA Region C include: IA (82), IL (51), IN (35), KS (84), MN (78), MO (36), NE (64), OH (33), WI (58).



# Michigan Hospital Compare Quality Measure Results for CAHs, 2018

**TABLE 1.** State Ranking of CAH Reporting Rates for Inpatient Quality Measures, 2018

Rank	State	CAHs reporting	% of CAHs
1	Minnesota	78	100.0
1	Wisconsin	58	100.0
1	Illinois	51	100.0
1	South Dakota	38	100.0
1	North Dakota	36	100.0
1	Georgia	30	100.0
1	Arkansas	29	100.0
1	Oregon	25	100.0
1	West Virginia	20	100.0
1	Maine	16	100.0
1	Wyoming	16	100.0
1	Pennsylvania	15	100.0
1	Alaska	14	100.0
1	New Hampshire	13	100.0
1	Vermont	8	100.0
1	Virginia	7	100.0
1	Alabama	4	100.0
1	South Carolina	4	100.0
1	Massachusetts	3	100.0
20	Nebraska	63	98.4
21	Washington	38	97.4
<b>22</b>	<b>Michigan</b>	<b>35</b>	<b>97.2</b>
23	Indiana	34	97.1
24	Kansas	81	96.4
25	Kentucky	26	96.3
26	Iowa	78	95.1
27	North Carolina	19	95.0
28	California	32	94.1
29	Ohio	31	93.9
30	Colorado	30	93.8
30	Tennessee	15	93.8
	<b>All CAHs</b>	<b>1,255</b>	<b>92.9</b>
32	Idaho	25	92.6
33	Utah	12	92.3
34	New Mexico	9	90.0
35	New York	16	88.9
36	Montana	42	87.5
37	Nevada	11	84.6
38	Mississippi	26	83.9
39	Missouri	30	83.3
40	Oklahoma	33	82.5
41	Florida	9	75.0
42	Texas	62	72.9
43	Louisiana	18	66.7
43	Arizona	10	66.7
45	Hawaii	5	55.6

**TABLE 2.** State Ranking of CAH Reporting Rates for Outpatient Quality Measures, 2018

Rank	State	CAHs reporting	% of CAHs
1	Minnesota	78	100.0
1	Nebraska	64	100.0
<b>1</b>	<b>Michigan</b>	<b>36</b>	<b>100.0</b>
1	Georgia	30	100.0
1	Arkansas	29	100.0
1	Idaho	27	100.0
1	Pennsylvania	15	100.0
1	New Hampshire	13	100.0
1	Nevada	13	100.0
1	Hawaii	9	100.0
1	Virginia	7	100.0
1	Alabama	4	100.0
1	South Carolina	4	100.0
14	Wisconsin	57	98.3
15	Washington	37	94.9
16	Missouri	34	94.4
16	New York	17	94.4
18	Indiana	33	94.3
19	Maine	15	93.8
19	Tennessee	15	93.8
21	Kansas	78	92.9
22	Oklahoma	37	92.5
23	Utah	12	92.3
24	North Dakota	33	91.7
25	North Carolina	18	90.0
25	West Virginia	18	90.0
27	Ohio	29	87.9
28	Montana	42	87.5
	<b>All CAHs</b>	<b>1,181</b>	<b>87.4</b>
29	Arizona	13	86.7
30	Colorado	27	84.4
31	South Dakota	31	81.6
32	Wyoming	13	81.3
33	Iowa	66	80.5
34	Oregon	20	80.0
34	New Mexico	8	80.0
36	Mississippi	23	74.2
37	Texas	61	71.8
38	Illinois	36	70.6
38	California	24	70.6
40	Florida	8	66.7
40	Massachusetts	2	66.7
42	Alaska	9	64.3
43	Louisiana	17	63.0
44	Kentucky	16	59.3
45	Vermont	3	37.5



**TABLE 3.** Inpatient and Outpatient Process of Care Results for Patients Discharged from CAHs in Michigan and All Other States, 2018

■ Significantly better than rate for all other CAHs nationally (p<.05)
 ■ Significantly worse than rate for all other CAHs nationally (p<.05)

	Code	Description	MI (n=36)		All other CAHs (n=1,315)	
			CAHs reporting	% of patients <sup>1</sup>	CAHs reporting	% of patients <sup>1</sup>
Inpatient	OP-27/IMM-3 <sup>†</sup>	Healthcare workers given influenza vaccination	34	92.1	950	90.3
	PC-01 <sup>‡</sup>	Early elective delivery (lower is better)	2	0.0	204	3.2
	VTE-6	Incidence of potentially-preventable VTE (lower is better)	6	*	121	*
	ABX <sup>†</sup>	Fulfills antibiotic stewardship core elements	31	64.5	1,049	74.4
		Description	CAHs reporting	% of patients <sup>1</sup>	CAHs reporting	% of patients <sup>1</sup>
Outpatient	OP-2 <sup>†</sup>	Fibrinolytic therapy received within 30 minutes	19	59.0	467	50.8
	OP-22 <sup>†</sup>	Patient left without being seen (lower is better)	27	1.0	773	1.0
	OP-23	Received head CT scan interpretation within 45 minutes	17	60.4	671	61.5
	OP-29	Appropriate follow-up interval, colonoscopy, average-risk patients	2	93.9	218	89.5
	OP-30	Appropriate follow-up interval, colonoscopy, patients with polyps	2	93.6	217	93.3

1. Rates without highlights were not significantly different from comparable rates in all CAHs nationally.

\* Insufficient data to calculate rate (<25 patients).

† MBQIP core measure, FY 2018-21 (this table shows Hospital Compare data)

‡ MBQIP additional measure, FY 2018-21 (this table shows Hospital Compare data)

**TABLE 4.** Median Time to Patients Receiving Recommended Care at CAHs in Michigan and All Other States, 2018

■ Significantly better than rate for all other CAHs nationally (p<.05)
 ■ Significantly worse than rate for all other CAHs nationally (p<.05)

Code	Description	MI (n=36)		All other CAHs (n=1,315)	
		CAHs reporting	Minutes <sup>1</sup>	CAHs reporting	Minutes <sup>1</sup>
ED-1b	Median time from ED admission to ED departure for admitted patients	28	224.5	974	190.5
ED-2b <sup>†</sup>	Admit decision time to ED departure time for admitted patients	28	52.0	964	44.0
OP-3b <sup>†</sup>	Median time to transfer to another facility- acute coronary intervention	17	55.0	583	69.0
OP-5 <sup>†</sup>	Median time to ECG	36	7.0	1,050	7.5
OP-18b <sup>†</sup>	Median time from ED arrival to ED departure for discharged patients	36	114.0	1,046	105.5

1. Median minutes to receiving care. Lower is better for all measures. Rates without highlights were not significantly different from comparable rates in all CAHs nationally.

\* Insufficient data to calculate rate (<25 patients)

† MBQIP core measure, FY 2018-21 (this table shows Hospital Compare data)

‡ MBQIP additional measure, FY 2018-21 (this table shows Hospital Compare data)



**TABLE 5.** Structural Quality Measures Reported by CAHs in Michigan and All Other States, 2018

Code	Description	MI (n=36)			All other CAHs (n=1,315)		
		No data	No	Yes	No data	No	Yes
OP-12	Ability to receive lab data directly to certified EHR	69.4	0.0	30.6	65.6	1.9	32.5
OP-17	Ability to track clinical results between visits	69.4	0.0	30.6	66.3	2.0	31.7

**TABLE 6.** Healthcare-Associated Infection Measures Reported by CAHs in Michigan, 2018

Code	Description	CAHs reporting	State SIR
HAI-1 <sup>‡</sup>	Central-line associated bloodstream infections (CLABSI)	24	*
HAI-2 <sup>‡</sup>	Catheter-associated urinary tract infections (CAUTI)	29	0.2
HAI-3 <sup>‡</sup>	Surgical site infections from colon surgery (SSI:C)	12	0.2
HAI-4 <sup>‡</sup>	Surgical site infections from abdominal hysterectomy (SSI:H)	6	*
HAI-5 <sup>‡</sup>	Methicillin-resistant Staphylococcus Aureus (MRSA) blood infections	28	*
HAI-6 <sup>‡</sup>	Clostridium difficile (C.diff) intestinal infections	27	0.3

1. SIRs are a ratio of the total number of infections observed in 2018 divided by the predicted number of annual infections

‡ MBQIP additional improvement measure, FY 2018-21 (this table shows Hospital Compare data)

\* Insufficient data to calculate SIR

-- No data available for this measure

## DEFINITIONS OF MEASURES

Note: higher numbers reflect better performance, except where indicated below.

- **ED-1b, Admit Decision Time to Emergency Department (ED) Departure Time for Admitted Patients:** Median time from admit decision time to time of departure from the ED for patients admitted to inpatient status (a lower number is better).
- **ED-2b, Median Time from Emergency Department (ED) Arrival to ED Departure for Admitted Patients:** Median time from ED arrival to time of departure from the ED for patients admitted to the facility from the ED (a lower number is better).
- **OP-2, Fibrinolytic therapy received within 30 minutes of arrival: Acute Myocardial Infarction (AMI)** patients receiving fibrinolytic therapy during the hospital stay and having a time from hospital arrival to fibrinolysis of 30 minutes or less.
- **OP-3b, Median Time to Transfer to Another Facility for Acute Coronary Intervention:** Median number of minutes before outpatients with heart attack who needed specialized care were transferred to another hospital (a lower number is better).
- **OP-5, Median Time to echocardiogram (ECG):** Median number of minutes before outpatients with heart attack (or with chest pain that suggests a possible heart attack) got an ECG (a lower number is better).





- **OP-12, Ability to Receive Lab Data Directly to Electronic Health Record (EHR):** The ability for providers with Health Information Technology (HIT) to receive laboratory data directly into their ONC-certified EHR system as discrete searchable data.
- **OP-17, Ability to Track Clinical Results between Visits:** The ability for a facility to track pending laboratory tests, diagnostic studies, or patient referrals through the ONC-certified Electronic Health Record (EHR) system.
- **OP-18b, Median Time from Emergency Department (ED) Arrival to ED Departure for Discharged Patients:** Median time from ED arrival to time of departure from the ED for patients discharged from the ED (a lower number is better).
- **OP-22, Left Without Being Seen:** Percent of patients who leave the Emergency Department (ED) without being evaluated by a physician, advanced practice nurse (APN), or physician's assistant (PA) (a lower number is better).
- **OP-23, Head CT or MRI Scan Results for Acute Ischemic Stroke or Hemorrhagic Stroke Patients who Received Head CT or MRI Scan Interpretation Within 45 Minutes of Emergency Department (ED) Arrival:** Percentage of acute ischemic stroke or hemorrhagic stroke patients who arrive at the ED within 2 hours of the onset of symptoms who have a head CT or MRI scan performed during the stay and have interpretation of the CT or MRI scan within 45 minutes of arrival.
- **OP-27 / IMM-3, Health Care Workers Given Influenza Vaccination:** Facilities must report vaccination data for three categories of Healthcare Personnel (HCP): employees on payroll; licensed independent practitioners (who are physicians, advanced practice nurses, and physician assistants affiliated with the hospital and not on payroll); and students, trainees, and volunteers aged 18 or older. Only HCP physically working in the facility for at least one day or more between October 1 and March 31 should be counted. Data on vaccinations received at the facility, vaccinations received outside of the facility, medical contraindications, and declinations are reported for the three categories of HCP.
- **OP-29, Appropriate Follow-up Interval for Normal Colonoscopy in Average Risk Patients:** Percentage of patients aged 50 to 75 years of age receiving a screening colonoscopy without biopsy or polypectomy who had a recommended follow-up interval of at least 10 years for repeat colonoscopy documented in their colonoscopy report.
- **OP-30, Colonoscopy Interval for Patients with a History of Adenomatous Polyps:** Percentage of patients aged 18 years and older receiving a surveillance colonoscopy, with a history of a prior colonic polyp(s) in previous colonoscopy findings, who had a follow-up interval of 3 or more years since their last colonoscopy.
- **PC-01, Elective Delivery:** Patients with elective vaginal deliveries or elective cesarean sections at greater than or equal to 37 and less than 39 weeks of gestation completed (a lower number is better).
- **VTE-6, Hospital Acquired Potentially-Preventable Venous Thromboembolism (VTE):** The number of patients diagnosed with confirmed VTE during hospitalization (not present at admission) who did not receive VTE prophylaxis between hospital admission and the day before the VTE diagnostic testing order date (a lower number is better).
- **Antibiotic stewardship program:** Hospital-based program intended to increase appropriate antibiotic



use and reduce microbial resistance. Antibiotic stewardship is measured using data from the NHSN Patient Safety Component Annual Hospital Survey and data are included in annual quality improvement reports as an inpatient measure.

- **HAI-1:** A central line-associated bloodstream infection (CLABSI) is a bloodstream infection in a patient with a central line. CLABSIs are measured using SIRs with the reported number of CLABSIs annually as the numerator and the predicted number of infections as the denominator.
- **HAI-2:** A catheter-associated urinary tract infection (CAUTI) is an infection of the bladder, kidneys, ureters, urethra, or any other part of the urinary system that are associated with the use of a catheter. CAUTIs are measured using SIRs with the reported number of CAUTIs annually as the numerator and the predicted number of infections as the denominator.
- **HAI-3:** A surgical site infection from colon surgery (SSI:C) is an infection that occurs in patients after they have colon surgery. SSI:C infections are measured using SIRs with the reported number of SSI:C infections annually as the numerator and the predicted number of infections as the denominator.
- **HAI-4:** A surgical site infection from abdominal hysterectomy (SSI:H) is an infection that occur in patients after they have abdominal hysterectomies. SSI:H infections are measured using SIRs with the reported number of SSI:H infections annually as the numerator and the predicted number of infections as the denominator.
- **HAI-5:** Methicillin-resistant *Staphylococcus aureus* (MRSA) infections are a type of bacterial infection that are resistant to common antibiotics and can infect many parts of the human body. MRSA infections can occur in patients several ways including after surgery or after the placement of intravenous tubing. MRSA infections are measured using SIRs with the reported number of MRSA infections annually as the numerator and the predicted number of infections as the denominator.
- **HAI-6:** A *Clostridium difficile* infection (CDI), also known as *C. diff*, is a bacterial infection resulting in diarrhea caused by *C. difficile* bacterium. CDIs are measured using SIRs with the reported number of CDIs annually as the numerator and the predicted number of infections as the denominator.

For more information on this study, please contact Megan Lahr at [lahrx074@umn.edu](mailto:lahrx074@umn.edu).

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