Healthcare-Associated Infections Prevention Program Annual Data Report, 2022

Healthcare-Associated Infections Prevention Program
Wisconsin Department of Health Services

P-00340-22 (03/2024)

WISCONSIN DEPARTMENT of HEALTH SERVICES

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About This Report

Healthcare-associated infections (HAIs) are infections that occur while receiving health care. The risk of developing an HAI is higher for patients undergoing surgical procedures or who have medical devices such as central lines, urinary catheters, and ventilators. Infections caused by multidrug-resistant organisms (MDROs), such as methicillin-resistant *Staphylococcus aureus* (MRSA), can also be acquired in various health care settings and are considered HAIs.

These infections are a significant burden and can cause serious illness and death, but many are preventable. Wisconsin works to monitor these infections because they are a threat to public health and patient safety.

The purpose of this report is to monitor trends and patterns in order to support evaluation of HAI prevention and control efforts among Wisconsin acute care and critical access hospitals. This report includes data on six HAI types:

- Catheter-associated urinary tract infections (CAUTIs)
- Central line-associated blood stream infections (CLABSIs)
- Ventilator-associated events (VAEs)
- Surgical site infections (SSIs)
- MRSA bacteremia (MRSA in the bloodstream)
- *Clostridioides difficile* infections (CDI)

About the Wisconsin HAI Prevention Program

The Wisconsin HAI Prevention Program conducts statewide HAI surveillance and provides technical assistance in a variety of areas for health care and public health partners, including infection prevention and control, multidrug-resistant organism containment, and antimicrobial stewardship.

Additional information on the Wisconsin HAI Prevention Program is available on the DHS website. For questions and comments, please email DHSWIHAIPreventionProgram@dhs.wisconsin.gov.

Methodology

The National Healthcare Safety Network (NHSN) is a national HAI reporting system developed and maintained by the CDC (Centers for Disease Control and Prevention).

The Wisconsin Department of Health Services, Division of Public Health (DPH) collects HAI data reported by hospitals into NHSN and reports aggregate data to monitor trends and to compare Wisconsin HAI occurrence to the national baseline. Hospitals voluntarily

share HAI data reported in NHSN with DPH. Among 142 eligible Wisconsin hospitals, all provided data regarding at least one type of HAI to DPH.

Where possible, annual data are displayed separately for acute care and critical access hospitals. Critical access hospitals are those in rural areas with an official federal billing designation, have 25 or fewer acute care inpatient beds, located more than 35 miles from another hospital, maintain an average length of stay of 96 hours or less, and provide emergency care services. The remaining acute care hospitals, including children's hospitals, are grouped separately in this report.

Data for this report was downloaded from NHSN in May 2023. Changes made to the data after this date are not reflected in this report.

Standardized infection ratio

The standardized infection ratio (SIR) is a key outcome measure in NHSN and is the ratio of the number of observed HAIs to the number of predicted infections. The number of predicted infections is determined by a risk adjustment process that accounts for differences in facility and patient characteristics. The specific factors included in the risk adjustment for each infection type vary, but often include hospital size and teaching status, patient population served by the hospital, and surgical patient characteristics.

The SIR enables "apples to apples" comparisons of HAI data across facilities and hospital unit types, as well as comparisons with state and national data.

- A SIR > 1 indicates that more infections were observed than predicted.
- A SIR < 1 indicates that fewer infections were observed than predicted.
- A SIR = 1 indicates there was no difference from the national baseline.

The current SIR national baseline was established utilizing data reported by hospitals into NHSN in 2015. NHSN is in the process of updating national baseline values based on data submitted by hospitals in 2022. This process is expected to be completed by the end of 2024.

For additional information on the SIR, see NHSN's *A Guide to the SIR*.

Symbols and conventions used in this report

In graphs and tables throughout this report, an asterisk (*) is used to denote a **statistically significant difference** between a SIR value and the 2015 national baseline SIR. The horizontal black line in the graphs represents the 2015 national baseline. The number of hospitals or hospital units reporting data for a specific HAI type is noted in graphs and tables (for example, n=58).

In the "Key Takeaways" section, plus and minus signs are used to show whether a SIR value is **higher or lower than the 2015 national baseline**, and whether the difference is statistically significant.

- Lower than national baseline, difference is statistically significant
- Lower than national baseline, difference is not statistically significant
- Higher than national baseline, difference is statistically significant
- Higher than national baseline, difference is not statistically significant

Colored arrows are used in this report to show to show the **direction of change** in a SIR value from year to year, and whether that change is statistically significant.

- Statistically significant decrease
- Decrease, not statistically significant
- Statistically significant increase
- Increase, not statistically significant

Finally, readers will also note the number of Wisconsin acute care hospitals reporting data in NHSN increased in 2022. This is primarily due to several new “micro hospitals” opening in Wisconsin in recent years.

Key Takeaways for 2022

Acute care hospitals

As in recent years, the 2022 state-level SIRs for Wisconsin acute care hospitals were significantly lower than the 2015 national baseline for almost all HAI types included in the report. In 2022 there were:

- Fewer CAUTIs than predicted.
- Fewer CLABSIs than predicted.
- Fewer VAEs than predicted.
- Fewer MRSA bacteremia events than predicted.
- Fewer CDI events than predicted.

In terms of statistically significant changes among Wisconsin acute care hospitals from 2021 to 2022, data show that:

- The CDI SIR decreased in 2022.

Critical access hospitals

Among critical access hospitals in Wisconsin, 2022 SIRs were also lower than the 2015 national baseline for most HAI types. However, with the exception of CDI, these differences were not statistically significant. In 2022, there were:

- Fewer CAUTIs than predicted.
- Fewer CLABSIs than predicted.
- Fewer MRSA bacteremia events than predicted.
- Fewer CDI events than predicted.

VAE data is not shown for critical access hospitals, as few critical access hospitals report on VAE in NHSN.

There were no statistically significant changes in the SIR for any HAI type from 2021 to 2022 among Wisconsin critical access hospitals.

Surgical site infections

When looking at SSI data for Wisconsin hospitals, data from acute care and critical access hospitals is combined. SSI data in this report reflect adult, inpatient procedures only.

The 2022 SIRs for SSIs associated with colon surgeries (COLO), hip prosthesis procedures (HPRO), and knee prosthesis procedures (KPRO) were lower than the 2015 national baseline, but the differences were not statistically significant.

The 2022 SIR for SSIs associated with abdominal hysterectomy procedures (HYST) was higher than the 2015 national baseline but again, this difference was not statistically significant. The same pattern of differences was found using the All SSI and the Complex Admission/Readmission SSI models in NHSN. In 2022 there were:

- Fewer COLO SSIs than predicted.
- Fewer HPRO SSIs than predicted.
- More HYST SSIs than predicted.
- Fewer KPRO SSIs than predicted.

There were a few statistically significant changes in the SSI SIRs for these procedures from 2021 to 2022, though different changes were noted under the two SSI models.

Using the All SSI model:

- The HYST SIR increased in 2022.

Using the Complex Admission/Readmission SSI model:

- The HPRO SIR increased in 2022.

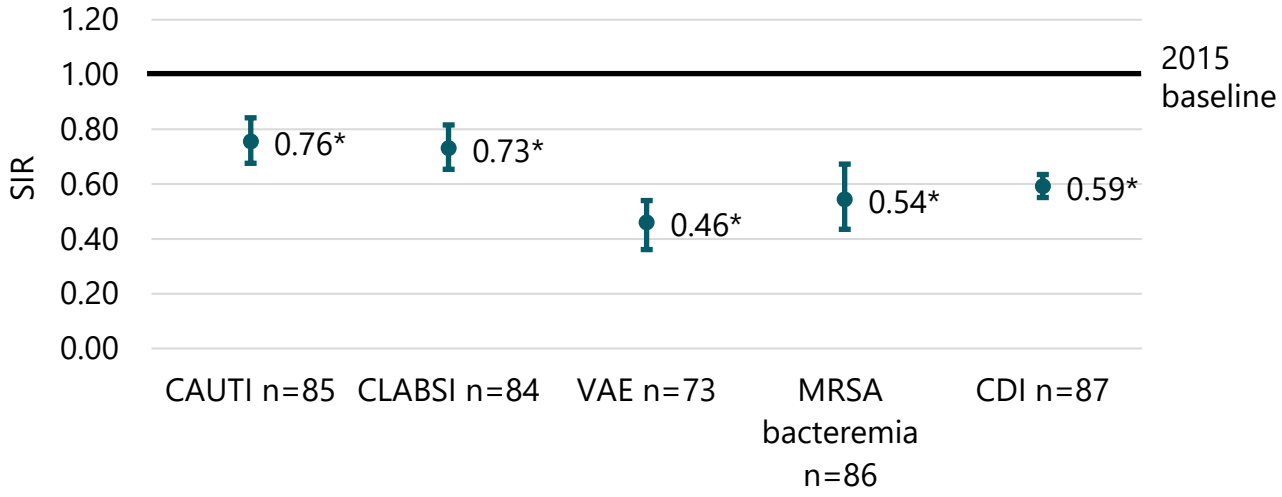
More details about each of these findings are included in the "Overview of 2022 SIRs" and "HAI-Specific Data" sections of this report.

Overview of 2022 SIRs

Acute care hospitals

In 2022, the CAUTI, CLABSI, VAE (Total VAE), MRSA bacteremia, and CDI SIRs for Wisconsin acute care hospitals were significantly lower than the 2015 national baseline.

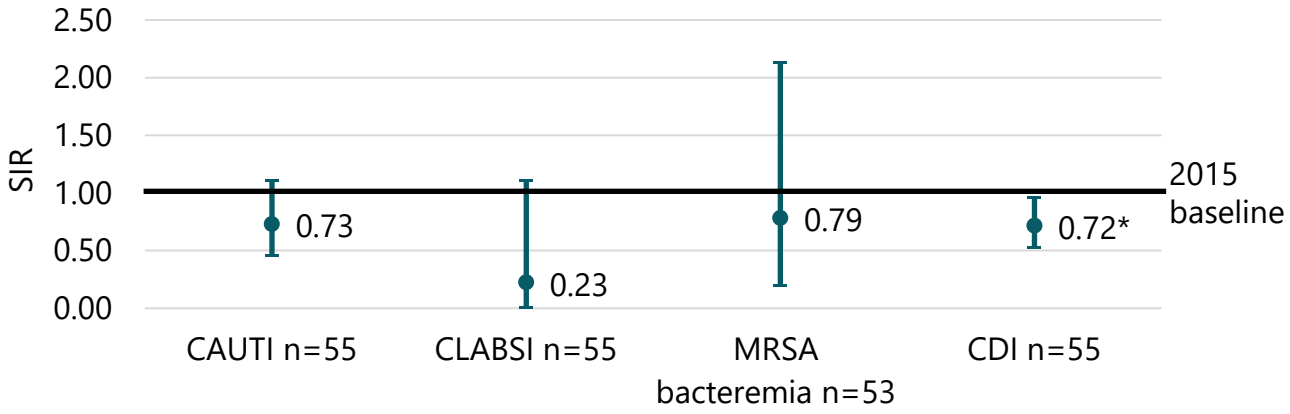
FIGURE 1. SIRs for Wisconsin acute care hospitals by HAI type, 2022.



Critical access hospitals

Among Wisconsin critical access hospitals, only the CDI SIR was significantly different from the 2015 national baseline in 2022.

FIGURE 2. SIRs for Wisconsin critical access hospitals by HAI type, 2022.

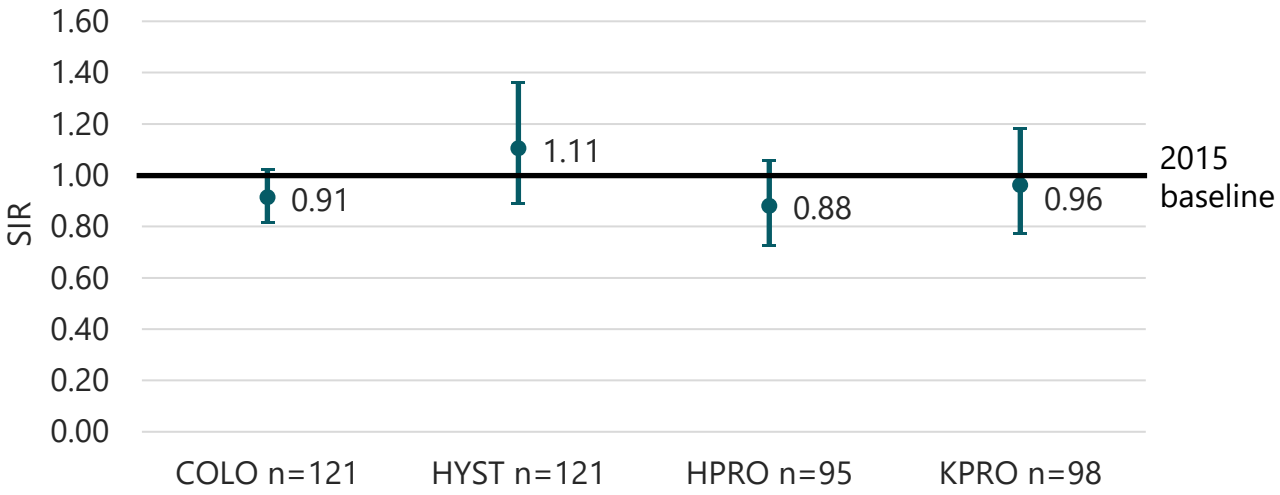


Surgical site infections

When looking at SSIs, data from acute care and critical access hospitals in Wisconsin is combined. Shown in Figure 3 are the 2022 SSI SIRs for adult, inpatient COLO, HYST, HPRO, and KPRO procedures. Data in Figure 3 is based on the All SSI model, which includes superficial, deep and organ/space SSIs.

Figure 3 shows that the 2022 SIRs for these procedure types were not significantly different from the 2015 national baseline. This is a change from 2021, when the SIRs for COLO, HPRO, and HYST were all significantly below the 2015 baseline.

FIGURE 3. SSI SIRs for Wisconsin acute care and critical access hospitals, select procedures, All SSI model, 2022.



Similar results were found for these four procedures when calculating SSI SIR values using NHSN's Complex Admission/Readmission SSI model. This model only includes infections at the deep or organ/space level that are detected during the same hospital admission as the surgical procedure, or upon readmission to the same facility where the procedure was performed.

The 2022 SSI SIRs for Wisconsin acute care and critical access hospitals for COLO, HYST, HPRO, and KPRO were not statistically different from the 2015 national baseline when calculated using the Complex Admission/Readmission SSI model.

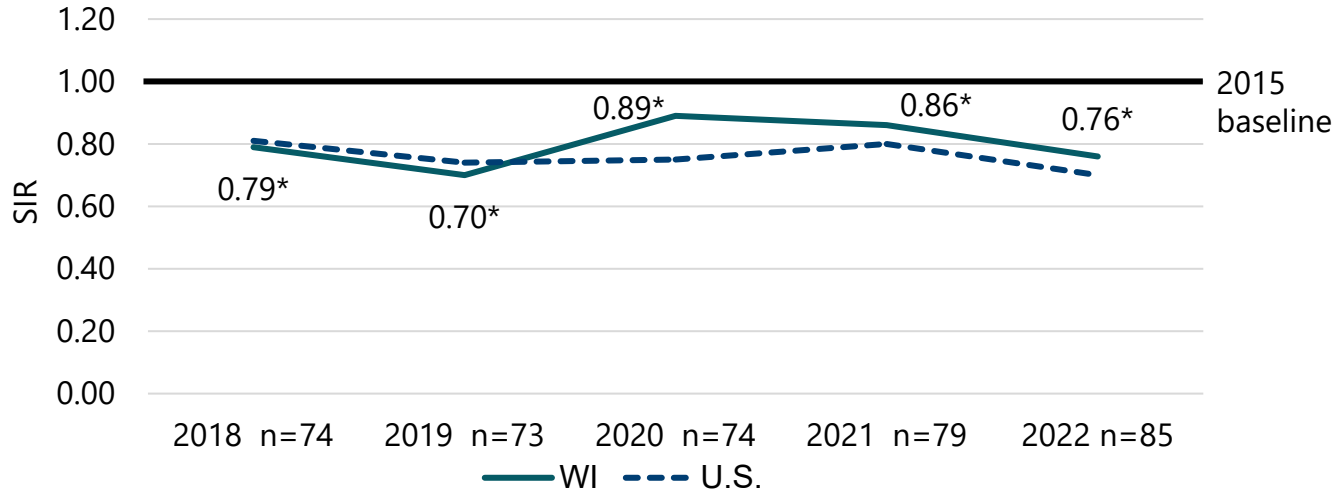
HAI-Specific Data

CAUTI: Acute care hospitals

At the national level, the CAUTI SIR decreased by 12% from 2021 to 2022 among acute care hospitals. National data for 2022 referenced in this report come from CDC's 2022 National and State HAI Progress Report.[1] National data for previous years was taken from the National and State Healthcare-Associated Infections Data Archive webpage.[2]

In Wisconsin, the CAUTI SIR for acute care hospitals decreased from 2021 to 2022, but this was not a statistically significant change.

FIGURE 4. Wisconsin and U.S. annual CAUTI SIRs, all acute care hospital reporting units, 2018–2022.



Not all hospitals can calculate an annual SIR as NHSN will only calculate a SIR value if the number of predicted infections for that time period is 1 or more. Of the 85 Wisconsin acute care hospitals reporting CAUTI data, 51 (60%) were able to calculate a facility-level CAUTI SIR in 2022. Among facilities that could calculate a CAUTI SIR for 2022, the median SIR value was 0.84.

FIGURE 5. Wisconsin acute care hospital CAUTI SIR values, 2022.

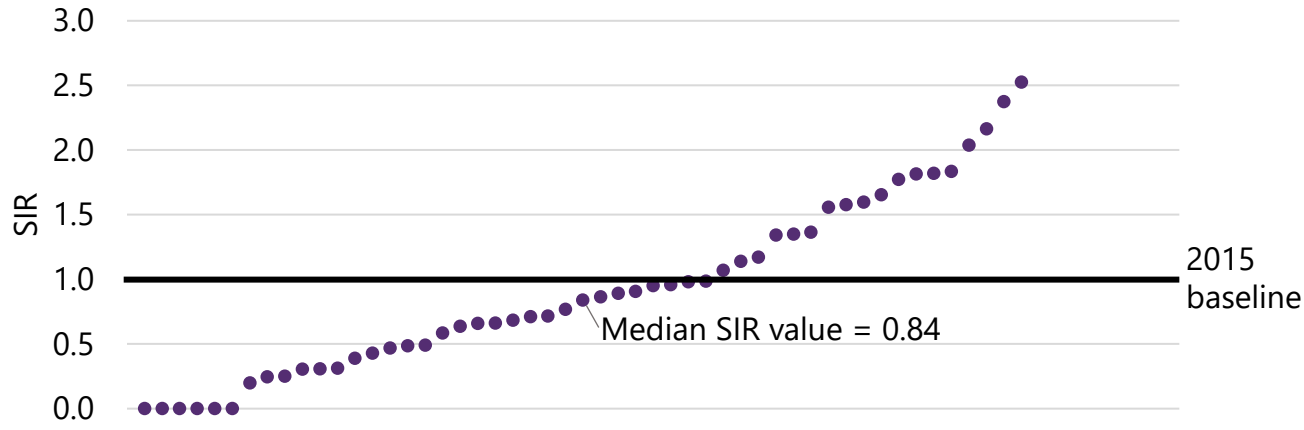


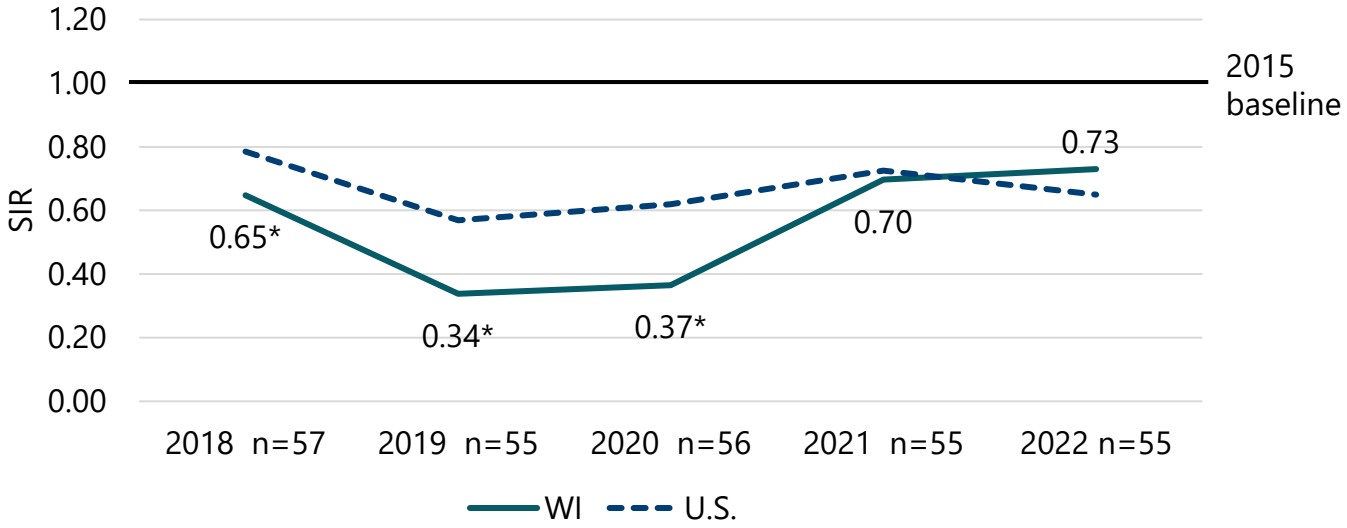
TABLE 1. Unit-level CAUTI information for acute care hospitals.

Unit information	Number of reporting hospitals (units)	Infection count	2022 SIR	95% confidence interval	Percent change 2021–2022
All units	85 (523)	321	0.76*	0.68, 0.84	⇩ 12% decrease
ICU	65 (96)	143	0.78*	0.66, 0.92	⇩ 26% decrease
Non-ICU	85 (427)	178	0.74*	0.64, 0.85	⇧ 6% increase

CAUTI: Critical access hospitals

Among critical access hospitals across the nation, the CAUTI SIR decreased by 10% from 2021 to 2022.[1,2] The CAUTI SIR among Wisconsin critical access hospitals increased in each of the past two years, though neither of these year-to-year changes was statistically significant.

FIGURE 6. Wisconsin and U.S. annual CAUTI SIRs, all critical access hospital reporting units, 2018–2022.



In 2022, four Wisconsin critical access hospitals (7%) were able to calculate a facility-level SIR for CAUTI. The SIR value was 0 for each of these four facilities.

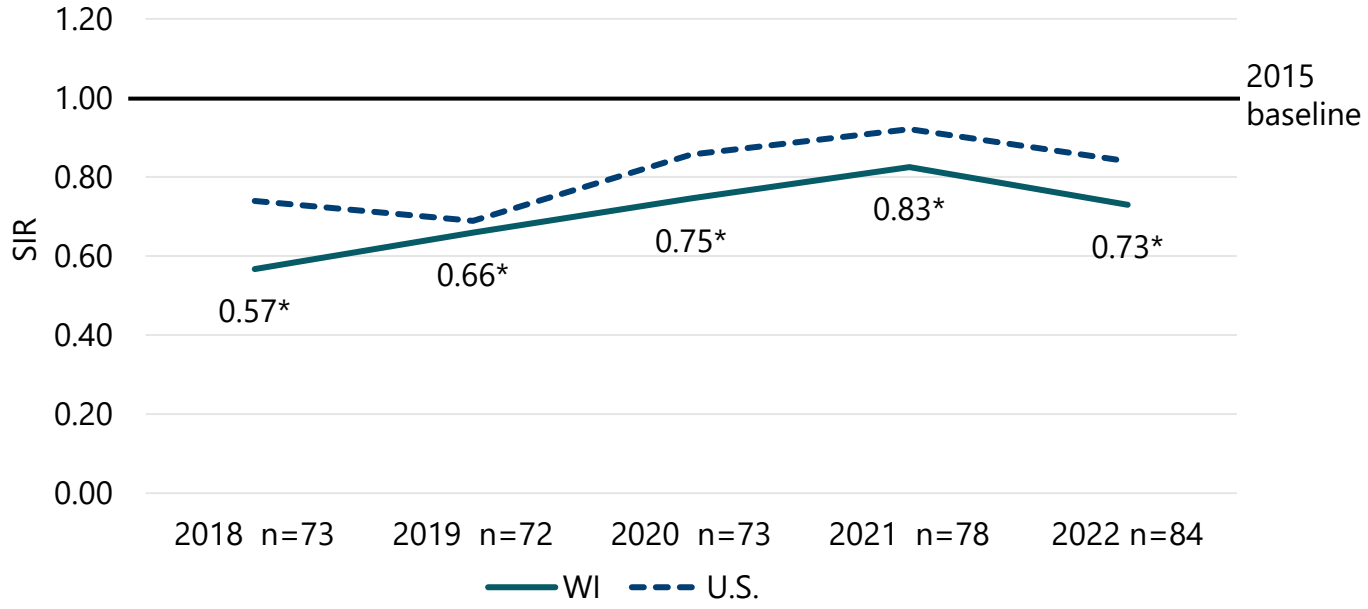
TABLE 2. Unit-level CAUTI information for critical access hospitals.

Unit information	Number of reporting hospitals (units)	Infection count	2022 SIR	95% confidence interval	Percent change 2021–2022
All units	55 (86)	20	0.73	0.46, 1.11	⇧ 4% increase
ICU	11 (11)	3	-	-	-
Non-ICU	55 (75)	17	0.64	0.39, 1.01	⇧ 6% increase

CLABSI: Acute care hospitals

From 2021 to 2022 the CLABSI SIR for acute care hospitals decreased 9% at the national level.[1,2] After several years of increases, the CLABSI SIR for Wisconsin acute care hospitals also decreased, though this was not a statistically significant change.

FIGURE 7. Wisconsin and U.S. annual CLABSI SIRs, all acute care hospital reporting units, 2018–2022.



Of the 84 acute care hospitals reporting CLABSI data, 49 (55%) were able to calculate a facility-level CLABSI SIR in 2022. Among these facilities, the median SIR value was 0.68.

FIGURE 8. Wisconsin acute care hospital CLABSI SIR values, 2022.

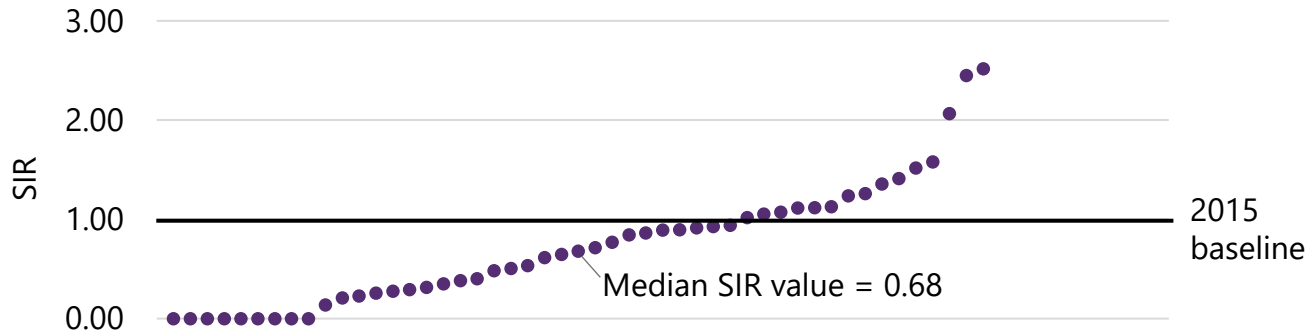


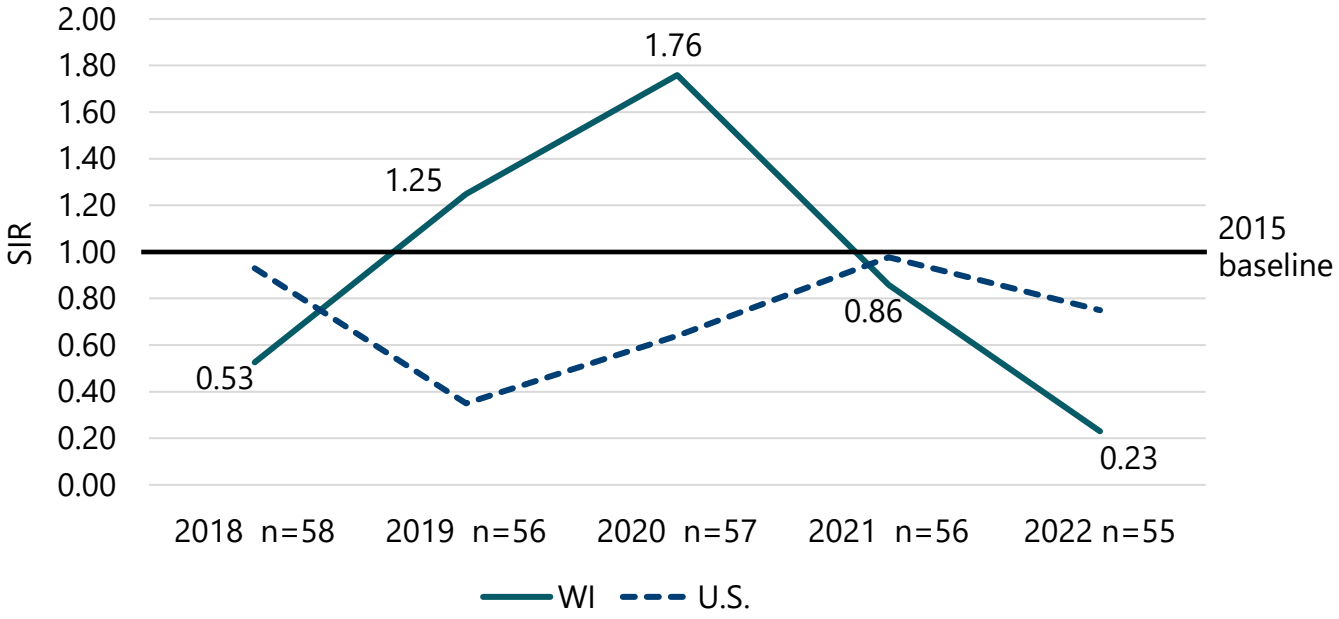
TABLE 3. Unit-level CLABSI information for acute care hospitals.

Unit information	Number of reporting hospitals (units)	Infection count	2022 SIR	95% confidence interval	Percent change 2021–2022
All units	84 (538)	313	0.73*	0.65, 0.82	⇩ 11% decrease
NICUs	17 (17)	16	1.08	0.64, 1.71	⇧ 52% increase
ICU	64 (93)	104	0.75*	0.62, 0.91	↓ 35% decrease
Non-ICU	84 (428)	193	0.70*	0.61, 0.81	⇧ 9% increase

CLABSI: Critical access hospitals

At the national level, the CLABSI SIR for critical access hospitals decreased 24% from 2021 to 2022.[1,2] In Wisconsin, the CLABSI SIR decreased from 2021 to 2022, but this was the difference between four reported infections in 2021 and one reported infection in 2022 and was not a statistically significant decrease.

FIGURE 9. Wisconsin and U.S. annual CLABSI SIRs, all Wisconsin critical access hospital reporting units, 2018–2022.



No Wisconsin critical access hospitals were able to calculate a facility-level CLABSI SIR in 2022.

TABLE 4. Unit-level CLABSI information for critical access hospitals.

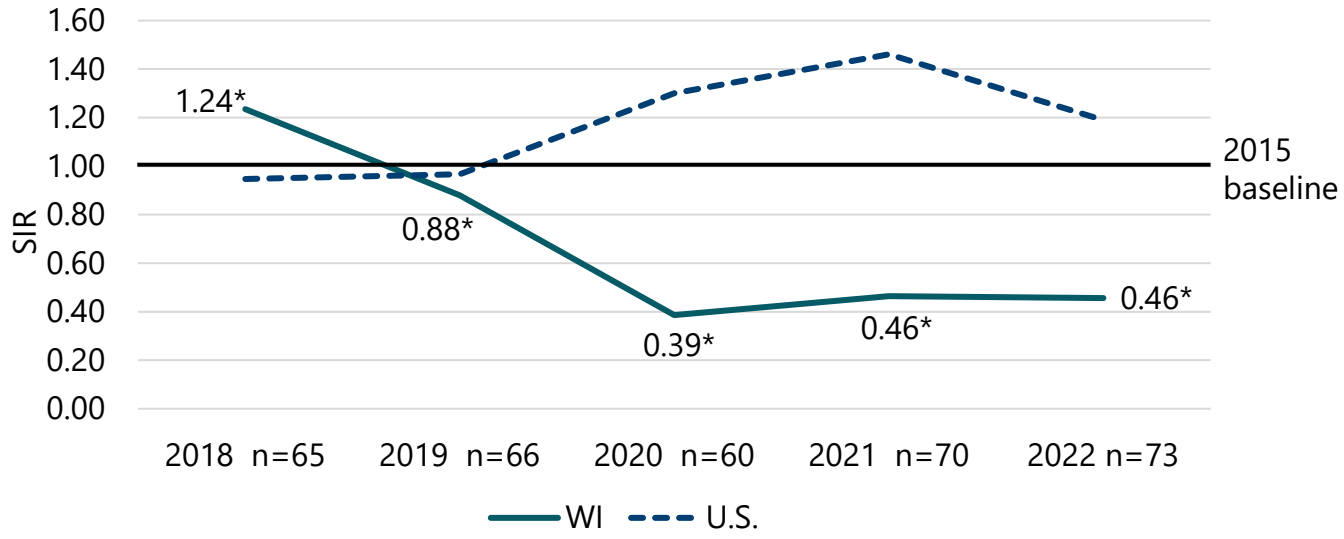
Unit information	Number of reporting hospitals (units)	Infection count	2022 SIR	95% confidence interval	Percent change 2021–2022
All units	55 (81)	1	0.23	0.01, 1.11	⇩ 73% decrease
ICU	11 (11)	0	-	-	-
Non-ICU	55 (70)	1	0.23	0.01, 1.15	⇩ 74% decrease

Ventilator-associated event (VAE): Acute care hospitals

Surveillance for VAEs includes both infections and other conditions that may or may not represent true infections. The Total VAE measure includes all VAEs. Data shown is for acute care hospitals only.

At the national level, the Total VAE SIR among acute care hospitals decreased by 19% in 2022.[1,2] In Wisconsin, the Total VAE SIR remained constant from 2021 to 2022.

FIGURE 10. Wisconsin and U.S. annual Total VAE SIRs, all acute care hospital reporting units, 2018–2022.



Of the 73 acute care hospitals that reported VAE data, 43 (59%) were able to calculate a facility-level Total VAE SIR for 2022. The median Total VAE SIR among these hospitals was 0.

FIGURE 11. Wisconsin acute care hospital Total VAE SIR values, 2022.

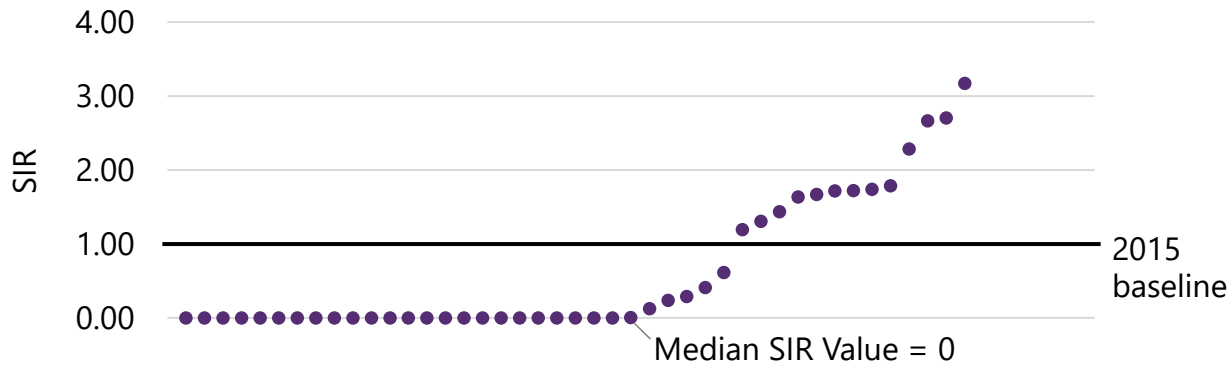


TABLE 5. Unit-level Total VAE information for acute care hospitals.

Unit information	Number of reporting hospitals (units)	Infection count	2022 SIR	95% confidence interval	Percent change 2021–2022
All units	73 (428)	270	0.46*	0.41, 0.51	No change
ICU	59 (85)	254	0.46*	0.41, 0.53	⇩ 4% decrease
Non-ICU	67 (343)	16	0.33*	0.20, 0.53	⇧ 28% increase

SSIs: All hospitals (All SSI SIR model)

SSIs are classified by the type of procedure with which they are associated, as well as the depth of the infection, and can involve tissues under the skin, organs, or implanted material. Shown in this section are data for adult, inpatient procedures in acute care and critical access hospitals using the All SSI model, which includes SSIs occurring at the superficial, deep and organ/space levels. See the NHSN SIR guide for details on the different SSI models.

Figure 12 shows procedure-specific SSI SIRs for COLO, HYST, HPRO, and KPRO over time. The SSI SIRs for COLO, HYST, HPRO, and KPRO were not statistically different from the 2015 national baseline in 2022. This is a shift from 2021, when the COLO, HYST, and HPRO SIRs were all significantly lower than the 2015 national baseline.

Figure 12 also shows that all four SIRs increased in 2022. The increase in the HYST SIR was statistically significant, and this increase comes after a statistically significant decrease in the HYST SIR from 2020 to 2021.

As shown in Table 6, when looking at the SSI SIR for all reported procedure types combined, there was also a statistically significant increase from 2021 to 2022.

FIGURE 12. SSI SIRs for COLO, HYST, HPRO, and KPRO, Wisconsin acute care and critical access hospitals, All SSI model, 2018–2022.

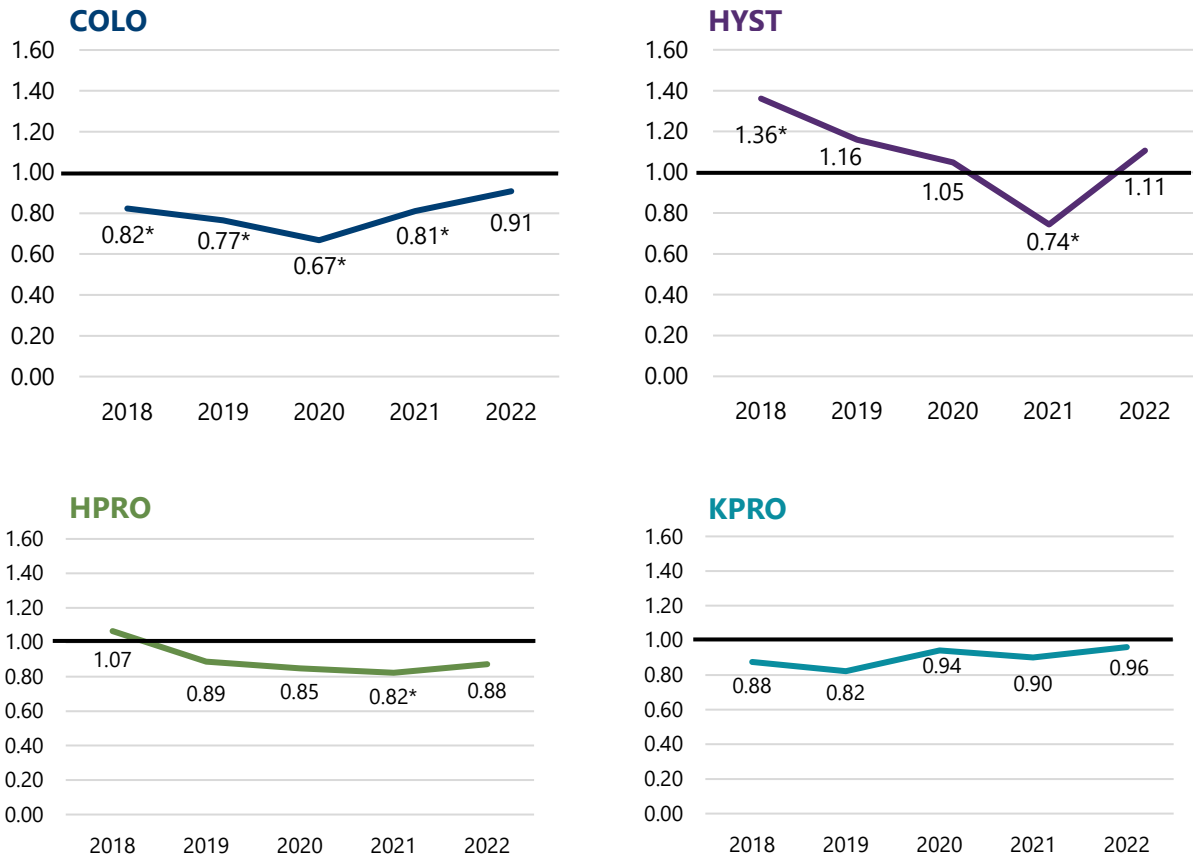


TABLE 6. All procedure and procedure-specific information (All SSI model).

	Number of reporting hospitals (procedures)	Infection count	2022 SIR	95% confidence interval	Percent change 2021–2022
All procedures combined	124 (66,131)	1,068	0.99	0.93, 1.05	▲ 17% increase
COLO	121 (6,170)	295	0.91	0.81, 1.02	⇧ 9% increase
HPRO	91 (11,335)	109	0.88	0.72, 1.06	⇧ 11% increase
HYST	121 (3,990)	85	1.11	0.89, 1.36	▲ 47% increase
KPRO	98 (14,271)	85	0.96	0.77, 1.18	⇧ 10% increase

SSI: All hospitals (Complex Admission/Readmission SSI model)

This page includes SSI data for adult, inpatient procedures in both acute care and critical access hospitals, and only includes infections at the deep or organ/space level that are detected during the same hospital admission as the surgical procedure, or upon readmission to the same facility where the procedure was performed. See the NHSN SIR guide for details on the different SSI models.

Similar to what was seen using the All SSI model, the 2022 SSI SIRs for COLO, HYST, HPRO, and KPRO were not statistically different from the 2015 national baseline under the Complex Admission/Readmission model.

SSI SIRs also increased under the Complex Admission/Readmission model from 2021 to 2022, though in this case only the increase in the HPRO SSI SIR was statistically significant.

FIGURE 13. SSI SIRs for COLO, HYST, HPRO, and KPRO, Wisconsin acute care and critical access hospitals, Complex Admission/Readmission SSI model, 2018–2022.

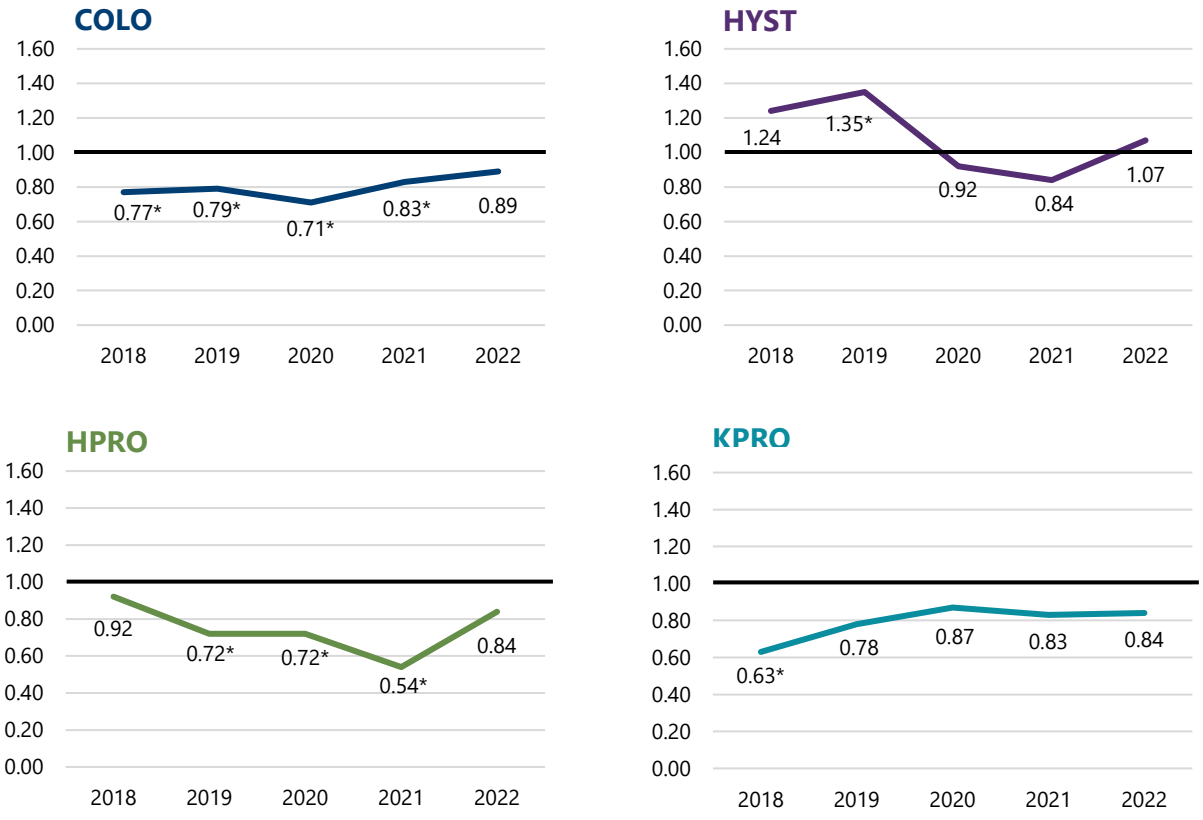


TABLE 7. All procedure and procedure-specific information (Complex Admission/Readmission SSI model).

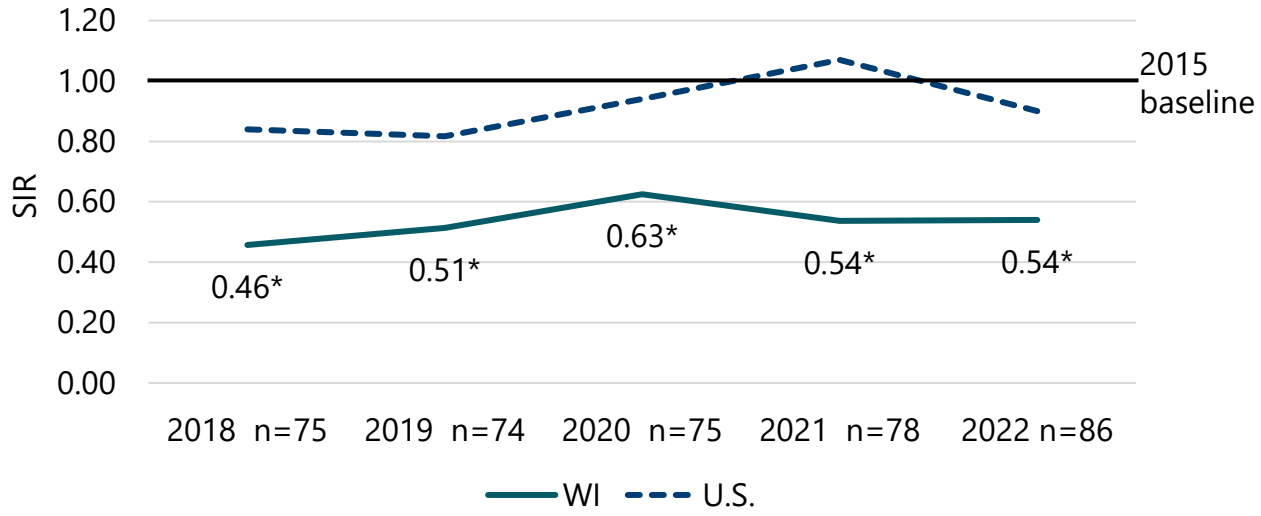
	Number of reporting hospitals (procedures)	Infection count	2022 SIR	95% confidence interval	Percent change 2021–2022
All procedures combined	124 (66,131)	505	0.93	0.85, 1.02	⇧ 13% increase
COLO	121 (6,170)	146	0.89	0.76, 1.05	⇩ 1% decrease
HPRO	95 (11,335)	60	0.84	0.64, 1.07	⇧ 67% increase
HYST	121 (3,990)	32	1.07	0.75, 1.50	⇧ 26% increase
KPRO	98 (14,271)	40	0.84	0.61, 1.13	⇧ 7% increase

MRSA bacteremia: Acute care hospitals

Patients treated with antibiotics or who have devices such as urinary catheters are at increased risk of acquiring HAIs caused by MRSA and other multidrug-resistant organisms. This measure includes laboratory-identified MRSA bloodstream infection occurring more than three days after a hospital admission (healthcare-onset).

The MRSA SIR among acute care hospitals across the nation decreased by 16% from 2021 to 2022.[1,2] The MRSA bacteremia SIR for Wisconsin acute care hospitals did not change from 2021 to 2022.

FIGURE 14. Wisconsin and U.S. annual MRSA bacteremia SIRs, all acute care hospital reporting units, 2018–2022.



Thirty-five Wisconsin acute care hospitals were able to calculate a facility-level MRSA bacteremia SIR for 2022. Among these facilities, the median SIR value was 0.60.

FIGURE 15. Wisconsin acute care hospital MRSA bacteremia SIR values, 2022.

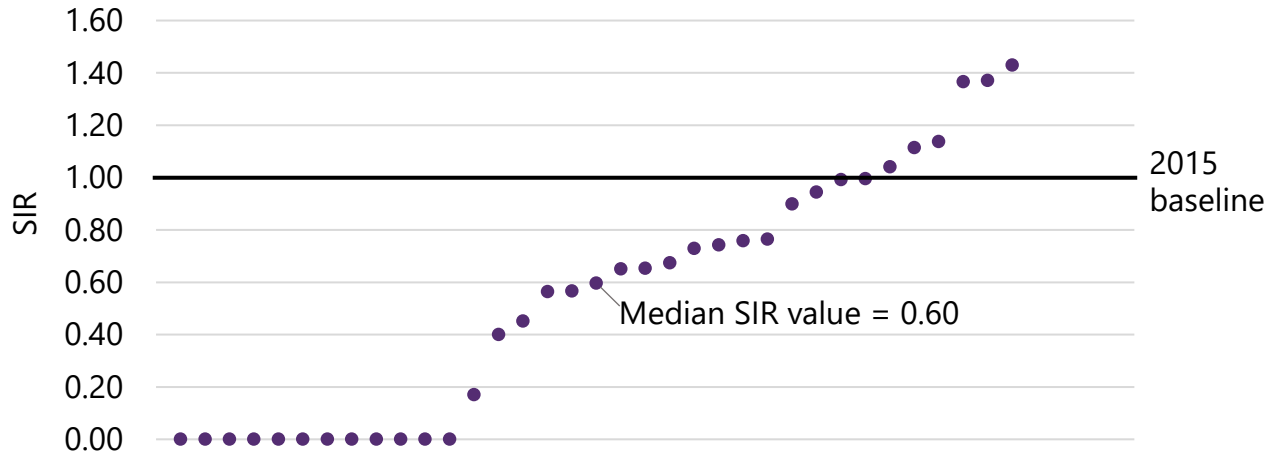


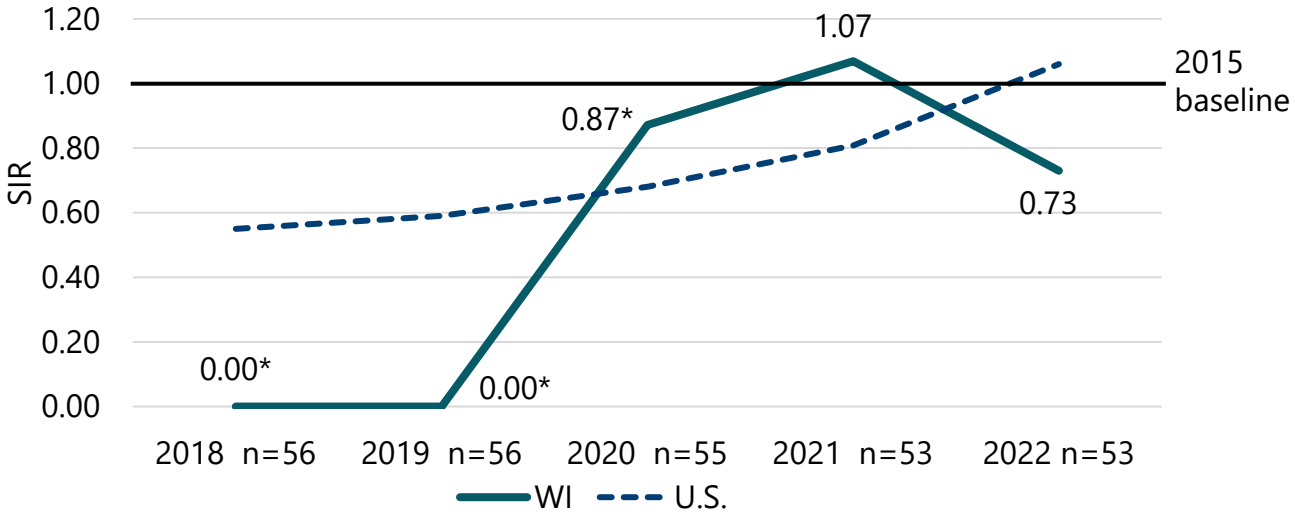
TABLE 8. Unit-level MRSA bacteremia information for acute care hospitals.

Unit information	Number of reporting hospitals	Infection count	2022 SIR	95% confidence interval	Percent change 2021–2022
All units	86	81	0.54*	0.44, 0.67	No change

MRSA bacteremia: Critical access hospitals

Among critical access hospitals across the United States, the MRSA bacteremia SIR increased by 31% from 2021 to 2022.[1,2] In Wisconsin, the MRSA bacteremia SIR among critical access hospitals decreased from 2021 to 2022, but this was the difference between four MRSA bacteremia LabID events reported in 2021 and three events reported in 2022 and was not a statistically significant change.

FIGURE 16. Wisconsin and U.S. annual MRSA bacteremia SIRs, all critical access hospital reporting units, 2018–2022.



No Wisconsin critical access hospitals were able to calculate a facility-level MRSA bacteremia SIR for 2022.

TABLE 9. Unit-level MRSA bacteremia information for critical access hospitals.

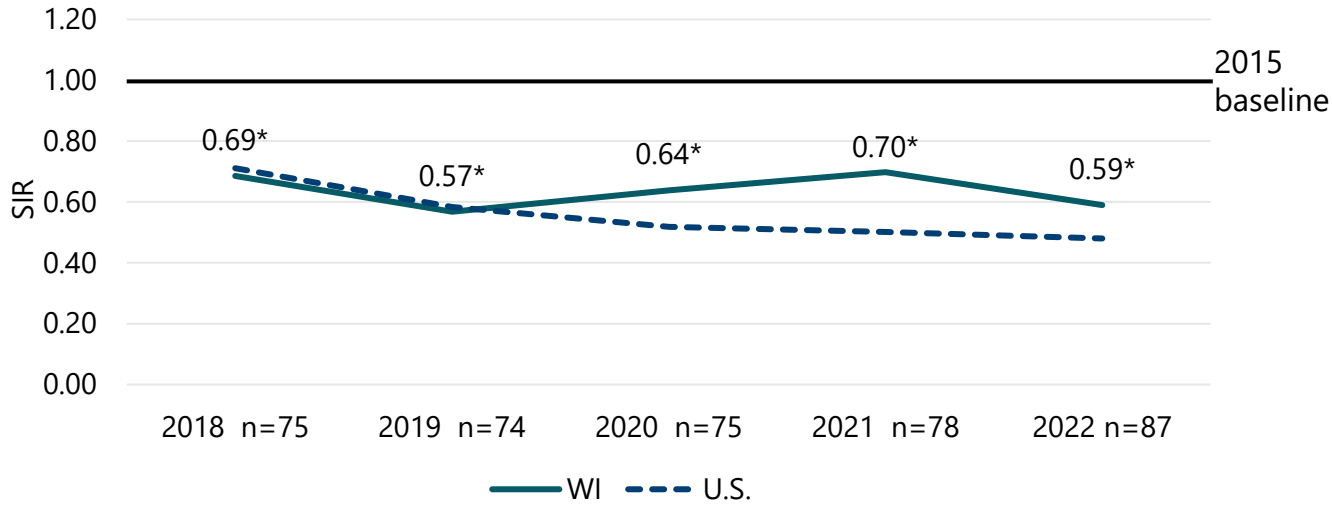
Unit Information	Number of Reporting Hospitals	Infection Count	2022 SIR	95% Confidence Interval	Percent Change 2021–2022
All units	53	3	0.79	0.20, 2.14	⇩ 26% decrease

CDI: Acute care hospitals

Persons at highest risk of CDI include older hospital patients or nursing home residents receiving prolonged antibiotic therapy. The measure shown here includes laboratory-identified CDIs occurring more than three days after a hospital admission (hospital-onset).

At the national level, CDI decreased during the COVID-19 pandemic, and this trend continued from 2021 to 2022 as the CDI SIR decreased by 3%.[1,2] Early in the pandemic Wisconsin data did not reflect the same decrease seen at the national level; however, there was a statistically significant decrease (16%) in the CDI SIR among Wisconsin acute care hospitals from 2021 to 2022.

FIGURE 17. Wisconsin and U.S. annual CDI SIRs, all acute care hospital reporting units, 2018–2022.



Seventy-one acute care hospitals in Wisconsin could calculate a facility-level CDI SIR for 2022. Among these facilities, the median SIR value was 0.54.

FIGURE 18. Wisconsin acute care hospital CDI SIR values, 2022.

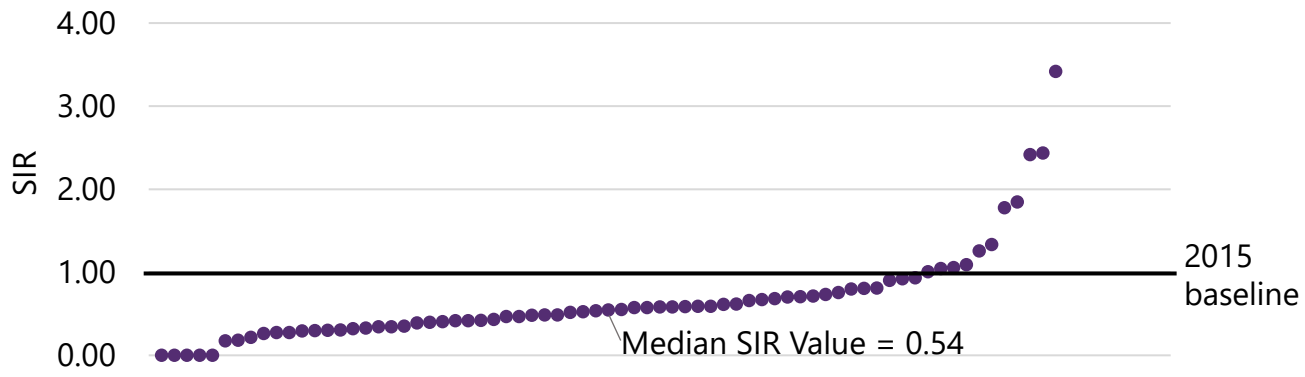


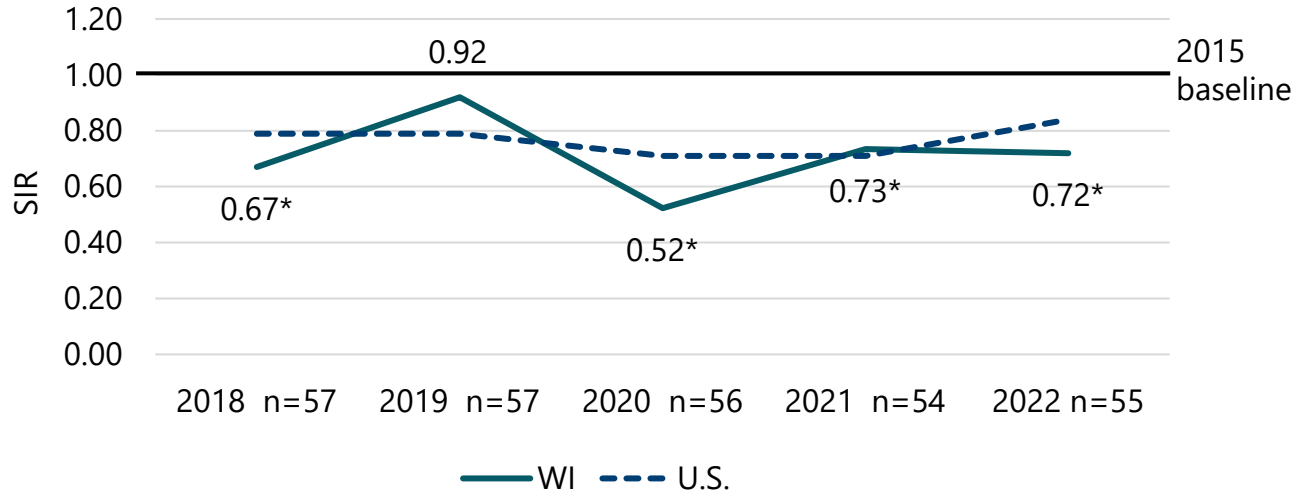
TABLE 10. Unit-level CDI information for acute care hospitals.

Unit information	Number of reporting hospitals	Infection count	2022 SIR	95% confidence interval	Percent change 2021–2022
All units	87	761	0.59*	0.55, 0.64	↓ 16% decrease

CDI: Critical access hospitals

At the national level, the CDI SIR among critical access hospitals increased by 17% from 2021 to 2022.[1,2] The CDI SIR among Wisconsin critical access hospitals was nearly unchanged from 2021 to 2022 and continued to be significantly below the 2015 national baseline in 2022.

FIGURE 19. Wisconsin and U.S. annual CDI SIRs, all critical access hospital reporting units, 2018–2022.



Twenty-six critical access hospitals in Wisconsin were able to calculate a facility-level CDI SIR for 2022. Among these facilities, the median CDI SIR value was 0.58.

FIGURE 20. Wisconsin critical access hospital CDI SIR values, 2022.

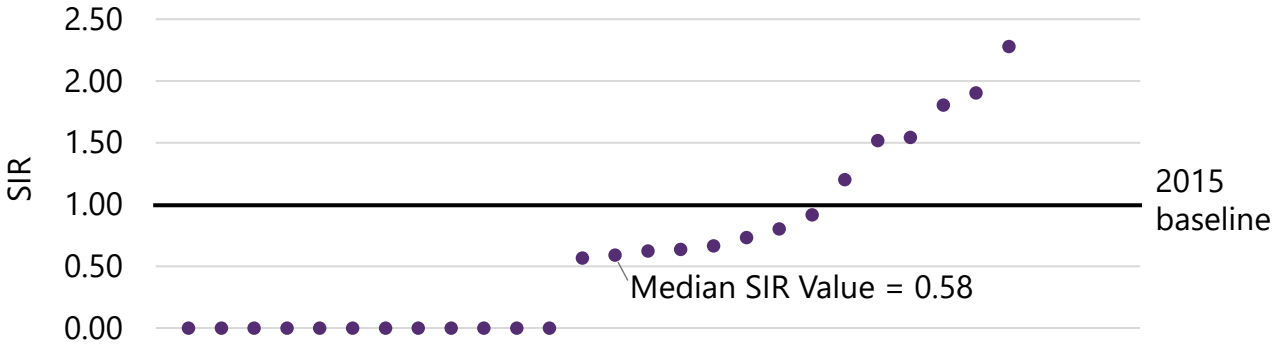


TABLE 11. Unit-level CDI information for critical access hospitals.

Unit information	Number of reporting hospitals	Infection count	2022 SIR	95% confidence interval	Percent change 2021–2022
All units	55	42	0.72*	0.52, 0.96	⇩ 1% decrease

Additional Information

For more information on the specific HAI types discussed in this report, visit the following webpages.

- CDC, CAUTI
- CDC, CLABSI
- CDC, VAE
- CDC, SSI
- DHS, MRSA bacteremia
- DHS, CDI

References

1. Centers for Disease Control and Prevention. 2022 National and State Healthcare-Associated Infections Progress Report. Available at: https://www.cdc.gov/hai/data/portal/progress-report.html. Accessed November 10, 2023.

2. Centers for Disease Control and Prevention. National and State Healthcare-Associated Infections Data Archive. Available at: https://www.cdc.gov/hai/data/archive/archive.html. Accessed November 10, 2023.