2017

Report on Healthcare Associated Infections (HAI) to the General Assembly

Submitted November 2018

Submitted to the Connecticut General Assembly
By the Infectious Disease Section,
Healthcare Associated Infections Program
Connecticut Department of Public Health

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This is the ninth annual report on Healthcare Associated Infections (HAI) to the Connecticut General Assembly, pursuant to C.G.S. 19a-490o. The aim of this report is to give the General Assembly a summary of publicly reportable HAI for calendar year 2017 and information on Connecticut's efforts to use the data to prevent these infections. In updating and streamlining the statutes that authorize and establish Connecticut's HAI program, Public Act No. 18-168 has incorporated annual reporting to the legislature into the reports available on the Department of Public Health website at http://www.ct.gov/dph/cwp/view.asp?a=3136&q=417318. This will make up-to-date and comprehensive information readily and simultaneously available to legislators, other policy makers, healthcare providers, consumers of healthcare, and the public in general.

What HAI data is being tracked?

The federal Department of Health and Human Services (DHHS) has created a national HAI prevention plan. That plan specifies national HAI prevention target goals and several key HAI that the federal government prioritizes for tracking in various healthcare settings. These are only a sample of the possible HAI types, but they have been prioritized by the federal government on the advice of experts because they are common, costly, harmful (often deadly), and are reasonably (but not easily) preventable.

Connecticut, on the advice of our statewide HAI Advisory Committee that was established pursuant to CGS 19a-490n, tracks the same HAI in the same types of facilities and locations that the federal government is tracking under the national plan. Connecticut also aims to achieve the same HAI prevention targets as the nation. As noted in the *2014 Annual Report to the General Assembly*, other than for central line blood stream infections (CLABSI), neither the nation nor Connecticut met the extremely ambitious HAI reduction target goals for the first period of national HAI surveillance that ended in 2013-2015. New National Prevention Targets have been developed and will guide HAI tracking through the year 2020, aligning them with a new 2015 baselines and the timeframe of Healthy People 2020.

How HAIs are tracked: the SIR and rates

The Connecticut HAI reporting mandate requires healthcare facilities to report specific HAI-related data to the National Healthcare Safety Network (NHSN), which is a secure, internet-based surveillance system created and managed by the Centers for Disease Control and Prevention (CDC) that healthcare facilities may use to track and report HAI data. NHSN includes standardized definitions, built-in analytical tools, user training and support, and integrated data quality checks. Only persons who have completed training on the standard definitions and surveillance methodology may perform NHSN data entry, and all protocols must be followed precisely. These protocols provide a rigorous national and state standard to ensure consistent collection of comparable data. The CDC makes NHSN available to all United States healthcare facilities across the spectrum of healthcare at no cost, and, as of the writing of this report, is currently collecting data from nearly 19,000 facilities from all fifty states, the District of Columbia, and the Commonwealth of Puerto Rico.

Participation in NHSN requires a considerable commitment by each participating healthcare facility. Qualified trained Infection Practitioners (IPs), or other staff trained in infection prevention, trained in nursing, microbiology, epidemiology, and/or medical technology, conduct HAI surveillance, and all have received additional training in infection prevention and control. These individuals collect HAI data from a

variety of sources maintained by facilities, including laboratory culture results, patient medical records, and flowcharts, such as those maintained on ICU patients. When facility IPs determine that a patient has a condition that meets the NHSN definition of an HAI, then the infection is reported to Connecticut DPH via NHSN. The data are stored on the secure NHSN server which is protected from inappropriate disclosure by both software security features and federal law. Once entered, the data are immediately available to the facility for viewing, analysis, and updating. Facility NHSN users must confer rights to the DPH HAI Program, which allows staff to view and analyze the data for public reporting. All patient and facility information is protected by state and federal law and are stored on secure computer servers.

Connecticut, other states, and CDC use a statistical measure called the standardized infection ratio (SIR) to assess the burden of HAI and to track progress in prevention. The SIR can be used to compare the number of HAI in a healthcare facility, a location within the facility, or across facilities statewide to the number of infections predicted based on national HAI data across the United States. A statistically significant SIR measuring below 1.0 means the state, facility, or location is performing better than predicted. A statistically significant SIR above 1.0 means the state, facility, or location is performing worse than predicted. For dialysis centers, SIRs are calculated and can be used for blood stream infections; however, rates, rather than SIRs, are used for other types of dialysis-related infections. A rate is a proportion, the number of events divided by the size of population at risk. Rates of infections in a state or healthcare facility that are higher than the national rates indicate the need for assessment and enhanced prevention actions. The first baseline period for various HAI that the state and nation track were developed during the period 2006-2011. As noted above, a new uniform baseline period for all tracked HAI was established in 2016 using 2015 data, called "the 2015 baseline." The 2015 baseline will be used to evaluate progress on the prevention of HAI through the year 2020, which would allow HAI to align with the broader Healthy People 2020 targets and planning. The data in this report are based on comparing the numbers of HAI in facilities in 2017 to the 2015 baseline.

Results for 2017

Six HAI have been reported to the Connecticut DPH from acute care hospitals (see the table below). A seventh, Ventilator Associated Events (VAE) in Long Term Acute Care Hospitals (LTACH) are now being added. Some are tracked by location type, some only facility-wide. Four HAI types are tracked in long term care hospitals, and one in inpatient rehabilitation facilities (IRF). Two infection types are reported in outpatient hemodialysis centers.

The following table summarizes the results for 2017. The national 2015 SIR baseline, is 0.99 - 1.0, and the national dialysis local access site infection (LASI) rate = 0.51 per 100 patient-months. Green and red colored Connecticut numbers are "statistically different" which means that their difference from the national SIR is not likely due to chance. Those in **green** are statistically "**better**" and those in **red**, statistically "**worse.**" Those in black may be higher or lower than the national SIR, but the difference might be just due to chance.

TABLE 1: 2017 HAI Reporting, Connecticut (Standardized Infection Ratios)										
Facility Type	Location	Patient type	CLABSI	CAUTI	VAE	SSI (COLO/HYST)	MRSA	C. diff	BSI	LASI
ACH	Overall	All	**0.95**	**1.12**		**0.86/0.80**	**0.78**	**0.89**		
ACH	ICU	Adult	**0.82**	**1.13**						
ACH	ICU	Pedi	**1.54**	**1.67**						
ACH	ICU	NICU	**0.71**							
ACH	Ward	Adult	**1.08**	**1.09**						
ACH	Ward	Pedi	**2.55**							
LTACH	Overall		**0.30**	**1.58**	**0.20**		**0.13**	**0.26**		
LTACH	ICU		**0.25**	**1.50**	**0.58**					
LTACH	Ward		**0.34**	**2.28**	**0.11**					
IRF				**2.75**						
Dialysis									**1.02**	**0.78***

* Rate per 100 patient months

Not reported/applicable

Too few predicted to calculate SIR

ACH = acute care hospital
BSI = blood stream infection
C. diff = laboratory-identified *Clostridium difficile* infection
CLABSI = central line associated blood stream infections
CAUTI = catheter associated urinary tract infections
Dialysis = outpatient hemodialysis center
ICU = intensive care unit
IRF = inpatient rehabilitation facility
LASI = local access site infection
LTACH = long term acute care hospital
MRSA = laboratory-identified methicillin-resistant *Staphylococcus aureus* bacteremia (BSI)
Pedi = pediatric
SIR = standardized infection ratio
SSI COLO = colon surgery infections
SSI HSYT =abdominal hysterectomy infections

Detailed data are on the DPH website by type of HAI and facility.

Progress in CT toward national 2020 reduction goals

The national HAI prevention plan set national 2020 HAI reduction goals for acute care hospitals, but not yet other healthcare settings. The following table documents Connecticut's progress toward achieving the national goals for acute care hospitals during the current (2015-2020) planning and action period.

TABLE 2: Progress toward achieving 2020 HAI prevention goals, Acute Care Hospitals 2015-2017 (Standardized Infection Ratios, SIRs)						
HAI Type	2015 CT	2015 US	2016 CT	2016 US	2017 CT	**2020 Goal**
CLABSI	1.16	0.99	1.03	0.93	0.95	**0.50**
CAUTI	1.00	0.99	0.95	0.89	1.12	**0.75**
SSI COLO	1.04	1.00	1.16	0.93	0.86	**0.70**
SSI HYST	1.15	1.00	0.96	0.87	0.80	**0.70**
MRSA	1.00	1.00	1.06	0.94	0.78	**0.50**
C. diff	1.19	0.99	0.89	0.92	0.89	**0.70**

The baseline benchmark for each targeted HAI is set at the beginning of each planning period is developed from the amount of that HAI across the nation as a whole during the baseline year. As reflected in the table that baseline level of HAI is set at an SIR of 1 (0.99-1.0). Connecticut data can be compared to the national benchmark during the baseline year. Both national and Connecticut data can be compared and tracked against the baseline in subsequent years to assess progress toward achieving HAI prevention goals.

Based on advice from experts, the federal Department of Health and Human Services sets reduction goal for each of the key targeted HAI. They expect a 50% reduction in CLABSI between the 2015 baseline year and the 2020 target year. Likewise, CAUTI are targeted to reduce by 25%, SSIs by 30%, MRSA 50% and C. diff 30%. These reductions from a baseline SIR of 1.0 translate into the SIR goals listed in the far right column.

In the 2015 baseline year, Connecticut was higher than the nation except for CAUTI and MRSA. In 2016 the nation as a whole made progress in reducing all HAI, while in Connecticut good progress was made against C. diff and SSI HYST. National data for 2017 is not yet publicly available, but Connecticut data is, and in Connecticut we have seen a consistent decrease in CLABSI; if the trend holds, Connecticut will approach but not necessarily achieve the national 50% reduction goal. CAUTI increased in 2017 in Connecticut. COLO and HYST both showed reductions in 2017; if the trends continue, the national 30% reduction goal (SIR 0.7) will likely be met. The MRSA SIR will achieve its target if the Connecticut reduction trend continues. The C. diff SIR has flattened over the past year; if progress occurs again, we could achieve the target.

Validation

Data must be validated to ensure timeliness, completeness, accuracy, and compliance with NHSN reporting protocols. C.G.S. 19a-490o stipulates that the data should be able to be validated. The DPH HAI Program works to ensure that Connecticut facilities are interpreting and applying these definitions consistently by applying its own data validation process to review the data for completeness and accuracy. NHSN has a series of internal logic checks that prevent users from entering inaccurate data. Further data checks are conducted by the DPH HAI Program using data output from NHSN aimed at identifying data quality issues. DPH HAI Program staff also periodically contact facility reporting partners to review their facilities' data, and to ask facility users to resolve data quality "alerts."

Finally, as resources permit, DPH HAI Program epidemiologists visit healthcare facilities to perform data validation studies, which include audits of patient medical records. These chart reviews are intended to identify cases that have been misclassified and incorrectly reported. Inconsistencies are discussed with the facility and addressed accordingly within NHSN to ensure adherence to the reporting guidelines. In total, these different data cleaning and validation activities act as a broad safety net to ensure that publicly-reported facility HAI data are accurate. The CDC has developed data validation standards, and a toolkit to help states validate their data.

While every year DPH checks on the quality of data with facility staff though "data checks" looking for outlier results and data that appear questionable, Connecticut has not performed the "gold standard" validation chart audits since 2013. We are currently engaged in performing validation employing chart audits again, using the CDC toolkit to guide our work. Using the CDC validation toolkit, we are performing a validation of all the HAI reported in 2017 (CLABSI, CAUTI, SSI, VAE, laboratory-identified MRSA bacteremia, and laboratory-identified C. diff) on a sample of eight acute care hospitals. We anticipate continuing to perform this "gold standard" level of validation annually on a rotating sample of facilities, aiming to cover all facilities in 3-4 year cycles, and extending beyond ACH to include all types of facilities reporting NHSN data.

Targeted Assessment for Prevention (TAP)

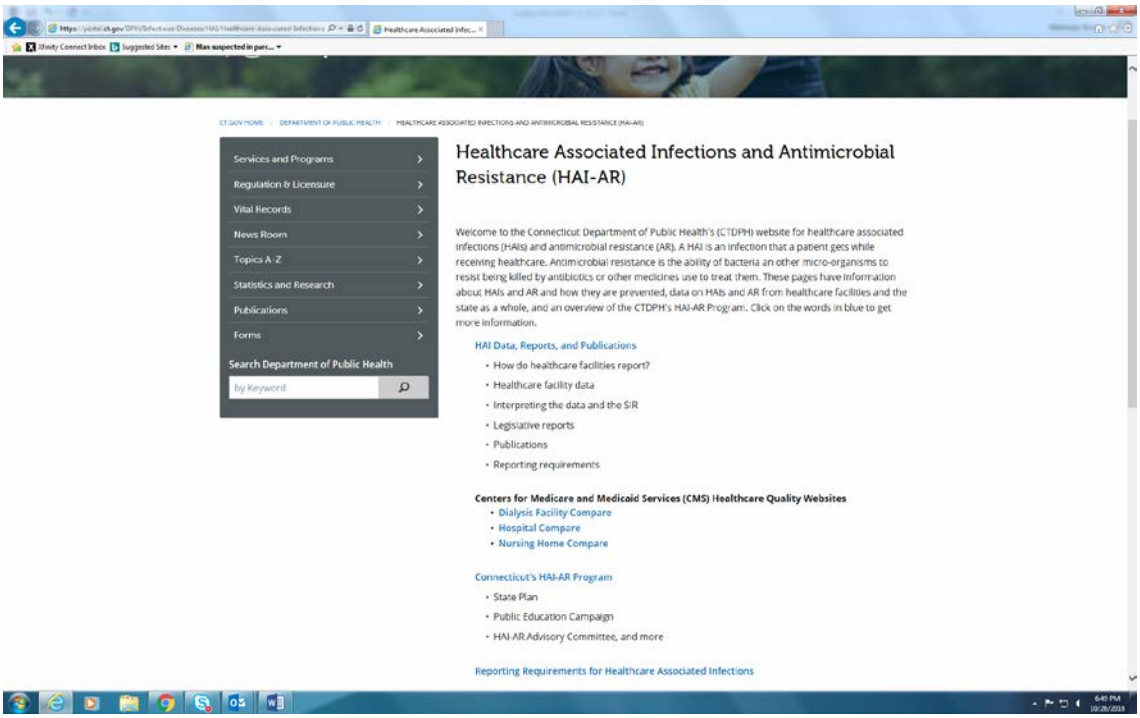
Using the data generated by NHSN and reported to DPH, we can perform analyses to target HAI prevention activities and technical assistance to healthcare facilities and providers. The Targeted Assessment for Prevention (TAP) Strategy is one framework CDC recommends for reducing HAI such as CAUTI and CLABSI.

As the data presented in this report indicate, Connecticut needs to make better progress at preventing CAUTI if we are to meet the national goal for CAUTI prevention by 2020. To better focus technical assistance for prevention, DPH is working with an Infectious Disease physician in-training completing the Leadership in Epidemiology, Antimicrobial Stewardship and Public Health (LEAP) Fellowship, funded by CDC. This LEAP Fellow is using TAP protocols and tools, which involves sophisticated data analysis techniques developed by CDC, to target specific hospitals and locations within hospitals. The analysis generates prevention goals for these facilities and locations. The CDC provides cutting edge training and technical assistance materials and DPH provides in-state and on-site support to the facilities. The facilities and locations are prioritized for enhanced infection control activities to ensure the highest quality infection control practices are used to prevent these infections and meet the national prevention goal.

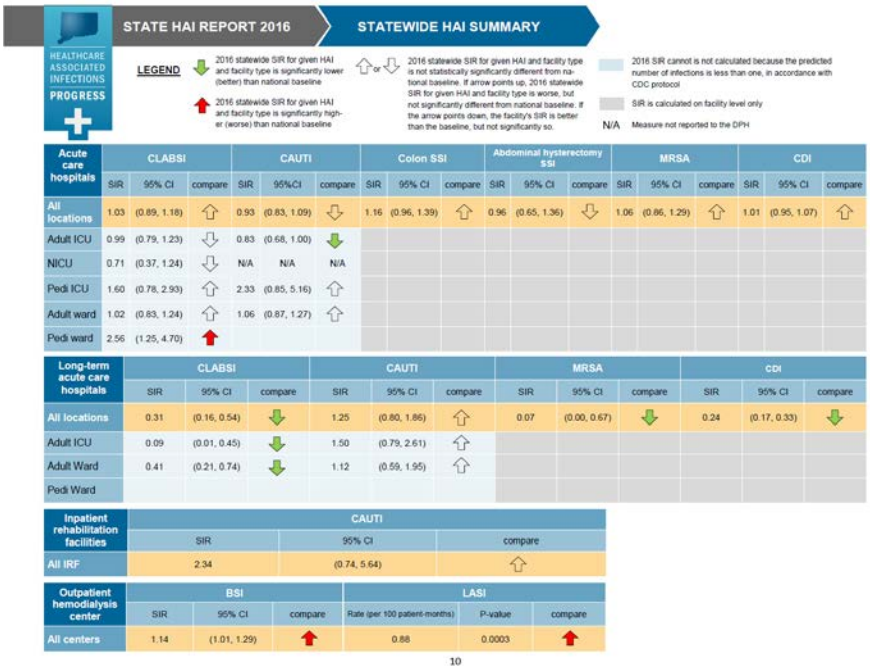
Continuing access to the data and reports: DPH website

The Connecticut Department of Public Health (DPH) HAI website is available through the DPH website at https://portal.ct.gov/DPH, and directly at https://portal.ct.gov/DPH/Infectious-Diseases/HAI/Healthcare-Associated-Infections-and-Antimicrobial-Resistance.

The HAI Program website can be found under "Online Resources" on the DPH launch page. It also includes the links required in state statute to the Centers for Medicare and Medicaid Services websites.



Data reported to DPH from the healthcare facilities are presented in formats recommended by the national CDC-Council of State and Territorial Epidemiologists (CSTE) working group on HAI data presentation best practices. This complex and detailed presentation format best for healthcare professionals, public health epidemiologists, and policymakers, including legislators. These data are presented in tables that show "aggregated" state-wide data and data listed by individual facilities for cross-facility comparison.



STATE HAI REPORT 2016 | STATEWIDE HAI SUMMARY

HEALTHCARE ASSOCIATED INFECTIONS PROGRESS

LEGEND

2016 statewide SIR for given HAI and facility type is significantly lower (better) than national baseline

2016 statewide SIR for given HAI and facility type is significantly higher (worse) than national baseline

2016 statewide SIR for given HAI and facility type is not statistically significantly different from national baseline. If arrow points up, 2016 statewide SIR for given HAI and facility type is worse, but not significantly different from national baseline. If the arrow points down, the facility's SIR is better than the baseline, but not significantly so.

2016 SIR cannot is not calculated because the predicted number of infections is less than one, in accordance with CDC protocol

SIR is calculated on facility level only

N/A Measure not reported to the DPH

Acute care hospitals	CLABSI			CAUTI			Colon SSI			Abdominal hysterectomy SSI			MRSA			CDI		
	SIR	95% CI	compare	SIR	95%CI	compare	SIR	95% CI	compare	SIR	95% CI	compare	SIR	95% CI	compare	SIR	95% CI	compare
All locations	1.03	(0.89, 1.18)	⇧	0.93	(0.83, 1.09)	⇩	1.16	(0.96, 1.39)	⇧	0.96	(0.65, 1.36)	⇩	1.06	(0.86, 1.29)	⇧	1.01	(0.95, 1.07)	⇧
Adult ICU	0.99	(0.79, 1.23)	⇩	0.83	(0.68, 1.00)	⇩												
NICU	0.71	(0.37, 1.24)	⇩	N/A	N/A	N/A												
Pedi ICU	1.60	(0.78, 2.93)	⇧	2.33	(0.85, 5.16)	⇧												
Adult ward	1.02	(0.83, 1.24)	⇧	1.06	(0.87, 1.27)	⇧												
Pedi ward	2.56	(1.25, 4.70)	⇧															

Long-term acute care hospitals	CLABSI			CAUTI			MRSA			CDI		
	SIR	95% CI	compare	SIR	95% CI	compare	SIR	95% CI	compare	SIR	95% CI	compare
All locations	0.31	(0.16, 0.54)	⇩	1.25	(0.80, 1.86)	⇧	0.07	(0.00, 0.67)	⇩	0.24	(0.17, 0.33)	⇩
Adult ICU	0.09	(0.01, 0.45)	⇩	1.50	(0.79, 2.61)	⇧						
Adult Ward	0.41	(0.21, 0.74)	⇩	1.12	(0.59, 1.95)	⇧						
Pedi Ward												

Inpatient rehabilitation facilities	CAUTI		
	SIR	95% CI	compare
All IRF	2.34	(0.74, 5.64)	⇧

Outpatient hemodialysis center	BSI			LASI		
	SIR	95% CI	compare	Rate (per 100 patient-months)	P-value	compare
All centers	1.14	(1.01, 1.29)	⇧	0.88	0.0003	⇧

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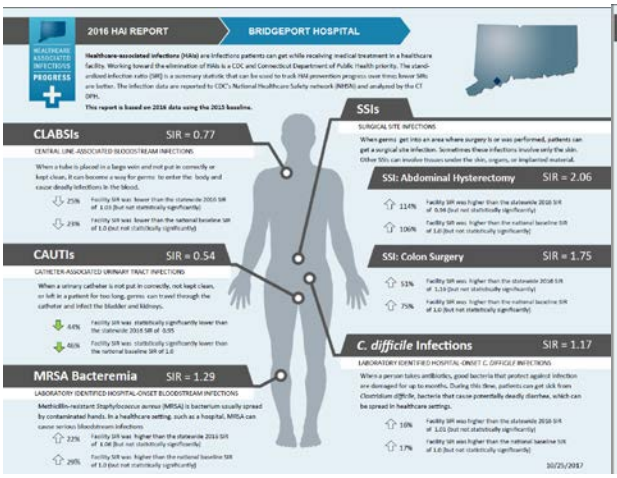
The provider report also includes individual facility report cards that combine all the data for that particular facility in one place, for example:



2016 HAI REPORT | BRIDGEPORT HOSPITAL

HEALTHCARE ASSOCIATED INFECTIONS PROGRESS

CLABSIs SIR = 0.77

CAUTIs SIR = 0.54

MRSA Bacteremia SIR = 1.29

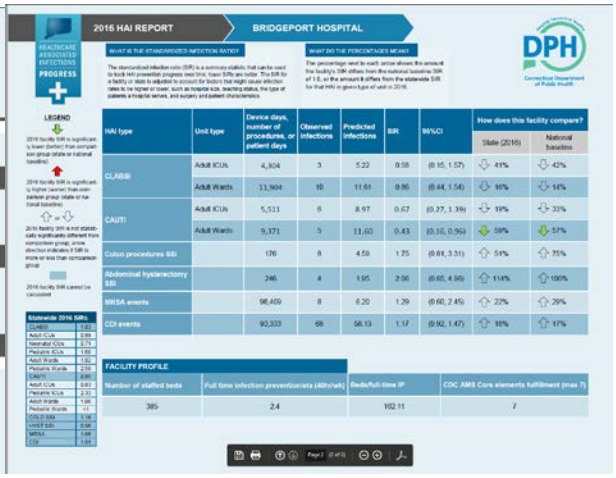
SSIs

SSI: Abdominal Hysterectomy SIR = 2.06

SSI: Colon Surgery SIR = 1.75

C. difficile Infections SIR = 1.17

10/25/2017



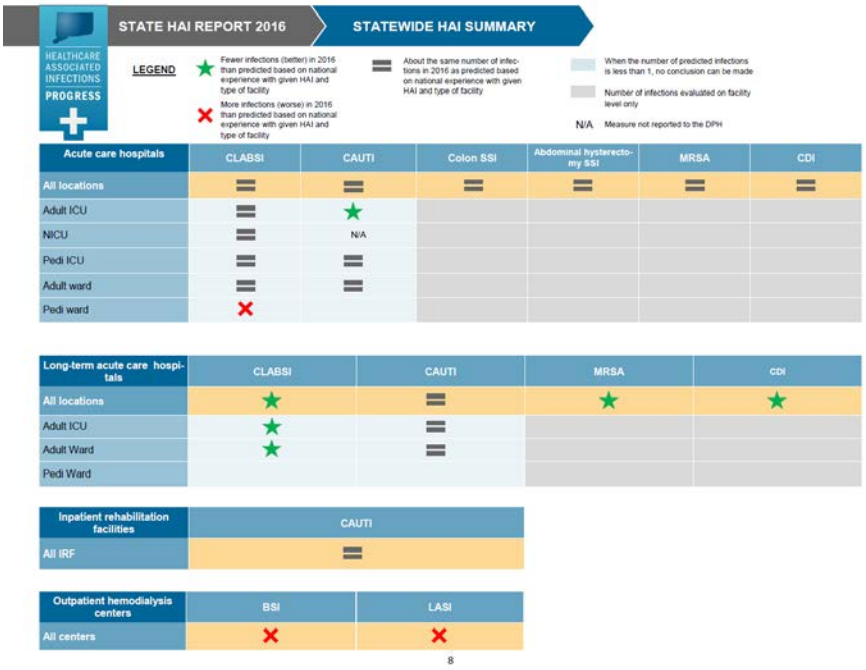
2016 HAI REPORT | BRIDGEPORT HOSPITAL

DPH

HAI type	Unit type	Device days, number of procedures, or patient days	Observed infections	Predicted infections	SIR	95%CI	How does this facility compare?	
							State (2016)	National baseline
CLABSI	Adult ICUs	4,304	3	5.22	0.58	(0.15, 1.57)	⇩ 41%	⇩ 42%
	Adult Wards	11,904	10	11.61	0.86	(0.44, 1.54)	⇩ 16%	⇩ 14%
CAUTI	Adult ICUs	5,511	5	8.97	0.67	(0.27, 1.39)	⇩ 19%	⇩ 33%
	Adult Wards	9,371	5	11.60	0.43	(0.16, 0.96)	⇩ 58%	⇩ 57%
Colon procedures SSI		176	8	4.58	1.75	(0.84, 3.31)	⇧ 51%	⇧ 75%
Abdominal hysterectomy SSI		246	4	1.85	2.06	(0.65, 4.96)	⇧ 114%	⇧ 100%
MRSA events		98,409	8	6.20	1.29	(0.60, 2.45)	⇧ 22%	⇧ 29%
CDI events		92,333	66	58.13	1.17	(0.92, 1.47)	⇧ 16%	⇧ 17%

FACILITY PROFILE			
Number of staffed beds	Full time infection preventionists (40hr/wk)	Beds/full-time IP	CDC AMS Core elements fulfillment (max 7)
385	2.4	102.11	7

The data are also presented in “consumer” data tables and individual facility reports using a simpler presentation topography.



STATE HAI REPORT 2016 — STATEWIDE HAI SUMMARY

HEALTHCARE ASSOCIATED INFECTIONS PROGRESS

LEGEND

★ Fewer infections (better) in 2016 than predicted based on national experience with given HAI and type of facility

✕ More infections (worse) in 2016 than predicted based on national experience with given HAI and type of facility

= About the same number of infections in 2016 as predicted based on national experience with given HAI and type of facility

When the number of predicted infections is less than 1, no conclusion can be made

Number of infections evaluated on facility level only

N/A Measure not reported to the DPH

Acute care hospitals	CLABSI	CAUTI	Colon SSI	Abdominal hysterectomy SSI	MRSA	CDI
All locations	=	=	=	=	=	=
Adult ICU	=	★				
NICU	=	N/A				
Pedi ICU	=	=				
Adult ward	=	=				
Pedi ward	✕					

Long-term acute care hospitals	CLABSI	CAUTI	MRSA	CDI
All locations	★	=	★	★
Adult ICU	★	=		
Adult Ward	★	=		
Pedi Ward				

Inpatient rehabilitation facilities	CAUTI
All IRF	=

Outpatient hemodialysis centers	BSI	LASI
All centers	✕	✕

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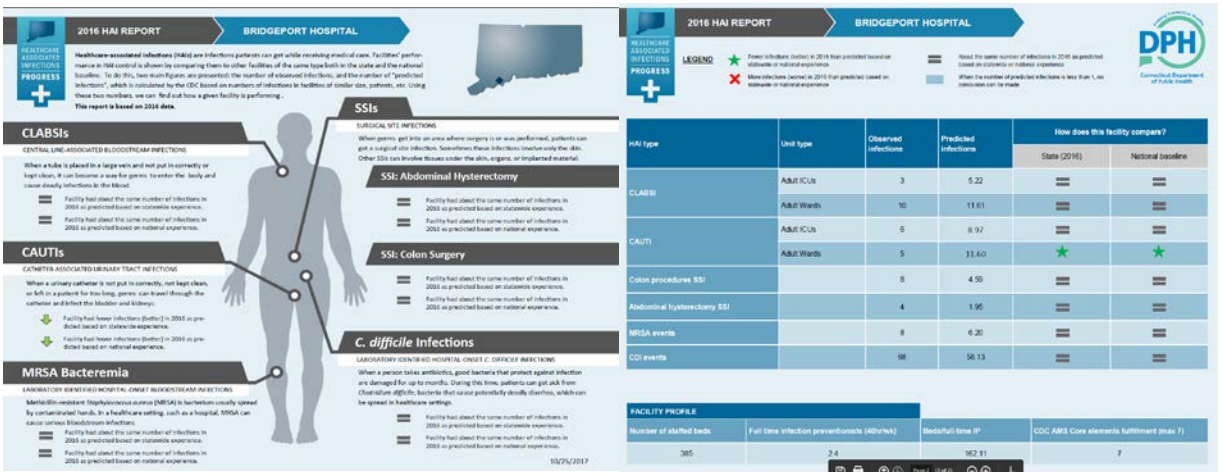
The report for consumers also includes individual facility reports:



2016 HAI REPORT — BRIDGEPORT HOSPITAL

HEALTHCARE ASSOCIATED INFECTIONS PROGRESS

CLABSIs

CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS

CAUTIs

CATHETER-ASSOCIATED URINARY TRACT INFECTIONS

MRSA Bacteremia

LABORATORY IDENTIFIED HOSPITAL-ONSET BLOODSTREAM INFECTIONS

SSIs

SURGICAL SITE INFECTIONS

SSI: Abdominal Hysterectomy

SSI: Colon Surgery

C. difficile Infections

LABORATORY IDENTIFIED HOSPITAL-ONSET *C. DIFFICILE* INFECTIONS

10/25/2017

2016 HAI REPORT — BRIDGEPORT HOSPITAL

DPH Connecticut Department of Public Health

LEGEND

HAI type	Unit type	Observed infections	Predicted infections	How does this facility compare? State (2016)	How does this facility compare? National baseline
CLABSI	Adult ICUs	3	5.22	=	=
	Adult Wards	10	11.61	=	=
CAUTI	Adult ICUs	6	8.97	=	=
	Adult Wards	5	11.60	★	★
Colon procedures SSI		8	4.59	=	=
Abdominal hysterectomy SSI		4	1.95	=	=
MRSA events		8	6.20	=	=
CDI events		68	58.13	=	=

FACILITY PROFILE

Number of staffed beds	Full time infection preventionists (40hr/wk)	Beds/full-time IP	CDC AMS Core elements fulfillment (max 7)
385	2.4	162.81	7

The website also includes a host of other information on the activities of the DPH HAI-AR program beyond the scope of our mandatory reporting activities, including prevention resources.

Conclusions and Recommendations

When the HAI program was first established in 2008, its focus was much narrower than it is now. Then the focus was on gathering HAI data from hospitals and making the data available to the public. With a decade of sustained support by the General Assembly and CDC, and with the collaborative efforts of public health staff and healthcare facilities and providers, we have maintained our efforts against HAI and have also expanded the scope of our activities beyond hospitals and beyond HAI reporting to include surveillance and containment of antimicrobial resistance (AR), which is often associated with healthcare.

Over these 10 years, the program has developed the high-quality infrastructure, staff, and collaborations needed to track and analyze the data and to use these "data for action" to target activities to prevent HAI and antimicrobial resistance in different healthcare settings. We have used existing infrastructure, including the federally-supported NHSN data management system, and expanded others, such as the Emerging Infections Program, to give us awareness of HAI and AR trends and outbreaks that is timely and detailed enough to track quality improvement, to assess the effects of our effort prevention efforts, and to quickly recognize and react to new challenges.

Dedicated effort is being made by all our stakeholders in Connecticut to give us access to these data and to use them for prevention. The partnerships we have developed with CSTE, CDC, and other states is reflected in a national learning community that is beneficial to our state. It is reflected in Connecticut's contributing to and adopting national best practices for data collection and reporting, evident in this report and on our website and the DPH Dashboard. Connecticut has recognized both the importance of HAI and AR by including them in the current State Health Assessment and State Health Improvement Plan, which ensures that all stakeholders in Connecticut are adequately aware of the public health issues posed by HAI and AR and are able to contribute effectively to address these problems in our state.

Though progress has been made, we need to continue our efforts and improve, especially with CAUTI. To make further progress and to sustain our success, Connecticut needs to build on work in partnership between clinical laboratories, the state laboratory, infection prevention and control professionals, and healthcare providers to contain and prevent HAI and AR. Using the TAP strategy we can identify those healthcare locations within health systems and within facilities to be more "surgical" in focusing containment and prevention activities, to better align the work of the public health and medical communities to use these data for action to benefit our citizens.

We hope that members of the General Assembly and staff will find our website accessible and useful. We are most interested in feedback from the General Assembly and other users. The staff of the DPH HAI-AR program are always available to discuss this technical information with the staff and members of the General Assembly, as well as other stakeholders.