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Annual Report on Health Care Associated Infections

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Medical Illustration of Candida: Courtesy of Centers of Disease Control and Prevention Newsroom Image Library

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Executive Summary

Health care-associated infections (HAIs) are infections that occur as a result of medical treatment at a health care facility. In the United States, an estimated 722,000 patients acquire HAIs annually, and as many as 75,000 of those patients die during their hospital stay (Magill, et al., 2014). In an effort to address the HAI problem and increase health care transparency in Texas, the Texas Department of State Health Services (DSHS) instituted a mandatory HAI reporting law which publishes HAI data from general hospitals and ambulatory surgery centers (ASCs) to the public. Therefore, helping to promote infection prevention activities within health care facilities and improving patient safety. This is the third annual report on Texas HAI data and summarizes data reported from January 2014 to December 2014 for the following infections:

- Central Line Associated Bloodstream Infections (CLABSI) data for any Adult, Pediatric or Neonatal Intensive Care Units (ICU) in general hospitals
- Catheter Associated Urinary Tract Infections (CAUTI) data for any Adult or Pediatric ICU in general hospitals
- Surgical Site Infections (SSIs) and related data for the following surgical procedure categories in pediatric/children's general hospitals:
    - Spinal surgery with instrumentation (Laminectomies, Fusions, Refusions)
    - Cardiac procedures (including Heart Transplant)
    - Ventricular shunt operations
- Surgical Site Infections (SSIs) and related data for the following surgical procedure categories in adult general hospitals and ASCs:
    - Colon surgeries
    - Hip arthroplasties
    - Knee arthroplasties
    - Abdominal hysterectomies
    - Vaginal hysterectomies
    - Coronary artery bypass grafts (with and without donor site incision)
    - Vascular procedures (abdominal aortic aneurysm repairs, carotid endarterectomies, peripheral vascular bypass grafts)

A total of 430 Texas health care facilities reported some HAI data to Texas in 2014 with 852 CLABSIs, 1,797 CAUTIs and 2,906 SSIs identified.

- The overall CLABSI Standardized Infection Ratio (SIR) was 0.455 which showed that Texas had a statistically significantly better experience than the baseline national 2006-2008 data.
- The overall CAUTI SIR was 1.086 which showed that Texas had a statistically significantly worse experience than the 2009 national baseline data.
- The overall SSI SIR was 0.725 which showed that Texas had a statistically significantly better experience than the baseline national 2006-2008 data.

Introduction

Each year, millions of patients contract infections in health care settings, creating a tremendous burden on health care systems and public health. In 1999, the Institute of Medicine (IOM) published the report, *To Err is Human* which called for a national effort to make health care safer. The report stated that as many as 98,000 patients die needlessly due to preventable medical harm particularly, health care-associated infections (HAIs) (Institute of Medicine, 2000). This report garnered national attention and put health care safety in the spot light. Since this report was published, strides have been made to reduce HAI risk in health care facilities. A recently published article by the Centers for Disease Control and Prevention (CDC) provided updated HAI estimates from data collected in 2011. They determined that approximately 722,000 HAIs occurred annually in the United States (Magill, et al., 2014). This is about 4% of hospitalized patients who developed one or more HAIs due to the care received in the hospital and of those, about 75,000 died during their hospital stay (Magill, et al., 2014).

Increased public awareness and understanding that these infections can be prevented has prompted consumers and policy makers to take action. The Patient Safety and Quality Improvement Act of 2005 was passed to improve patient safety by encouraging voluntary reporting of events that adversely affect patient outcomes (Agency for Healthcare Research and Quality, 2008). Such HAI reporting legislation that requires facilities to publically disclose their HAI incidence, works to encourage facilities to implement effective infection prevention measures to reduce their HAI risk. In the years that followed, many state legislatures passed laws that mandated public reporting of HAIs: Texas was among them.

Texas health care facilities began public reporting of specific health care-associated infection (HAI) data in October, 2011. This third annual Texas Health Care Safety report summarizes the HAI reporting activities of Texas health care facilities from January 2014 through December 2014 and is based on data submitted to the National Healthcare Safety Network (NHSN) by June 22, 2015. The information provided in this report is intended to inform patient consumers and health care personnel as well as encourage health care systems to move toward the elimination of HAIs. For those readers who are unfamiliar with health care terminology, a glossary can be found in Appendix A of this report.

Background

As the United States population ages, the number of people in need of health care services will increase. Between 2000 and 2050, the percent of the population aged 85 and over is projected to increase by up to 350% (Wiener, 2002). With increased use of health care services, the risk of developing an HAI becomes greater. These infections, caused by microorganisms that a patient is exposed to while receiving medical care at a health care facility, affect approximately one in every 20 patients during their hospital stay (US Department of Health and Human Services, 2010).

HAIs are a significant cause of morbidity and mortality in the United States. Each year, these infections are responsible for $28 to $33 billion dollars in avoidable health care expenses (US Department of Health and Human Services, 2010). In Texas, an estimated 200,000 HAIs occur annually, causing 8,000-9,000 deaths in the over 23 million residents (The Centers for Disease Control and Prevention, 2009). Fortunately, these infections are preventable and reduction efforts can save lives as well as avoid unnecessary medical costs.

As patient demand for health care transparency increases, more states are publically reporting health care quality information in consumer-directed reports. In an effort to increase health care transparency and accountability in Texas, the Texas Department of State Health Services (DSHS) established an advisory panel in 2005 to study and make recommendations for the collecting and reporting of HAIs. This panel was comprised of health care consumer advocates, infection preventionists, health care facility leaders, physicians and DSHS representatives. The following is a summary of the advisory panel recommendations that were adopted by DSHS.

Advisory Panel Recommendations for Reporting

Using the Centers for Disease Control and Prevention's (CDC) HAI surveillance definitions, the advisory panel recommended that licensed general hospitals (excluding comprehensive medical rehabilitation facilities), state owned or operated hospitals and ambulatory surgery centers report central line-associated primary bloodstream infections occurring in special care inpatient settings and surgical site infections associated with specific high-volume and high-risk surgical procedures. In order to accomplish this, the advisory panel recommended that Texas establish an electronic reporting system to collect HAI data and publish facility-specific HAI reports on a public web site. This would allow consumers to make informed choices about their own health care, as well as incentivize facilities to reduce their infection rates by improving patient safety and reducing health care costs.

The advisory panel recommended a phased-in approach to reporting. This would expand the types of infections reported over time as the state and its health care facilities built the infrastructure required for a robust and refined reporting system. These recommendations ensure that the best quality data are provided to the public as soon as possible.

In 2007, Texas joined the ranks of states that have created mandatory HAI reporting laws with the passing of Chapter 98 of the Texas Health and Safety Code, (Reporting of Health Care-Associated Infections and Preventable Adverse Events), and 25 Texas Administrative Code, Chapter 200 (Health Care-Associated Infections). In accordance with the advisory panel's recommendations, DSHS is required to 1) establish and implement the Texas HAI Reporting System, 2) provide education and training to stakeholders, 3) verify the accuracy and completeness of data reported, 4) compile and make available to the public a data summary by health care facility at least annually, 5) allow health care facilities to submit concise written comments regarding their HAI reports for public view and 6) enforce reporting mandates. Legislation was also amended to include preventable adverse events (PAE) reporting and required the addition of 4 health care quality improvement professionals to the advisory panel. The summary results of PAE reporting will be discussed in a separate report once PAE reporting is implemented and a year of data is available for analysis.

The Texas State Advisory Panel on Public Reporting of HAIs and PAEs has reached many milestones since its inception in 2005. Appendix B describes these important accomplishments. The advisory panel continues to guide implementation efforts in the state and meets regularly to advise DSHS regarding health care safety matters. For a full list of 2014 Advisory Panel Members, see Appendix C.

Mandated HAI Reporting Schedule

As suggested by the advisory panel, DSHS implemented a phase-in schedule for HAI reporting. Starting in 2011, general hospitals (both pediatric and adult) were required to report central line-associated bloodstream infections (CLABSI) that occurred in special care units. Ambulatory surgery centers (ASCs) and adult general hospitals were also required to report surgical site infections associated with knee prosthesis procedures (KPRO), hip prosthesis procedures (HPRO), and cardiac artery bypass grafts (CBGB and CBGC). Pediatric general hospitals (i.e. children's hospitals) were required to report surgical site infections associated with ventricular shunt procedures (VSHN), cardiac surgeries (CARD) and heart transplants (HTP).

Additional surgical procedures were phased in starting January 1, 2013. These included vaginal hysterectomies (VHYS), abdominal hysterectomies (HYST), colon procedures (COLO), peripheral vascular bypass grafts (PVBY), carotid endarterectomies (CEA), abdominal aortic aneurysm repair (AAA), spinal fusions (FUSN), spinal refusions (RFUSN) and laminectomies (LAM). Catheter associated urinary tract infection (CAUTI) reporting began July 2013 for general hospitals to report from any intensive care unit (ICU) locations (excluding neonatal ICUs). See Table 1 for the complete phase-in reporting schedule.

Table 1. Texas HAI Reporting Schedule			
Phase	**HAI**	**Facility Type/Unit**	**Start Date**
1	CLABSI: Bloodstream infection in patient with central line	All General Hospital ICUs	10/1/11
	KPRO: Arthroplasty of knee	ADULT General Hospitals and ASCs	10/1/11
	VSHN: Ventricular shunt operations, including revision and removal of shunt	PEDIATRIC General Hospitals	10/1/11
2	HPRO: Arthroplasty of hip	ADULT General Hospitals and ASCs	1/1/12
	CBGB: Procedure to perform direct revascularization of the heart; includes obtaining vein from donor site	ADULT General Hospitals and ASCs	1/1/12
	CBGC: Procedure to perform direct vascularization of the heart	ADULT General Hospitals and ASCs	1/1/12
	CARD: Procedures on the heart; includes valves or septum; does not include coronary artery bypass graft, surgery on vessels, heart transplantation, or pacemaker implantation	PEDIATRIC General Hospitals	1/1/12
	HTP: Transplantation of heart	PEDIATRIC General Hospitals	1/1/12
3	VHYS: Removal of uterus via vagina; includes laparoscopic	ADULT General Hospitals and ASCs	1/1/13
	HYST: Removal of uterus through abdominal wall; includes that by laparoscope	ADULT General Hospitals and ASCs	1/1/13
	COLO: Incision, resection, or anastomosis of large intestine; includes large-to-small & small-to-large bowel anastomosis; not rectal operations	ADULT General Hospitals and ASCs	1/1/13
	PVBY: Bypass operations on peripheral arteries	ADULT General Hospitals and ASCs	1/1/13
	CEA: Endarterectomy on vessels of head and neck (includes carotid artery and jugular vein)	ADULT General Hospitals and ASCs	1/1/13
	AAA: Resection of abdominal aorta with anastomosis or replacement	ADULT General Hospitals and ASCs	1/1/13
	FUSN: Immobilization of spinal column	PEDIATRIC General Hospitals	1/1/13
	RFUSN: Refusion of spine	PEDIATRIC General Hospitals	1/1/13
	LAM: Exploration or decompression of spinal cord through excision or incision into vertebral structures	PEDIATRIC General Hospitals	1/1/13
4	CAUTI: Urinary Tract Infections in patients with a urinary catheter.	All general hospital ICUs (excluding NICUs)	7/1/13

Education and Training

DSHS has partnered with various professional organizations to provide wide-spread education and training to as many health care professionals in Texas as possible. Since 2010, the DSHS Health Care Safety Program staff have presented at numerous conferences and functions for various stake-holder organizations. Most noteworthy are the local chapter meetings and conferences for the Association for Professionals in Infection Control and Epidemiology (APIC), the Texas Society of Infection Control and Prevention (TSICP), Texas Ambulatory Surgery Center Society (TASCS), Texas Medical Association (TMA), Texas Association for Healthcare Quality (TAHQ), Texas Medical Foundation Health Quality Institute (TMF) and the Texas Hospital Association Foundation (THAF).

The Texas 83rd Legislature (2013) awarded DSHS Exceptional Item funds for fiscal years 2014 and 2015 in order to reduce the burden of *Clostridium difficile* infection (CDI) in Texas Medicare & Medicaid recipients. These monies were used to educate health care providers regarding necessary CDI prevention and control measures.

In 2014, DSHS contracted with TSICP to perform trainings to infection preventionists regarding *C. difficile* and Multidrug-Resistant Organisms (MDROs) in 18 cities across Texas. The purpose of this educational activity was to enhance the knowledge, skills, and practice of Infection Preventionists by addressing surveillance methods and identifying evidence-based practices for preventing MDROs and *C. difficile* in health care settings. Four hundred and ninety-one participants completed the training, including health care professionals from hospitals, long term care facilities, home health agencies, public health departments, state agencies, professional organizations and foundations, private consultants, and others.

The Texas Department of Aging and Disability Services (DADS) also partnered with DSHS to conduct trainings to healthcare workers on Infection Control in long-term care settings. The training covered topics ranging from pathogen transmission and infection surveillance to vaccine preventable diseases and MDROs. In addition to these training sessions, DADS also partnered with DSHS to provide infection prevention training to State-Supported Living Centers (SSLCs) which included on-site evaluations by certified infection preventionists to identify gaps in infection prevention and help mitigate any issues identified. For each SSLC, a set of Infection Prevention reference texts were provided as an additional resource/tool to aid in infection prevention efforts.

Prevention Collaboratives

In addition to the education and training mentioned above, DSHS also initiated significant collaborations with various organizations listed below. Table 2 shows a summary of the Texas sponsored prevention collaboratives.

Table 2. HAI Prevention Collaboratives

Organization	Term	Purpose
Texas Society of Infection Control and Prevention (TSICP)	FY 14-15	Infection control and prevention training regarding surveillance, prevention, and control of MDROs and *C. difficile.*
University of Texas Health Science Center (UTHSC)	FY 14-15	Evaluate intra-hospital transmission of *C. difficile*.
University of Houston (UH)	FY 14-15	Community household environmental studies on potentially pathogenic *C. difficile* and to create a Clinical Risk Index for Primary *C. difficile* Infection.
Texas Hospital Association Foundation (THAF)	FY 14	Administered infection control survey to member hospitals to assess infection control practice and document examples of best practice.

Methods

This report contains self-reported HAI data from 430 Texas health care facilities and contains information about infections that occurred from January 2014 through December 2014. These data were downloaded from NHSN on June 22, 2015.Therefore, any changes or updates to the data after this date will not be reflected in this report.

National Healthcare Safety Network (NHSN)

In order to collect large amounts of data from health care facilities and implement Texas HAI reporting, a database management system with a secure electronic interface was required. The most widely used HAI reporting database is the National Healthcare Safety Network (NHSN), maintained by the Division of Healthcare Quality Promotion (DHQP) at the CDC. NHSN is a voluntary, secure, internet-based surveillance system that integrates patient safety and health care worker safety surveillance and has been utilized extensively by many states for HAI reporting. As of December 16, 2014 a total of 13,280 health care facilities were enrolled in NHSN (The Centers for Disease Control and Prevention, 2014). These enrolled health care facilities include acute care hospitals, long-term acute care hospitals, psychiatric hospitals, rehabilitation hospitals, outpatient dialysis centers, ambulatory surgery centers, and long term care facilities.

NHSN is designed to accommodate the routine transfer of large amounts of health care data from the thousands of facilities reporting into the system. In order to assist in this process, many software vendors have developed compatible software systems for uploading the large facility data files into NHSN. This is especially helpful for large facilities that perform a high volume of surgeries on a regular basis.

Another important feature of the NHSN reporting system is that participating facilities are required to use standardized CDC definitions for identifying HAIs. Surveillance definitions have been in place since 2008 for CLABSI and SSI and continue to be revised as HAI understanding increases (The Centers for Disease Control and Prevention, 2012). These standardized definitions enable facilities' HAI experience to be comparable to health care facilities, nationally. To aid in the use of these standardized definitions, CDC provides extensive online training and educational materials that facilities can use to educate themselves on the use of surveillance protocols and data entry.

In 2011, NHSN was designated as the web-based electronic reporting system for Texas HAI reporting. In addition to state reporting, the Center for Medicare and Medicaid Services (CMS) also requires hospitals enrolled in the Hospital Inpatient Quality Reporting Program to report to NHSN all CLABSIs in adult, pediatric and neonatal ICUs and SSIs related to colon surgeries and abdominal hysterectomies in order to receive full reimbursement for services. These data are also posted for public reporting on the U.S. Department of Health and Human Services (DHHS) Hospital Compare website (Centers for Medicare and Medicaid Services, 2012). However, it is important to note that the CMS NHSN data reports will differ from Texas NHSN data reports. This is due to differences in reporting requirements, data submission deadlines, and how the standardized infection ratio (SIR) is calculated.

Data Quality Assurance

It is the responsibility of each facility to ensure data have been accurately collected and reported in accordance with NHSN protocols. However, to aid facilities, NHSN and DSHS have instituted routine data checks to identify data quality issues that require facility attention. Between the DSHS notifications and the internal logic checks built into NHSN, health care facilities are given several opportunities to review and correct data inconsistencies prior to publication of their data summaries.

NHSN

Within the NHSN system there are internal data logic checks and rules built into the web interface that help reduce the occurrence of common data entry error. These checks are designed to reduce keystroke errors and provide a mechanism for assuring the validity of data entered into NHSN. For example, the following are some of the logic checks NHSN performs on date data entered into the system:

- Date procedure was performed must be the same date or before the date the patient's infection occurred
- Date procedure was performed must be the same date or after the patient's date of birth
- Patient's date of birth must be the same date or after 01/01/1890 and the same date or before the current date
- Patient's date of birth must be the same date or before the date the patient's infection occurred
- Patient's date of birth must be the same date or before the date the patient was admitted to the hospital
- Date the patient's infection occurred must be the same date or after the date the patient was admitted to the hospital

Another data accuracy tool built into the reporting system is the NHSN Action List. This list contains various data error alerts that are displayed upon logging into NHSN. This list shows users whether a facility has any missing or incomplete records entered into NHSN and requires user action in order to resolve these data issues. See Appendix D: Missing/Incomplete Alerts list for a detailed description of these NHSN data quality alerts.

DSHS

Along with the NHSN data checks, DSHS also performs several checks for data consistency. Every quarter, DSHS provides facilities with a facility-specific Internal Data Review Report showing the number of CAUTI, CLABSI, SSI and Procedure records that were downloaded from NHSN for a given reporting time period. Facilities can then compare the DSHS HAI record numbers to their internal HAI record numbers to determine if all records were entered into NHSN. In addition, DSHS also creates reports to identify facilities with data quality issues. Some of these issues include incomplete records, and inconsistent reporting plans. When this occurs, facility contacts are notified and follow-up is provided to ensure facilities are aware of their data errors and given the opportunity to verify and correct their data prior to data publication.

DSHS has also performed data verification to review HAIs reported from facilities with statistically significantly high SIRs. These facilities were identified for each half year (i.e. January – June 2014 and July – December 2014) and a DSHS staff member performed a site visit to review the reported HAIs and surveillance practices. This process was used to identify false positives and to determine if there were any areas for improvement in the infection prevention practices of the facility. If areas for improvement were identified or the facility was found to have significantly high SIRs in the following round of data verification, an HAI Epidemiologist was consulted to review appropriate infection prevention practices with the facilities, as needed.

In 2014, 65 facilities were identified as having a statistically significantly high SIR. Due to a shortage of DSHS auditors, DSHS contracted with Infection Prevention and Management Associates, Inc. (IPMA) to help complete the audits. Less than 10% of the records reviewed were over-reported and those that were misclassified represented the more complex cases. Table 3 below shows a summary of the audit results for 2014.

Table 3. Audit Results Summary for 2014

	January – June	July - December	Total
Total Records Reported as HAIs	286	263	549
Total Records Verified as HAIs	274	261	535
% Reported Correctly	**96%**	**99%**	**97%**

Contact Management System (TxHSN)

Data downloaded from NHSN are uploaded into the Texas Health Care Safety Network (TxHSN) where HAI data are saved and used to populate the published facility specific HAI reports. In addition to being a data warehouse, the TxHSN system is also designed to keep track of health care facilities' reporting status and contact information. Annually, letters are sent to all Texas HAI reporting-eligible health care facilities (i.e. general hospitals and ASCs) requesting them to inform DSHS of any changes in their reporting status or whether they are still required to report. Changes in reporting status may occur due to the opening/closing of ICUs or changes to surgical services provided. Facilities are also given an opportunity to submit contact information for up to two staff members who will be contacted by DSHS for questions or notifications regarding HAI reporting. Designated facility contacts are responsible for maintaining communications with DSHS and updating any facility or contact changes.

Reporting Schedule and Data Deadlines

NHSN data downloads occur 8 times per year—twice a quarter—and follow a strict timeline. The reporting timeline breaks down the calendar year into 4 reporting time periods: the first quarter of the year (January through March) or Q1, the first half of the year (January through June) or H1, the third quarter (July through September) or Q3, and the second half of the year (July through December) or H2 (see Table 3).

In order to aid facilities in the reporting process, TxHSN has an email notification system that enables DSHS staff to send and track emails to the facilities' designated contacts. This enables DSHS to send reporting deadline reminders to facility contacts throughout the year and helps synchronize the reporting schedule. For each of the reporting time periods, facility contacts are notified and given an opportunity to check and correct data in NHSN.

In accordance with NHSN Rules of Behavior, facilities must enter their HAI data into NHSN within 30 days of the end of the reporting month. For example, facilities must enter all April data by the end of May. DSHS will download a preliminary set of NHSN data approximately 60 days after the end of the calendar quarter to perform Data Reconciliation. The dates for the first data download of the reporting time period are June 1, Sept 1, December 1 and March 1. Preliminary data are reviewed and compiled in facility-specific reports called Internal Data Review Reports which include record counts for SSIs, CLABSIs and Procedures. Fifteen days after the DSHS Data Reconciliation, the facility contacts receive an email notification from TxHSN. This email informs contacts that their Internal Data Review Report is ready to be reviewed in TxHSN and they should review their NHSN Action Items list. They will have 15 days to correct any errors before the final data pull occurs. The second and final data pull for the reporting time period is scheduled for July 1, October 1, January 1 and April 1. After this date, the data for the given time period cannot be changed. This ends the reporting process for Q1 and Q3 reporting time periods.

However, twice a year—for each half year—DSHS creates facility-specific HAI Reports that are published on the public website. When this happens, 15 days after the second and final data pull of the reporting time period, TxHSN facility users receive a second email to notify them that their Facility HAI Reports are ready to preview in TxHSN.

After facility contacts review the reports in TxHSN, they may wish to further explain what their data mean and may do so by submitting a comment in TxHSN. Facilities may also wish to provide additional information to the public about current infection prevention or quality improvement efforts being taken at their facility. Facilities will have 15 days to review the report and submit a public comment for review by DSHS. Once submitted, DSHS program staff can either approve or not approve the submitted comment. Approved comments are appended to the facility's HAI reports that are posted in December (for H1 data) and June (H2 data of the previous year). Comments may not be approved for any of the following reasons:

- Inappropriate language
- Refers to another health care facility
- Refers to another reporting time period
- Comment is submitted after the deadline for comments has passed
- Comment does not appear to be meant for display on the public report

Those comments that are not approved by DSHS are indicated as such in TxHSN and the facility may resubmit a second comment for review if the comment deadline has not passed. All approved comments will be displayed on the facility's HAI reports for the public to view.

Each facility will have two final facility-specific HAI reports generated for each half year. The Consumer Version of the report was created to be understood by a health care consumer or layperson who may not be familiar with the data or statistical processes. This version of the report shows the number of infections reported by the facility (Actual Number of Infections) and the number of infections predicted to occur (Predicted Number of Infections) during that time period based on the national benchmarks. Generally, if a facility reported fewer infections than were predicted, they were doing better than the national benchmark. If the facility reported more infections than were predicted, they were doing worse. However, because statistical significance cannot be determined by these numbers alone, this report also provides an interpretation under the National Comparison column to help the consumer interpret the numbers. Additionally, the number of HAIs that contributed to a patient's death is also shown on this version of the report.

For those health care professionals or persons who are more familiar with statistical processes, there is a detailed or Technical Version of the report that is also published on the website. This detailed report shows the numerator (the number of observed infections), the denominator (for CLABSI, central line days; for CAUTI, urinary catheter days; for SSI, number of surgical procedures performed), the predicted number of infections (based on national benchmarks), along with the SIR, upper and lower confidence intervals and statistical interpretation that provides a more statistically precise interpretation of the data presented in the report (see Appendix E for more information). As is shown on the Consumer Version of the report, the Technical Version also displays the number of HAIs that contributed to a patient's death.

Table 4. Texas HAI Reporting Deadlines				
Reporting Quarter	**Q1: Jan 1 – Mar 31**	**H1: Jan 1 – June 30**	**Q3: July 1 – Sept 30**	**H2: July 1 – Dec 31**
Data submission deadline (data entry into NHSN)	**According to NHSN rules: ~within 30 days of end of reporting month**			
Departmental data reconciliation (Data from NHSN –emails facility contacts ~15th)	1-Jun	1-Sep	1-Dec	1-Mar
Facility data corrections due (in NHSN)	30-Jun	30-Sep	31-Dec	31-Mar
DSHS data summary to facilities (DSHS sends email to contacts)	NA	15-Oct	NA	15-Apr
Facility comment period (Facility enters comments into TxHSN)	NA	30-Oct	NA	30-Apr
DSHS review of comments	NA	15-Nov	NA	15-May
Public posting of summary (with approved comments)	NA	1-Dec	NA	1-Jun

Facility Health Care Safety Reports Website

Once comments are approved, Facility-Specific Health Care Safety Reports are published on a public website that can be accessed at www.haitexas.org. From here, there is a link to the HAI Data website (http://txhsn.dshs.texas.gov/hai/) where consumers can search for HAI data by facility name, county or city and run facility-specific HAI reports.

Standardized Infection Ratio (SIR) Calculation

In the past, HAI data have been presented using infection incidence rates. This rate was calculated as the number of HAIs divided by the appropriate denominator. For CLABSIs, the denominator was central line days, for CAUTIs the denominator was urinary catheter days and for SSIs the denominator was the total number of surgical procedures performed. However, these rates did not take into consideration the differences between health care settings and therefore, made it difficult to accurately compare facilities' HAI experience.

On the other hand, the standardized infection ratio (SIR) can be used as a standardization method for summarizing HAI experience across any number of health care facilities or unit types. It can assess HAIs at a national, state, or local level and adjusts for patients of varying risk within each facility. Because of this, the SIR has become the new standard for comparing HAI incidence since 2009 (The Centers for Disease Control and Prevention, 2012). Simply put, the SIR compares the facility's actual HAI incidence to the baseline national HAI data—obtained from January 2006 through December 2008 for CLABSI and SSI and 2009 for CAUTI—and adjusts for several risk factors that are significantly associated with differences in infection incidence (Edwards J, 2009).

Having risk adjusted data means that different health care facilities can be accurately compared by adjusting for differences in severity of illness and other factors that may affect HAI risk. For example, one would expect a health care facility that performs complex procedures on very sick patients to have a higher infection rate than a hospital that performs less complex surgeries on healthier patients. Because of this, it is important to adjust for the number and proportion of high and low risk patients before comparing the infection rates of these facilities. The HAIs presented in this report are all risk adjusted and use the SIR as the standard of measurement. However, it is important to note that the methods of risk adjustment differ between the three types of infection described in this report: CLABSIs, CAUTIs and SSIs.

Central Line Associated Bloodstream Infections (CLABSIs) and Catheter Associated Urinary Tract Infections (CAUTIs)

For adult and pediatric ICU patients, CLABSI and CAUTI risk adjustment uses the type of patient care location, bed size of the patient care location and hospital affiliation with a medical school to determine the patient's risk for acquiring an infection (Malapiedi PJ, 2013). However, additional criteria may be used in certain settings. For example, the patient's birth weight is also used for CLABSI risk adjustment in neonatal intensive care units (NICUs). A complete list of NHSN patient care locations including location descriptions can be found on the NHSN website at: http://www.cdc.gov/nhsn/PDFs/pscManual/15LocationsDescriptions_current.pdf.

To illustrate the way the CLABSI and CAUTI SIRs are calculated and to show how it can be used as an HAI comparison metric, the following example data are displayed below:

	Observed Hospital CLABSI		**National CLABSI**
Location Type	**#CLABSI**	**#Central line-days**	**CLABSI rate***
Neurosurgical ICU	1	712	2.0
**defined as the number of CLABSIs per 1000 central line-days*			

This SIR is calculated by dividing the total number of observed CLABSI events by a "predicted" number of CLABSI events based on the national CLABSI rates. This "predicted" number is calculated by multiplying the National CLABSI rate with the number of central line days that occurred in the hospital unit and divide by 1000 (remember that the CLABSI rate is per 1000 central line days). The formula for calculating the predicted number of CLABSI for this unit is:

$$\frac{\text{(Observed central line days) * (National rate)}}{1000} = \frac{(712) * (2.0)}{1000} = 1.42$$

1.42 is the number of expected/predicted CLABSIs for this location at this hospital.

Therefore the SIR calculation is:

$$\text{SIR} = \frac{\text{(Observed \# CLABSIs)}}{\text{(Predicted \# CLABSIs)}} = \frac{1}{1.42} = 0.70$$

If the SIR is larger than 1, it means the health care facility reported more HAIs than predicted based on the national baseline and therefore, is doing worse than the national experience. If the SIR is less than 1, it means the health care facility reported fewer HAIs than expected and therefore, is doing better than the national experience. If the SIR is equal to 1, then the facility reported the same number of HAIs as expected and is doing about as well as the national experience. For the example shown above, a SIR of 0.70 means that the facility had 30% fewer CLABSIs than what was predicted and is therefore, 30% better than the national experience.

Although a SIR may indicate a facility is doing better or worse than the national experience, the statistical significance of that difference is important to note. Confidence intervals and p-values are used to determine this statistical significance. They determine whether the SIR is a result of chance or if the SIR indicates a true distinction from the national experience. A SIR that has a confidence interval (CI) that contains 1.0 or a p-value that is ≥ 0.05 should be interpreted as indicating there is no difference from the national HAI experience, regardless of whether the SIR is greater to or less than 1. Many times, a CI or p-value that does not indicate significance is due to not enough data available for a given time period.

Surgical Site Infections (SSIs)

The SSI SIR is calculated in a different way. For patients undergoing surgery, risk adjustment is calculated using logistic regression models. In 2014, the NHSN baseline data from 2006 – 2008 were used to determine the risk factors and the weight of each risk factor. The logistic regression model looks at several different risk factors that are specific to each type of surgical procedure. Each risk factor's contribution to the overall infection risk varies, depending on its effect. For example, risk factors for cardiac surgery include patient's age, the American Society of Anesthesiologists (ASA) score and the duration of the procedure. The risk factors for knee prosthesis procedures include the same as those for cardiac surgeries, but they are weighted differently. Knee prosthesis procedures also include additional risk factors such as the patient's gender, whether the procedure was a revision, and the number of hospital beds, among others. Risk factors for the different procedure categories are shown in Appendix F.

The risk of each individual surgery is then added up for each procedure category and is used to determine the predicted number of SSIs. The SIR is the number of observed SSIs divided by the number of expected SSIs. For a more detailed explanation of the SIR calculation, please see the National Healthcare Safety Network (NHSN) October 2010 newsletter at http://www.cdc.gov/nhsn/PDFs/Newsletters/NHSN_NL_OCT_2010SE_final.pdf.

Eligible Data

This report presents HAI surveillance data for calendar year 2014 that was reported to NHSN from eligible general hospitals and ambulatory surgery centers across Texas. These data were downloaded from NHSN on June 22, 2015.

Due to unavailable national baseline data, SIRs are not provided in this report for ASCs and Long Term Acute Care hospitals (LTAC). Secondary SSIs, or those infections that did not develop in the primary incision site of the surgical procedure are not included in the SIR calculation. In addition, months with missing or incomplete data are also excluded from the SIR calculation.

Results

The HAIs described in these analyses were identified using the January 2014 NHSN surveillance definitions and were collected on June 22nd, 2015 for the time period of January 1st, 2014 through December 31st, 2014. Please note that these data are self-reported from each health care facility and have not been formally validated by DSHS apart from the data review processes described previously.

Facility Summary Tables

Only 438 of the 879 eligible general hospitals and ASCs were required to report HAIs to Texas in 2013. The other facilities did not have ICUs nor did they perform any of the Texas reportable procedures; therefore, they did not have anything to report.

In 2014, 430 facilities reported HAI data to Texas (via NHSN). A summary of these health care facilities is shown in Table 5. Those facilities that were required to report but did not confer data rights to Texas in NHSN were referred to DSHS Regulatory Department for follow-up.

Table 5. Facility Type Summary

Facility Type	N	Percent of Facility Type Reporting HAI
General Hospital	293	68%
Ambulatory Surgery Center	54	13%
Surgical Hospital	40	9%
Critical Access Hospital	24	6%
Children's Hospital	14	3%
Orthopedic Hospital	3	1%
Oncology Hospital	1	<1%
Women's Hospital	1	<1%
All Facilities	**430**	**100%**

The majority of Texas health care facilities reporting HAI data to Texas in 2014 were general hospitals, making up 68% of the facilities that reported HAI data to DSHS. Tables 6 – 8 summarize the characteristics of the healthcare facilities that reported HAI data to Texas. Note that not all hospitals that reported HAI data to Texas via NHSN completed the annual facility survey where bed size, medical school affiliation and facility ownership data were obtained.

Table 6 shows the mean and total number of hospital beds and ICU beds that were set up and staffed by facility type. These hospitals had a total of 58,237 staffed beds (9,342 of which were

ICU beds) in Texas in 2014. The mean number of staffed beds in Texas hospitals was 159 and the mean number of staffed ICU beds was 26. There are no staffed ICU beds for Ambulatory Surgery Centers.

Table 6. Hospital Bed Summary Table					
Hospital Type	**# Facilities**	**Mean # Staffed Beds**	**Total # Staffed Beds**	**Mean # Staffed ICU Beds**	**Total # Staffed ICU Beds**
General Hospital	285	186	52,961	29	8,169
Children's Hospital	14	174	2,436	62	864
Surgical Hospital	40	30	1,194	2	89
Oncology Hospital	1	660	660	58	58
Critical Access Hospital	23	23	532	1	34
Women's Hospital	1	397	397	128	128
Orthopedic Hospital	3	19	57	0	0
All Hospitals	367	159	58,237	26	9,342

Table 7 lists facilities with and without medical school affiliation. This table shows that there were 71 (18%) facilities that were affiliated with a medical school and 296 (74%) that did not have medical school affiliation.

Table 7. Facility Frequency by Medical School Affiliation		
Medical School Affiliation	**No. Facilities**	**Percent of Total**
Medical School Affiliation	**71**	**18%**
Undergraduate	8	2%
Major	31	8%
Graduate	32	8%
No Medical School Affiliation	**296**	**74%**
*****Missing*****	**32**	**8%**

Table 8 summarizes the type of facility ownership. There were about the same number of not-for-profit health care facilities as there were for profit facilities. Only10% were physician owned and 6% were government run (this excludes veteran’s hospitals and other federal government-run health care facilities).

Table 8. Facility Frequency by Hospital Ownership		
Facility Ownership	**No. Hospitals**	**Percent of Total**
Not for Profit (including church)	162	41%
For Profit	172	43%
Physician-Owned	40	10%
Government	25	6%

Table 9 displays the number of ICUs reporting CLABSI and CAUTI by hospital type and ICU type. Because general hospitals accounted for 68% of the facilities that reported HAI in Texas, it is not surprising that a majority of the ICUs that reported CLABSI and CAUTI were from general hospitals. Also, of the 500 ICUs that reported, a majority (202) were defined as Medical/Surgical ICUs. Of the pediatric ICUs reporting HAI data to Texas, 26 of them were Pediatric Medical/Surgical ICUs as well.

Table 9. Number of Hospitals Reporting CLABSI and CAUTI by ICU Type						
ICU Type	**Critical Access**	**Children**	**General**	**Surgical**	**Women's**	**Total**
Burn		1	4			**5**
Cardiac			20			**20**
Cardiothoracic			23	1		**24**
Pediatric Cardiothoracic		3	2			**5**
Medical			49			**49**
Pediatric Medical			1			**1**
Medical/Surgical	8		190	3	1	**202**
Pediatric Medical/Surgical		10	16			**26**
Neurologic			2			**2**
Neurosurgical			15			**15**
NICU Level III		4	48	1		**53**
Surgical			27	1		**28**
Trauma			7			**7**
NICU Level II/III		6	55	1	1	**63**

Table 10 shows the number of facilities reporting SSIs by type of health care facility and surgical procedure category. As expected, a majority of the facilities that reported SSI data were general hospitals. Of the non-children's hospitals, abdominal hysterectomies (HYST) were reported the most, followed by vaginal hysterectomies (VHYS), colon procedures (COLO) and knee prosthesis procedures (KPRO). For children's hospitals, only 2 report performing heart transplant surgeries (HTP).

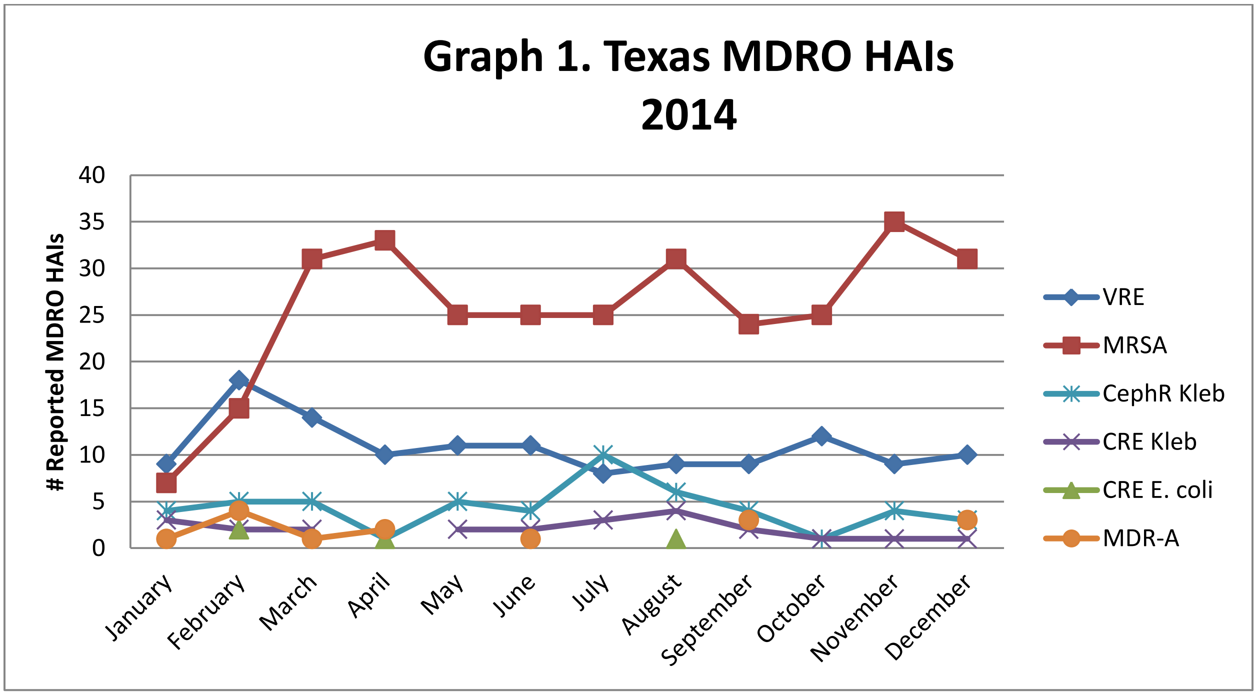
Table 10. Number of Facilities Reporting Inpatient and/or Outpatient SSI data by Procedure Category									
Procedure Type	**Surgery Centers**	**Critical Access**	**Children's Hospital**	**General Hospital**	**Cancer Hospital**	**Ortho Hospital**	**Surgical Hospital**	**Women's Hospitals**	**Total**
AAA				97			2		99
CARD			7						7
CBGB				132			4		136
CBGC				105			4		109
CEA				185			6		191
COLO	1	8		315	2	1	11	2	339
FUSN			12	2			5		19
HPRO		4		268	2	3	33		310
HTP			2						2
HYST	12	18		364	2		20	2	406
KPRO	2	5		283	1	3	41		333
LAM			8	3			3		14
PVBY				171			4		175
RFUSN			9	1					10
VHYS	17	10		334	2		17	1	364
VSHN			12						12

Table 11 shows the number of facilities reporting outpatient SSI data. Abdominal aortic aneurysm repairs (AAA), cardiac procedures (CARD), coronary bypass graft procedures (CBGB/CBGC), heart transplants (HTP), laminectomies (LAM), and refusions (RFUSN) are not included in this table because these procedures are complex and therefore, not performed as outpatient procedures. A majority of the outpatient procedures reported by hospitals and ASCs were abdominal and vaginal hysterectomies (HYST and VHYS).

Table 11. Number of Facilities Reporting Outpatient SSI data by Procedure Category								
Procedure Type	**Surgery Centers**	**Critical Access**	**Children's Hospital**	**General Hospital**	**Cancer Hospital**	**Surgical Hospital**	**Women's Hospitals**	**Total**
CEA				19		1		**20**
COLO	1			63	1	1	1	**67**
FUSN			1					**1**
HPRO				21	1	1		**23**
HYST	12	6		113	1	2	1	**135**
KPRO	2	1		41		6		**50**
PVBY				18		1		**19**
VHYS	17	4		112	1	4		**138**
VSHN			3					**3**

Texas Pathogen Summary Tables

The number of HAIs that were caused by Multidrug Resistant Organisms (MDROs) in 2014 is shown in Graph 1 below. It shows the number of MDROs reported to DSHS as HAIs in 2014. These MDROs include Vancomycin Resistant Enterococcus (VRE), Methicillin Resistant *Staphylococcus aureus* (MRSA), Carbapenem Resistant *Escherichia coli* (CRE E.coli), Carbapenem Resistant Klebsiella, Cephalosporin Resistant Klebsiella and Multidrug Resistant Acinetobacter (MDR-A). MRSA was reported the most often and with the most reported in November 2014.



Antibiograms are tables that show the overall profile of an organism's antibiotic susceptibility. They can be used to monitor trends in resistance and aid clinicians in selecting empiric antimicrobial therapies in a given geographical area.

Using the HAI pathogen data submitted to NHSN for 2014, Texas has developed a series of antibiograms to help evaluate trends in antibiotic susceptibility and resistance across the state. Table 12 and Table 13 show the 2014 Overall Texas HAI Antibiogram for gram-positive organisms/fungi and gram-negative organisms, respectively. These antibiograms contain data about the SSI, CLABSI and CAUTI pathogens reported to NHSN for 2014. The antibiotics are grouped by drug class. Please note that the percent shown in each cell represents the percent susceptible. Antimicrobials with 25 or fewer isolates tested per pathogen were excluded from this antibiogram.

There were 217 different pathogens reported in 2014. A majority of the pathogens reported were identified as *Escherichia coli*. This pathogen accounted for 962 (15%) of the 6,478 isolates reported in 2014. The next most commonly reported pathogen was *Staphylococcus aureus* with 797 (12%) reported, followed by *Enterococcus faecalis* (550 or 8.5%), C*andida albicans* (440 or 6.8%), and *Pseudomonas aeruginosa* (426 or 6.6%).

Regional antibiograms for the state of Texas are also provided in Appendix G of this report. The following map shows the 11 different regions in Texas. These regions are referred to as Health Service Regions (HSRs). HSRs 2/3, 4/5N, 6/5S and 9/10 are usually grouped together in analyses and are therefore grouped as such in the tables shown in Appendix G.

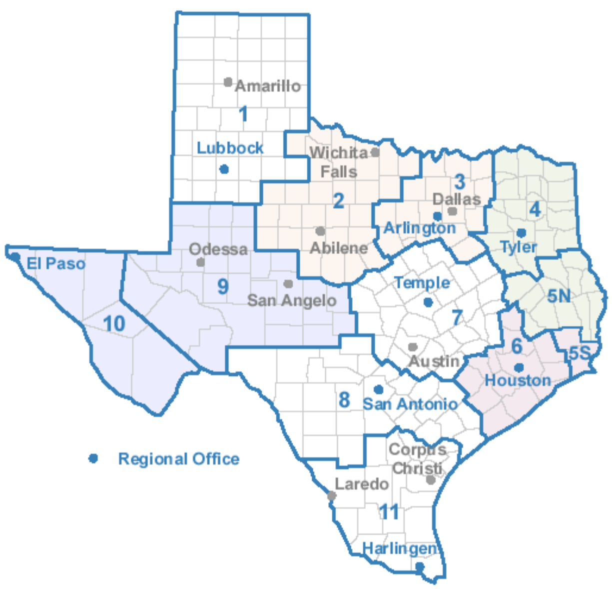


Table 14 shows the 2014 Overall Texas Antibiogram for CAUTIs. This antibiogram compiles CAUTI pathogen data from all ICU locations, except neonatal ICUs (NICUs). The most commonly reported pathogens associated with CAUTI infections were Candida/yeast and accounted for 522 of the 2,023 CAUTI pathogens reported. This was followed by *E. coli* (406) and then *K. pneumonia* (166).

Table 15 shows the 2014 Overall Texas Antibiogram for CLABSIs. This antibiogram compiles CLABSI pathogen data from all ICU locations. *S. aureus* was the most common pathogen responsible for CLABSI infections in Texas, accounting for 116 of the 989 CLABSI pathogens reported. The next most common pathogen was *S. epidermidis* (108 infections), followed by *E. faecalis* (105).

Table 16 shows the 2014 Overall Texas Antibiogram for SSIs. This is an aggregate of all pathogens identified as SSIs related to any of the reportable surgical procedures. The most common pathogen reported for SSIs was *S. aureus*, with 655 of the 3,466 SSI pathogens reported. This was followed by *E. coli*, which caused 614 infections.

Table 12. Texas Health Care Associated Infections (HAI) Gram Positive Organisms and Fungi Antibiogram, 2014

Antimicrobial Class				Antifungals	Beta-lactam penicillins		Cephalosporins		Fluoroquinolones			Glycopeptide	Lincosamide	Lipopeptides	Macrolides		Oxazolidinone	Penicillins				Tetracyclines			TMP/SMX
Antimicrobial	Gentamicin	Gentamicin-High Level Test	Streptomycin-High Level Test	Fluconazole	Ampicillin/ Sulbactam	Amoxicillin/ Clavulanic Acid	Cefazolin	Ceftriaxone	Ciprofloxacin	Levofloxacin	Moxifloxacin	Vancomycin	Clindamycin	Daptomycin	Rifampin	Erythromycin	Linezolid	Ampicillin	Methicillin	Oxacillin	Penicillin G	Doxycycline	Minocycline	Tetracycline	Trimethoprim/ Sulfamethoxazole
Fungi																									
Candida albicans				39 **82%**																					
Candida glabrata				36 **22%**																					
Gram Positive																									
Coagulase Negative Staphylococcus												119 **100%**	36 **39%**			40 **28%**								31 **84%**	
Enterococcus faecium		76 **88%**										149 **38%**		54 **93%**			113 **96%**	62 **34%**						29 **41%**	
Enterococcus faecalis		302 **75%**	77 **77%**						55 **71%**	86 **80%**		522 **98%**		120 **94%**	25 **44%**	49 **29%**	212 **93%**	217 **100%**			57 **100%**	32 **34%**		104 **25%**	
Enterococcus spp.		41 **88%**										139 **82%**					51 **92%**	57 **70%**							
Staphylococcus aureus	483 **95%**				32 **56%**	51 **51%**	51 **55%**	28 **61%**	223 **59%**	388 **64%**	117 **78%**	711 **100%**	691 **65%**	195 **100%**	495 **97%**	686 **44%**	369 **100%**	27 **11%**	60 **55%**	701 **55%**	28 **14%**	83 **95%**	59 **90%**	656 **92%**	656 **98%**
Staphylococcus epidermidis	77 **65%**					27 **15%**			30 **37%**	64 **38%**		238 **100%**	96 **30%**		71 **99%**	84 **23%**	47 **100%**			102 **18%**				73 **93%**	58 **41%**

Note: Antimicrobials with 25 or fewer isolates tested per pathogen were excluded from this antibiogram. The number on top indicates the total number of isolates and the percent susceptible is shown in bold.

Table 13. Texas Health Care Associated Infections (HAI) Gram Negative Organisms Antibiogram, 2014

Antimicrobial Class	Aminoglycosides			Beta-lactam penicillins				Carbapenems				Cephalosporins							Fluoroquinolones			Monobactams	Penicillins	Tetracycline	TMP/SMX
Antimicrobial	Amikacin	Gentamicin	Tobramycin	Ampicillin/ Sulbactam	Amoxicillin/ Clavulanic Acid	Piperacillin	Piperacillin/ Tazobactam	Doripenem	Ertapenem	Imipenem	Meropenem	Cefazolin	Cefepime	Cefotaxime	Ceftazidime	Ceftriaxone	Cefuroxime	Cefotetan	Ciprofloxacin	Levofloxacin	Moxifloxacin	Aztreonam	Ampicillin	Tetracycline	Trimethoprim/ Sulfamethoxazole
Gram Negative																									
Acinetobacter baumannii			15 **56%**										28 **36%**												
Enterobacter aerogenes	30 **100%**	58 **95%**	42 **93%**	26 **46%**	241 **72%**		54 **72%**		28 **96%**		37 **92%**		47 **94%**		29 **66%**	51 **65%**			38 **92%**	47 **94%**			27 **4%**		51 **92%**
Escherichia coli	577 **98%**	904 **85%**	714 **83%**	713 **42%**			831 **89%**	58 **97%**	306 **99%**	261 **99%**	540 **100%**	644 **73%**	676 **89%**	313 **87%**	449 **87%**	836 **88%**	355 **81%**	71 **100%**	621 **59%**	701 **57%**	78 **73%**	433 **90%**	837 **40%**	333 **61%**	833 **64%**
Enterobacter cloacae	99 **97%**	143 **99%**	119 **97%**	81 **14%**			133 **71%**		38 **95%**	55 **96%**	100 **99%**	74 **9%**	115 **93%**	70 **53%**	75 **64%**	121 **57%**	49 **14%**		100 **95%**	110 **93%**		69 **62%**	86 **3%**	53 **91%**	135 **90%**
Klebsiella oxytoca	33 **97%**	43 **98%**	39 **97%**	32 **72%**			36 **83%**				26 **92%**	35 **46%**	35 **94%**		26 **92%**	37 **86%**			36 **94%**	32 **94%**		25 **88%**	36 **6%**		39 **95%**
Klebsiella pneumoniae	200 **94%**	335 **92%**	271 **88%**	288 **72%**	101 **87%**		307 **88%**		126 **90%**	77 **92%**	195 **93%**	226 **83%**	254 **87%**	110 **88%**	174 **84%**	307 **88%**	126 **78%**	29 **100%**	227 **88%**	269 **85%**		167 **89%**	274 **4%**	126 **75%**	296 **82%**
Pseudomonas aeruginosa	245 **94%**	387 **86%**	340 **92%**			105 **71%**	370 **88%**	30 **80%**		131 **73%**	295 **85%**		351 **85%**		248 **82%**				355 **84%**	280 **81%**		175 **72%**			
Proteus mirabilis	57 **98%**	86 **90%**	62 **90%**	60 **72%**			74 **97%**		28 **100%**		41 **98%**	57 **68%**	63 **97%**		39 **97%**	77 **95%**			52 **67%**	78 **74%**			85 **65%**	32 **6%**	79 **70%**
Serratia marcescens		42 **100%**	28 **86%**										36 **94%**			39 **87%**			30 **97%**	32 **97%**					32 **94%**

Note: Antimicrobials with 25 or fewer isolates tested per pathogen were excluded from this antibiogram. The number on top indicates the total number of isolates and the percent susceptible is shown in bold.

Table 14. Texas Catheter Associated Urinary Tract Infection (CAUTI) Antibiogram, 2014

Antimicrobial Class	Aminoglycosides	Aminoglycosides	Aminoglycosides	Aminoglycosides	Aminoglycosides	Beta-lactam penicillins				Carbapenems			Cephalosporins						Fluoroquinolones			Glycopeptide	Lipopeptides	Monobactams	Oxazolidinone	Penicillins	Tetracyclines	TMP/SMX
Antimicrobial	**Amikacin**	**Gentamicin**	**Gentamicin-High Level Test**	**Streptomycin-High Level Test**	**Tobramycin**	**Ampicillin/ Sulbactam**	**Amoxicillin/ Clavulanic Acid**	**Piperacillin**	**Piperacillin/ Tazobactam**	**Ertapenem**	**Imipenem**	**Meropenem**	**Cefazolin**	**Cefepime**	**Cefotaxime**	**Ceftazidime**	**Ceftriaxone**	**Cefuroxime**	**Ciprofloxacin**	**Levofloxacin**	**Moxifloxacin**	**Vancomycin**	**Daptomycin**	**Aztreonam**	**Linezolid**	**Ampicillin**	**Tetracycline**	**Trimethoprim/ Sulfamethoxazole**
Escherichia coli	237 **98%**	385 **84%**			308 **82%**	296 **41%**	117 **66%**		335 **90%**	143 **100%**	96 **99%**	203 **100%**	258 **69%**	254 **88%**	113 **82%**	178 **84%**	352 **87%**	143 **83%**	265 **56%**	300 **57%**	29 **76%**			160 **89%**		344 **37%**	143 **55%**	352 **63%**
Enterobacter cloacae		34 **94%**			29 **90%**				31 **71%**					28 **86%**			29 **52%**		25 **88%**	26 **85%**								31 **77%**
Enterococcus faecium																						30 **17%**			25 **96%**			
Enterococcus faecalis			65 **72%**	29 **76%**															34 **68%**	55 **80%**		147 **98%**	33 **100%**		61 **90%**	89 **100%**	64 **22%**	
Enterococcus spp.																						40 **88%**						
Klebsiella pneumoniae	93 **89%**	155 **91%**			124 **85%**	130 **68%**	49 **86%**		132 **85%**	60 **87%**	32 **84%**	78 **90%**	95 **78%**	104 **83%**	44 **80%**	81 **80%**	144 **85%**	54 **74%**	103 **84%**	127 **82%**				69 **88%**		112 **3%**	59 **76%**	137 **80%**
Pseudomonas aeruginosa	94 **96%**	149 **80%**			133 **88%**			53 **75%**	144 **85%**		63 **67%**	110 **81%**		136 **80%**		93 **81%**			140 **74%**	114 **74%**				66 **70%**				
Proteus mirabilis		34 **82%**							26 **92%**					25 **92%**			30 **90%**			34 **65%**						33 **55%**		32 **59%**

Note: Antimicrobials with 25 or fewer isolates tested per pathogen were excluded from this antibiogram. The number on top indicates the total number of isolates and the percent susceptible is shown in bold.

Table 15. Texas Central Line Associated Bloodstream Infection (CLABSI) Antibiogram, 2014

Antimicrobial Class	Aminoglycosides		Beta-lactam penicillins		Carbapenems	Cephalosporins			Fluoroquinolones		Glycopeptide	Lincosamide	Macrolides	Monobactams	Oxazolidinone	Penicillins		Tetracyclines
Antimicrobial	**Amikacin**	**Gentamicin**	**Ampicillin/ Sulbactam**	**Piperacillin/ Tazobactam**	**Meropenem**	**Cefazolin**	**Cefepime**	**Cefotaxime**	**Ciprofloxacin**	**Levofloxacin**	**Vancomycin**	**Clindamycin**	**Erythromycin**	**Aztreonam**	**Linezolid**	**Ampicillin**	**Oxacillin**	**Tetracycline**
Staphylococcus coagulase negative											44 **100%**							
Escherichia coli	30 **90%**	56 **80%**	39 **33%**	51 **82%**	28 **100%**	37 **65%**	44 **82%**	49 **86%**	35 **63%**	41 **54%**				26 **92%**		56 **36%**		
Enterococcus faecium											44 **39%**				33 **94%**			
Enterococcus faecalis											96 **98%**				39 **97%**	37 **100%**		
Klebsiella pneumoniae		48 **88%**	36 **61%**	45 **84%**		32 **81%**	36 **83%**	41 **85%**	29 **83%**	39 **82%**						43 **5%**		
Pseudomonas aeruginosa		35 **86%**		34 **85%**	29 **69%**		32 **72%**		31 **87%**									
Staphylococcus aureus		68 **96%**								46 **57%**	101 **100%**	96 **53%**	99 **40%**		62 **100%**		93 **57%**	85 **84%**
Staphylococcus epidermidis		31 **39%**								29 **31%**	93 **100%**	49 **20%**	42 **12%**				47 **9%**	29 **90%**

Note: Antimicrobials with 25 or fewer isolates tested per pathogen were excluded from this antibiogram. The number on top indicates the total number of isolates and the percent susceptible is shown in bold.

Table 16. Texas Surgical Site Infection (SSI) Antibiogram, 2014

Antimicrobial Class	Aminoglycosides	Aminoglycosides	Aminoglycosides	Aminoglycosides	Aminoglycosides	Beta-lactam penicillins				Carbapenems				Cephalosporins							Fluoroquinolones			Glycopeptide	Lincosamide	Lipopeptides	Macrolide		Monobactams	Oxazolidinone	Penicillins				Tetracyclines		TMP/SMX
Antimicrobial	**Amikacin**	**Gentamicin**	**Gentamicin-High Level Test**	**Streptomycin-High Level Test**	**Tobramycin**	**Ampicillin/ Sulbactam**	**Amoxicillin/ Clavulanic Acid**	**Piperacillin**	**Piperacillin/ Tazobactam**	**Doripenem**	**Ertapenem**	**Imipenem**	**Meropenem**	**Cefazolin**	**Cefepime**	**Cefotaxime**	**Ceftazidime**	**Ceftriaxone**	**Cefuroxime**	**Cefotetan**	**Ciprofloxacin**	**Levofloxacin**	**Moxifloxacin**	**Vancomycin**	**Clindamycin**	**Daptomycin**	**Rifampin**	**Erythromycin**	**Aztreonam**	**Linezolid**	**Ampicillin**	**Methicillin**	**Oxacillin**	**Penicillin G**	**Minocycline**	**Tetracycline**	**Trimethoprim/ Sulfamethoxazole**
Staphylococcus coagulase negative																								65 **100%**													
Enterobacter aerogenes		26 **96%**							25 **80%**																												24 **96%**
Escherichia coli	310 **99%**	463 **86%**			370 **84%**	378 **45%**	106 **78%**		445 **90%**	32 **100%**	149 **99%**	153 **99%**	309 **100%**	349 **78%**	378 **91%**	184 **89%**	249 **89%**	435 **89%**	191 **79%**	57 **95%**	321 **62%**	360 **59%**	49 **71%**						247 **90%**		437 **43%**					166 **65%**	425 **65%**
Enterobacter cloacae	58 **97%**	86 **100%**			71 **100%**	53 **15%**			79 **71%**			34 **97%**	60 **98%**	46 **13%**	69 **99%**	41 **51%**	46 **63%**	74 **57%**	30 **10%**		55 **98%**	68 **97%**							38 **55%**		56 **4%**					36 **94%**	83 **93%**
Enterococcus faecium			39 **95%**																					75 **45%**						55 **96%**	32 **47%**						
Enterococcus faecalis			168 **77%**	31 **77 %**																		26 **81%**		279 **97%**		70 **91%**		28 **32%**		112 **93%**	91 **100%**					32 **34%**	
Enterococcus spp.			33 **85%**																					88 **84%**						27 **89%**	32 **69%**						
Klebsiella oxytoca		27 **96%**			26 **96%**										26 **92%**			26 **85%**																			**0%**
Klebsiella pneumoniae	91 **98%**	132 **95%**			116 **91%**	122 **79%**	33 **88%**		130 **93%**		44 **98%**	36 **100%**	93 **96%**	99 **89%**	114 **93%**	54 **93%**	71 **92%**	122 **91%**	55 **87%**		95 **93%**	103 **90%**							74 **93%**		119 **5%**					50 **76%**	117 **85%**
Pseudomonas aeruginosa	129 **95%**	203 **90%**			178 **96%**			43 **70%**	192 **90%**			60 **83%**	156 **90%**		183 **90%**		136 **84%**				184 **90%**	144 **88%**							100 **75%**								**0%**
Proteus mirabilis	30 **100 %**	44 **93%**			34 **94%**	33 **82%**			39 **100%**					30 **70%**	32 **100%**			38 **97%**			26 **73%**	37 **84%**									43 **67%**						38 **74%**
Staphylococcus aureus		394 **95%**				30 **60%**	45 **56%**							42 **55%**				26 **65%**			187 **58%**	327 **64%**	100 **76%**	587 **100%**	587 **67%**	167 **100%**	409 **98%**	578 **45%**		299 **100%**		52 **60%**	587 **55 %**	25 **16 %**	54 **91%**	552 **94%**	542 **98%**
Staphylococcus epidermidis		35 **77%**																				26 **35%**		121 **100%**	45 **38%**		27 **96%**	41 **32%**					42 **14 %**			30 **93%**	

Note: Antimicrobials 25 or fewer isolates tested per pathogen were excluded from this antibiogram. The number on top indicates the total number of isolates and the percent susceptible is shown in bold.

CLABSI SIR Summary Tables

State-wide metrics summarizing the HAI experience across Texas are displayed in Table 16. The overall CLABSI SIR uses data from all ICU patient care locations including ICUs and NICUs.

Texas ICUs reported 934,820 central line days and 849 CLABSIs in 2014 compared to the 1,864 CLABSIs that were predicted based on the national baseline from 2006-2008. The resulting overall Texas CLABSI SIR for ICUs was calculated at 0.455 (p-value < 0.0001; 95% CI 0.452 – 0.487) and was statistically significant. This indicates that the Texas reported approximately 55% fewer infections than were predicted based on the national baseline.

Table 17 shows the CLABSI SIR data by ICU unit type, broken down by age group (adult, pediatric and neonatal). All age groupings showed statistically significantly lower SIRs which indicate a better CLABSI experience.

Table 17. Overall 2014 Texas CLABSI SIR by Unit Age Group

Unit Type	Central Line Days	# CLABSIs	Predicted # Infections	SIR	SIR p-value	95% Confidence Interval
Texas	934,820	849	1,864.884	0.455	<0.0001	(0.425, 0.487)
Adult ICUs	715,813	601	1,316.8	0.456	<0.0001	(0.421, 0.494)
Pediatric ICUs (≤ 18)	54,205	73	167.73	0.435	<0.0001	(0.344, 0.544)
Neonatal ICUs (infants and newborns)	164,802	175	380.3354	0.46	<0.0001	(0.396, 0.532)

Table 18 shows the CLABSI SIR by ICU type. All other units showed a statistically significantly better experience than the national referent population except the Neurological ICU. The adult Trauma (SIR = 0.195), Burn (SIR = 0.202) and Neurosurgical ICUs (SIR = 0.257) had the lowest SIRs, while the Cardiothoracic ICUs (SIR = 0.594) had the highest CLABSI SIRs.

Table 18. Overall 2014 Texas CLABSI SIR by ICU Type						
Intensive Care Unit Type	**Central Line Days**	**# CLABSIs**	**Predicted # Infections**	**SIR**	**SIR p-value**	**95% Confidence Interval**
Burn	6,291	7	34.6005	0.202	<0.0001	0.088, 0.400
Cardiac	36,070	36	72.14	0.499	<0.0001	0.355, 0.683
Cardiothoracic	62,504	52	87.5056	0.594	<0.0001	0.448, 0.773
Medical	107,465	106	227.4683	0.466	<0.0001	0.383, 0.561
Medical/Surgical	398,643	320	630.0915	0.508	<0.0001	0.454, 0.566
Neurological	4,419	3	6.1866	0.485	0.1895	0.123, 1.320
Neurosurgical	28,028	18	70.07	0.257	<0.0001	0.157, 0.398
Surgical	55,278	47	127.1394	0.37	<0.0001	0.275, 0.487
Trauma	17,115	12	61.614	0.195	<0.0001	0.106, 0.331
Pediatric Cardiothoracic	17,354	20	57.2682	0.349	<0.0001	0.219, 0.530
Pediatric Medical	52	0	0.0676			
Pediatric Medical/Surgical	36,799	53	110.397	0.48	<0.0001	0.363, 0.623
NICU (Level II/III)	82,618	81	188.5837	0.43	<0.0001	0.343, 0.531
NICU (Level III)	82,184	94	191.7517	0.49	<0.0001	0.398, 0.597

Table 19 shows the 2014 CLABSI SIR by Health Service Region. All of the regions' SIRs indicate that they were significantly better than the national experience. HSR 2/3 had the lowest SIR of 0.400, followed by region 6/5S (SIR = 0.426) and region 1 (SIR = 0.437).

Table 19. Overall 2014 Texas CLABSI SIR by Health Service Region						
Health Service Region	**Central Line Days**	**# CLABSIs**	**Predicted # Infections**	**SIR**	**SIR p-value**	**95% Confidence Interval**
HSR 1	40,215	38	86.908	0.437	<0.0001	0.314, 0.594
HSR 2/3	259,930	210	524.37	0.400	<0.0001	0.349, 0.457
HSR 4/5N	32,694	26	54.649	0.476	<0.0001	0.317, 0.687
HSR 6/5S	296,392	259	608.66	0.426	<0.0001	0.376, 0.480
HSR 7	84,035	74	164.84	0.449	<0.0001	0.355, 0.560
HSR 8	97,113	115	188.11	0.611	<0.0001	0.507, 0.731
HSR 9/10	44,066	41	83.454	0.491	<0.0001	0.357, 0.660
HSR 11	74,914	80	143.19	0.559	<0.0001	0.446, 0.692

Table 20 shows a comparison of the 2014 CLABSI SIR by health service region to the 2014 Texas CLABSI SIR of 0.455 and the comparison to the 2013 CLABSI SIR for that region. Most regions saw a decrease from the previous year, with the exception of 6/5S and region 9/10.

Table 20. CLABSI SIR Comparisons by Health Service Region (HSR)				
Health Service Region	**2014 HSR SIR**	**2013 HSR SIR**	**2014 HSR SIR Compared to 2014 Texas SIR**	**2014 HSR SIR Compared to 2013 HSR SIR**
HSR 1	0.437*	0.516*	↓	↓
HSR 2/3	0.4*	0.552*	↓	↓
HSR 4/5N	0.476*	0.595*	↑	↓
HSR 6/5S	0.426*	0.419*	↓	↑
HSR 7	0.449*	0.565*	↓	↓
HSR 8	0.611*	0.623*	↑	↓
HSR 9/10	0.491*	0.321*	↑	↑
HSR 11	0.559*	0.863	↑	↓

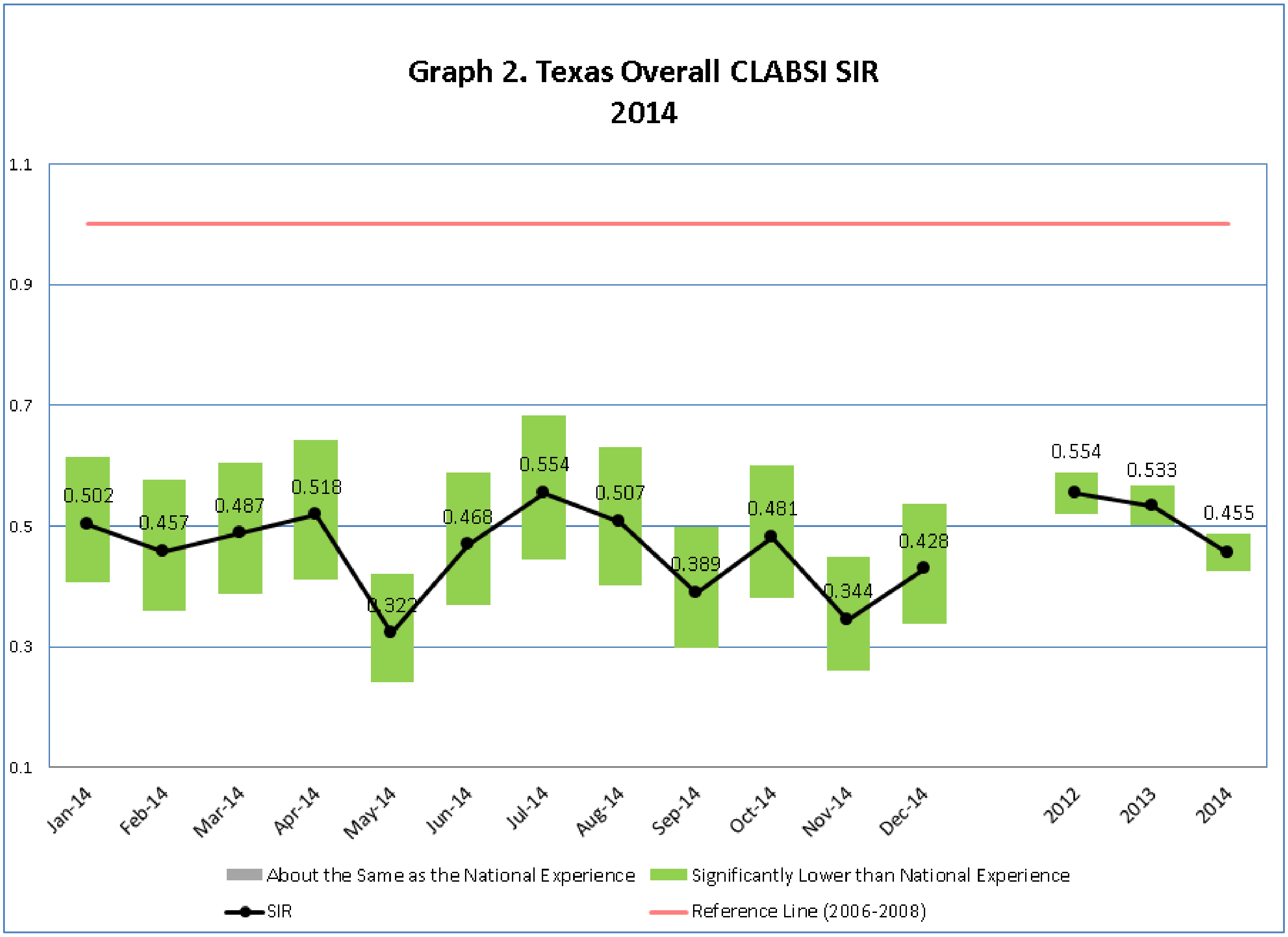
2014 Texas CLABSI SIR = 0.455
↓ indicates fewer infections than reference;
↑ indicates more infections than reference;
** indicates SIR was statistically significantly different from the 2006-2008 reference population.*

In addition to these spatial analyses, DSHS also compiled overall monthly SIR data in order to identify temporal trends. Graph 2 shows the overall Texas CLABSI SIR by month. Here we can see that the CLABSI SIR for all months is significantly better than the national experience.

Each month is represented by a vertical bar that specifies the 95% confidence interval and a black circle which indicates the SIR value for that month. The overall CLABSI SIR for all of 2014 is shown on the far right.

A red line is drawn horizontally at 1.0 and represents the reference line. This is used to indicate whether the SIR is significant or not. If the confidence interval bar crosses the red line, it means the SIR is not significant. If the bar is completely above the red significance line then the bar will be colored red to show that the SIR is significantly higher/worse than the national experience. The bar is green when it is completely below the red significance line, showing that the SIR value is significantly lower and indicates that significantly fewer infections were reported than expected based on the referent population.

The graph below (Graph 2) shows that for each month in 2014, the SIR was significantly lower/better than the national experience. And as noted previously, the overall 2014 CLABSI SIR was 0.455 and was statistically significant.



CAUTI SIR Summary Tables

In 2014, Texas ICUs reported 879,045 urinary catheter days and 1,777 CAUTIs compared to the 1,636 CAUTIs that were predicted based on the national experience in 2009. The resulting overall Texas CAUTI SIR was calculated at 1.086 (p-value = 0.0006) and was statistically significantly high. This indicates that the Texas reported approximately 8.6% more infections than were predicted based on the national experience.

Table 21 shows the CAUTI SIR data by ICU unit type for each age group (adult or pediatric). Patients aged 18 or younger are placed in Pediatric ICUs. These ICUs had a SIR of 1.052 indicating 5.2% more infections than expected. However, this was not statistically significant. Adult ICUs had approximately 8.8% more infections than were predicted and this was statistically significant.

Table 21. Overall 2014 Texas CAUTI SIR by Unit Age Group						
Unit Type	Urinary Catheter Days	# CAUTIs	Predicted # Infections	SIR	SIR p-value	95% Confidence Interval
Texas	879,045	1,777	1636	1.086	0.0006	1.037, 1.138
Pediatric ICUs (≤ 18)	23,579	69	65.6	1.052	0.6604	0.825, 1.324
Adult ICUs	855,468	1,708	1,570.5	1.088	0.0006	1.037, 1.140

Table 22 shows the CAUTI SIR by ICU type. The Surgical ICU had a statistically significantly low SIR of 0.669. However, the Medical/Surgical ICU had the highest SIR (statistically significant) of 1.289. This means that there were approximately 29% more CAUTIs that were reported in this unit type than were predicted, based on the national experience.

Table 22. Overall 2014 Texas CAUTI SIR by ICU Type						
Intensive Care Unit Type	Urinary Catheter Days	# CAUTIs	Predicted # Infections	SIR	SIR p-value	95% Confidence Interval
Burn	6,515	27	28.666	0.942	0.7782	0.633, 1.351
Cardiac	43,314	70	86.628	0.808	0.0677	0.635, 1.015
Cardiothoracic	58,956	110	100.23	1.098	0.3528	0.906, 1.318
Pediatric Cardiothoracic	4,494	7	12.134	0.577	0.1263	0.252, 1.141
Medical	120,662	276	250.95	1.1	0.1245	0.976, 1.236
Medical/Surgical	489,039	835	647.97	1.289	<0.0001	1.203, 1.378
Pediatric Medical/Surgical	19,085	62	53.438	1.16	0.2454	0.897, 1.477
Neurological	5,205	19	19.779	0.961	0.8903	0.596, 1.472
Neurosurgical	42,984	183	189.13	0.968	0.6897	0.835, 1.116
Surgical	68,463	119	178	0.669	<0.0001	0.556, 0.797
Trauma	20,328	69	69.115	0.998	1.000	0.783, 1.256

Table 23 shows the 2014 CAUTI SIR by Health Service Region (HSR). The HSRs with the lowest SIR was Region 1 with a SIR of 0.521. This indicates that there were 48% fewer CAUTIs reported than were predicted for this region in 2014. HSR 4/5N and 9/10 also had statistically significantly low SIRs of 0.586 and 0.644, respectively. However, there were several HSRs with statistically significantly high SIRs. The highest CAUTI SIR occurred in HSR 8 (SIR = 1.630), followed by HSR 7 (1.478), and HSR 11 (1.224).

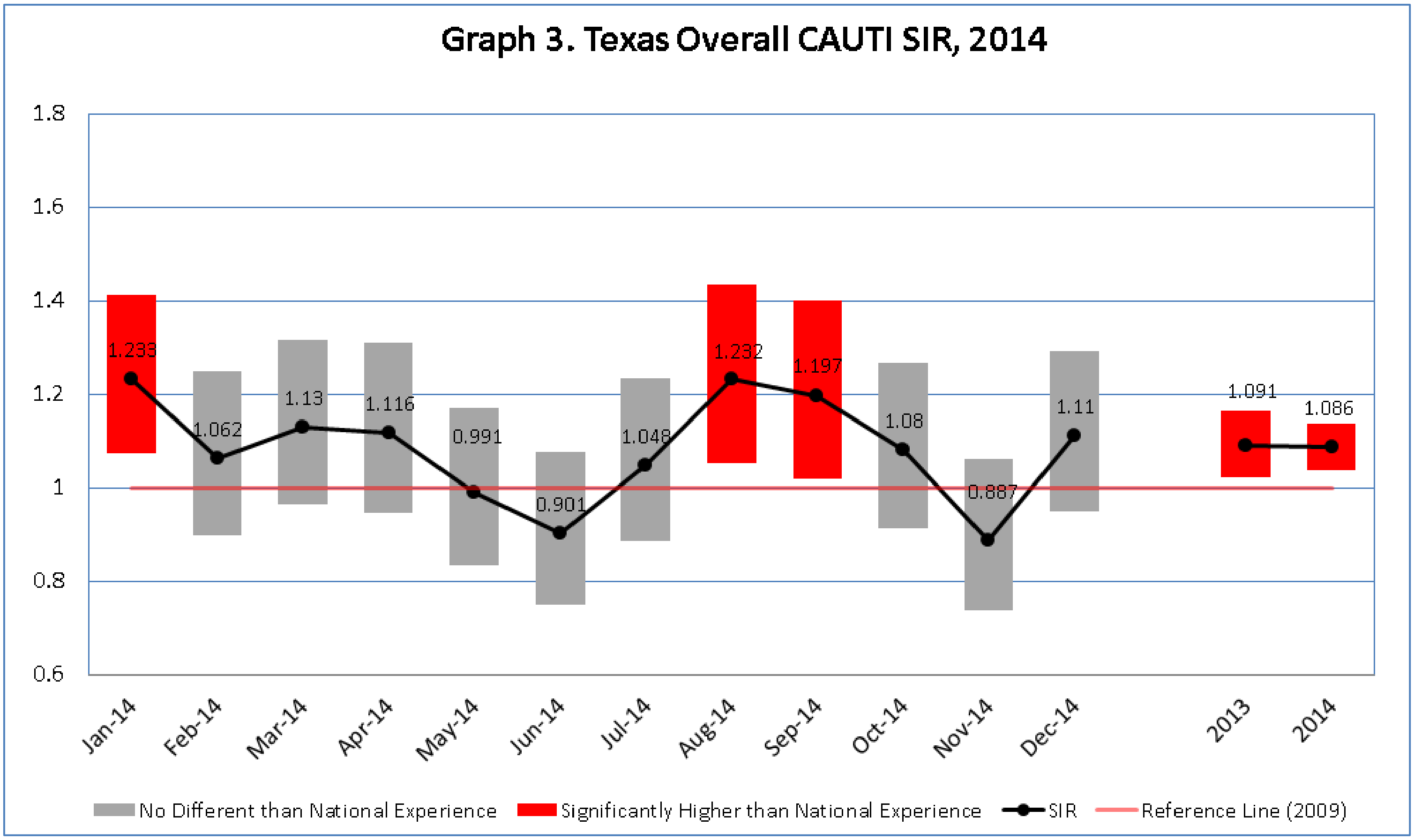
Table 23. Overall 2014 Texas CAUTI SIR by Health Service Region						
Health Service Region	**Urinary Catheter Days**	**# CAUTIs**	**Predicted # Infections**	**SIR**	**SIR p-value**	**95% Confidence Interval**
HSR 1	43,190	62	10	0.521	<0.0001	0.392, 0.680
HSR 2/3	221,828	463	430	1.076	0.121	0.982, 1.178
HSR 4/5N	57,218	59	101	0.586	<0.0001	0.450, 0.751
HSR 6/5S	261,186	528	506	1.042	0.350	0.956, 1.134
HSR 7	73,993	188	127	1.478	<0.0001	1.278, 1.701
HSR 8	98,879	286	175	1.630	<0.0001	1.449, 1.827
HSR 9/10	43,830	45	70	0.644	0.002	0.475, 0.854
HSR 11	78,755	157	128	1.224	0.015	1.044, 1.428

The following table (Table 24) shows how each health service region in 2014 compared to the 2014 Texas Overall CAUTI SIR and the previous year's regional SIR. Three regions have SIRs that were higher than the overall Texas 2014 CAUTI SIR of 1.086 and all but three regions had an increase in SIRs since 2013.

Table 24. CAUTI SIR Comparisons by Health Service Region				
Health Service Region	**2014 HSR SIR**	**2013 HSR SIR**	**2014 HSR SIR Compared to 2014 Texas SIR**	**2014 HSR SIR Compared to 2013 HSR SIR**
HSR 1	0.521*	0.41*	↓	↑
HSR 2/3	1.076	1.181*	↓	↓
HSR 4/5N	0.586*	0.636*	↓	↓
HSR 6/5S	1.042	0.996	↓	↑
HSR 7	1.478*	1.412*	↑	↑
HSR 8	1.63*	1.378*	↑	↑
HSR 9/10	0.644*	0.368*	↓	↑
HSR 11	1.224*	1.652*	↑	↓

2014 Texas CLABSI SIR = 1.086
↓ indicates fewer infections than reference;
↑ indicates more infections than reference;
** indicates SIR was statistically significantly different from the 2009 reference population.*

Graph 3 shows the overall Texas CAUTI SIR by month. Here we can see that the CAUTI SIR for each month shows slightly more infections occurred in Texas in 2014 than were predicted, which was statistically significantly higher than the national experience. This indicates that Texas had approximately 8.6% more infections than predicted based on the national baseline from 2009.


Graph 3. Texas Overall CAUTI SIR, 2014
1.8
1.6
1.4
1.2
1
0.8
0.6
1.233
1.062
1.13
1.116
0.991
0.901
1.048
1.232
1.197
1.08
0.887
1.11
1.091
1.086
Jan-14
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14
2013
2014
No Different than National Experience
Significantly Higher than National Experience
SIR
Reference Line (2009)

SSI SIR Summary Tables

In 2014, Texas hospitals and ambulatory surgery centers reported 174,757 surgical procedures and 2,683 SSIs compared to the 3,701 SSIs that were predicted to occur during that time frame. The overall Texas SSI SIR was calculated at 0.725 (p-value < 0.0001; 95% CI = 0.698 – 0.753) and was statistically significant. Therefore, the Texas had approximately 27% fewer SSIs reported than predicted based on the national reference population in 2006-2008.

Table 25 shows the overall state SSI SIR and the SIRs by procedure category. Generally, all procedures showed a significantly better experience than the national experience, except for CBGC, HTP and LAM that did not show a significant difference from the national referent population.

Table 25. 2014 Texas SSI SIR by Procedure Category

Procedure Type	Procedure Count	# of SSIs	Predicted # Infections	SIR	SIR p-value	95% Confidence Interval
Texas	174,757	2683	3701.082	0.725	<0.0001	0.698, 0.753
AAA	725	9	28.161	0.32	<0.0001	0.156, 0.586
CARD	1,168	3	26.729	0.112	<0.0001	0.029, 0.305
CBGB	14,447	209	310.528	0.673	<0.0001	0.586, 0.769
CBGC	1,036	14	22.035	0.635	0.0743	0.362, 1.041
CEA	6,662	12	21.985	0.546	0.0229	0.296, 0.928
COLO	20,811	1010	1266.005	0.798	<0.0001	0.750, 0.848
FUSN	1,504	19	31.09	0.611	0.0218	0.379, 0.937
HPRO	27,960	391	433.303	0.902	0.042	0.816, 0.995
HTP	42	0	1.386	0	0.2501	, 2.161
HYST	33,205	377	605.462	0.623	<0.0001	0.562, 0.688
KPRO	49,030	352	494.26	0.712	<0.0001	0.641, 0.790
LAM	642	2	6.208	0.322	0.0678	0.054, 1.064
PVBY	4,372	194	313.177	0.619	<0.0001	0.537, 0.711
RFUSN	32	2	0.967		.	
VHYS	11,933	65	93.457	0.696	0.002	0.541, 0.881
VSHN	1,188	24	46.33	0.518	0.0003	0.340, 0.759

There were 352 facilities that reported SSI data in 2014. A majority of the facilities had SIRs that indicated the same or better SSI experience. Table 26 shows the SSI SIRs by procedure category for procedures performed as an inpatient.

Table 26. 2014 Texas SSI SIR by Procedure Category – Inpatient Procedures Only						
Procedure Type	**Procedure Count**	**# of SSIs**	**Predicted # Infections**	**SIR**	**SIR p-value**	**95% Confidence Interval**
Texas	165890	2646	3585	0.738	<0.0001	0.710, 0.767
AAA	725	9	28.161	0.32	<0.0001	0.156, 0.586
CARD	1168	3	26.729	0.112	<0.0001	0.029, 0.305
CBGB	14447	209	310.53	0.673	<0.0001	0.586, 0.769
CBGC	1036	14	22.035	0.635	0.0743	0.362, 1.041
CEA	6615	12	21.83	0.55	0.0248	0.298, 0.935
COLO	20653	1010	1257.9	0.803	<0.0001	0.755, 0.854
FUSN	1503	19	31.048	0.612	0.0222	0.379, 0.938
HPRO	27894	391	432.49	0.904	0.046	0.818, 0.997
HTP	42	0	1.386	0	0.2501	, 2.161
HYST	27759	355	527.98	0.672	<0.0001	0.605, 0.745
KPRO	48614	352	490.39	0.718	<0.0001	0.646, 0.796
LAM	642	2	6.208	0.322	0.0678	0.054, 1.064
PVBY	4295	193	307.86	0.627	<0.0001	0.543, 0.720
RFUSN	32	2	0.967	.	.	
VHYS	9290	52	73.225	0.71	0.0096	0.536, 0.924
VSHN	1175	23	46.184	0.498	0.0002	0.323, 0.735

Table 27 shows the SSI SIRs by procedure category for outpatient procedures performed in a hospital. Note that these numbers do not include any ASC data. NHSN does not calculate SIRs for ASCs because national baseline data for these settings is not available.

Table 27. 2014 Texas SSI SIR by Procedure Category – Outpatient Hospital Procedures Only						
Procedure Type	**Procedure Count**	**# of SSIs**	**Predicted # Infections**	**SIR**	**SIR p-value**	**95% Confidence Interval**
Texas	8,867	37	116.13	0.319	<0.0001	0.228, 0.435
CEA	47	0	0.155	-	-	-
COLO	158	0	8.065	0	0.0003	, 0.371
FUSN	1	0	0.042	-	-	-
HPRO	66	0	0.818	-	-	-
HYST	5446	22	77.487	0.284	<0.0001	0.182, 0.423
KPRO	416	0	3.872	0	0.0208	, 0.774
PVBY	77	1	5.315	0.188	0.036	0.009, 0.928
VHYS	2643	13	20.232	0.643	0.0952	0.357, 1.071
VSHN	13	1	0.147	-	-	-

Table 28 shows the reported SSI severity by how the SSI was detected. A majority (55%) of the SSIs of all severity levels were identified during a patient readmission to the facility where the operation was performed. A higher proportion of SSIs were identified in this detection category for deep and organ/space infections than for superficial infections.

The table also shows that 40% of the SSIs reported were superficial, followed by organ/space (34%) and deep SSIs (26%). The most common organ space infections were intra-abdominal infections (592). Please note that secondary SSIs were not used to calculate SIRs.

Table 28. 2014 SSI Severity by When Detected

SSI Severity	A	P	RF	RO	Total
Total Superficial Incisional Infections	**234**	**274**	**574**	**67**	**1149**
SIP - Superficial Incisional Primary	230	268	539	65	1102
SIS - Superficial Incisional Secondary	4	6	35	2	47
Total Deep Incisional Infections	**124**	**74**	**484**	**73**	**755**
DIP - Deep Incisional Primary	123	73	471	73	740
DIS - Deep Incisional Secondary	1	1	13		15
Total Organ/Space Infections	**328**	**77**	**534**	**63**	**1002**
BONE - Osteomyelitis	1	2	8		11
CARD - Myocarditis or pericarditis	1		1		2
GIT - Gastrointestinal tract	17	1	15	5	38
IAB – Intra-abdominal	296	34	232	30	592
MED - Mediastinitis	2	1	23	2	28
MEN - Meningitis or ventriculitis	4		16		20
OREP - Other infections of reproductive tract	4	6	40	5	55
PJI – Prosthetic Joint Infection	3	9	145	13	170
SA – Spinal abscess without meningitis			1		1
VASC - Arterial or venous infection			14		14
VCUF - Vaginal cuff		24	39	8	71
Total	**686**	**425**	**1592**	**203**	**2906**

A: SSI was identified before the patient was discharged from the facility following the operation.
P: SSI was identified only as part of post-discharge surveillance.
RF: SSI was identified due to patient readmission to the facility where the operation was performed.
RO: SSI was identified due to readmission to facility other than where the operation was performed.

Table 29 shows the SSI SIR for 2014 by Health Service Region. All Health Service Regions show statistically significantly better experiences than the national with the lowest SSI SIR in region 11 (showing a 42% fewer SSIs than predicted).

Table 29. Overall 2013 Surgical Site Infection SIR by Health Service Region						
Health Service Region	**Procedure Count**	**# of SSIs**	**Predicted # Infections**	**SIR**	**SIR p-value**	**95% Confidence Interval**
HSR 1	8,195	82	139.52	0.588	<0.0001	0.470, 0.726
HSR 2/3	53,432	842	1088.1	0.774	<0.0001	0.723, 0.827
HSR 4/5N	12,443	145	236.46	0.613	<0.0001	0.519, 0.719
HSR 6/5S	43,419	702	1054.7	0.666	<0.0001	0.618, 0.716
HSR 7	18,432	318	366.74	0.867	0.0102	0.776, 0.966
HSR 8	17,716	318	386.92	0.822	0.0003	0.735, 0.916
HSR 9/10	8,956	118	155.27	0.760	0.0022	0.632, 0.907
HSR 11	12,072	158	271.57	0.582	<0.0001	0.496, 0.678

Table 30 compares the 2014 HSR SIR to the Overall Texas SIR for the same year (0.725). It also shows whether the health service region's 2014 SIR was higher than the previous year (indicating more infections reported than were predicted) or if the SIR was lower than the previous year (indicating fewer infections were reported than predicted). Health Service Regions 1 and 6/5S both had a lower SIR compared to the 2014 Texas SSI SIR and their 2013 HSR SSI SIR.

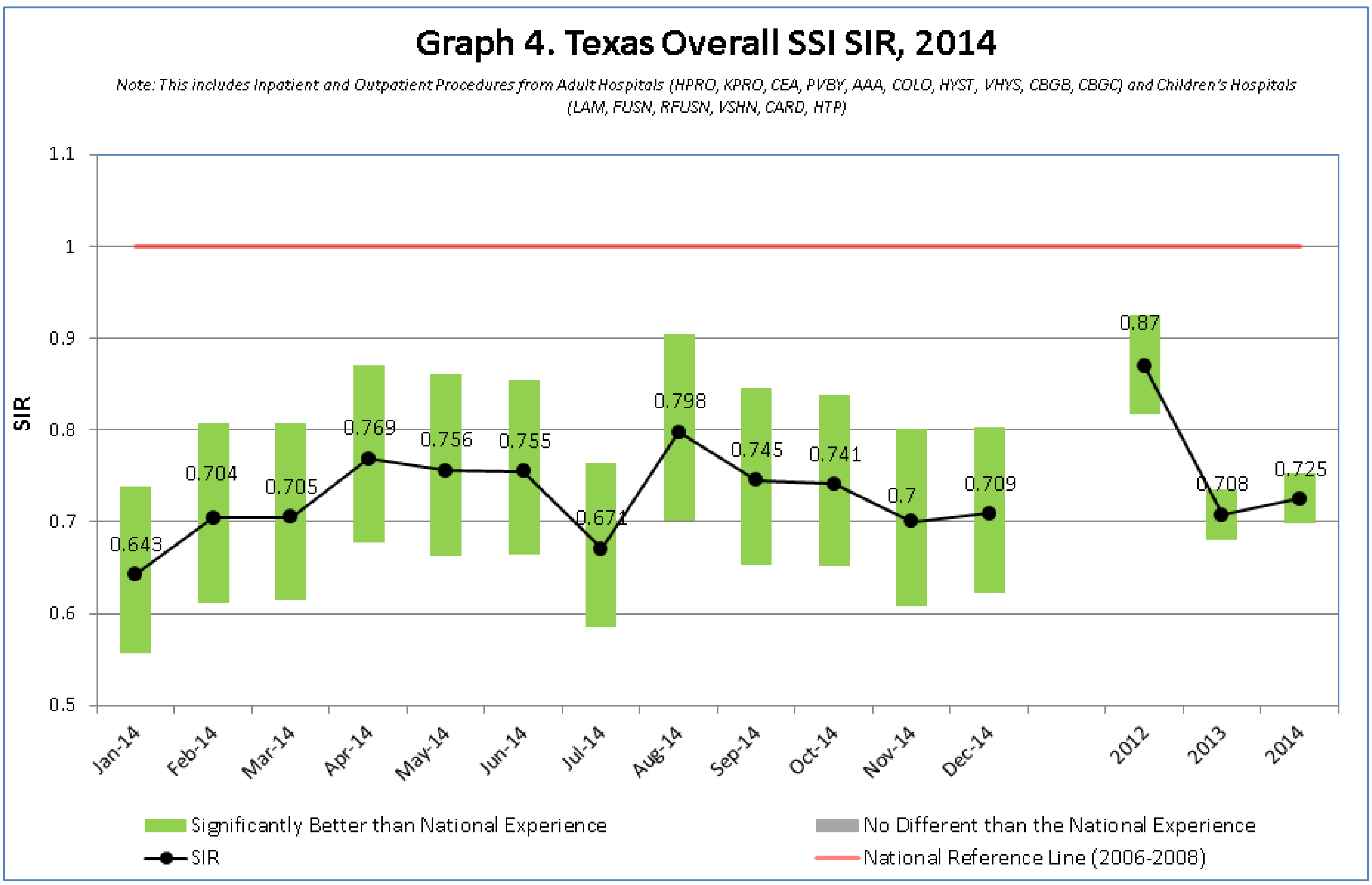
Table 30. SSI SIR Comparisons by Health Service Region				
Health Service Region	**2014 HSR SIR**	**2013 HSR SIR**	**2014 HSR SIR Compared to 2014 Texas SIR**	**2014 HSR SIR Compared to 2013 HSR SIR**
HSR 1	0.588*	0.652*	↓	↓
HSR 2/3	0.774*	0.724*	↑	↑
HSR 4/5N	0.613*	0.607*	↓	↑
HSR 6/5S	0.666*	0.702*	↓	↓
HSR 7	0.867*	0.888*	↑	↓
HSR 8	0.822*	0.782*	↑	↑
HSR 9/10	0.76*	0.672*	↑	↑
HSR 11	0.582*	0.47*	↓	↑

2014 Texas SSI SIR = 0.725
↓ indicates fewer infections than reference;
↑ indicates more infections than reference;
** indicates SIR was statistically significantly different from the 2006-2008 reference population.*

As was done with the CLABSI and CAUTI SIR data, DSHS compiled overall monthly SIR data for SSIs in order to identify data trends occurring over time. Graph 4 shows the overall Texas SSI SIR by month and overall for the 2014 reporting year.

As for the CLABSI SIR graph, this SSI SIR graph shows each month is represented by a vertical bar that indicates the 95% confidence interval (CI) and a black circle that indicates the SIR value for a given month. The overall SSI SIR for all of 2014 is shown on the far right.

Graph 4 shows that the SSI experience in Texas for each month in 2014 was statistically significantly better than the national experience. The overall 2014 SSI SIR was 0.725 and indicates that Texas had 27.5% fewer infections than were predicted based on the national baseline.



Infection Preventionist Summary Data

Infection Preventionists (IPs) lead programs in health care settings that protect patients, visitors, volunteers, and health care providers from acquiring health care associated infections (HAIs). The quality and effectiveness of a facility's infection prevention program often depends on the facility's available resources, such as personnel. The number of IPs in a facility varies widely and is often dependent on the size of the facility or the complexity of the services provided by that facility. For example, small critical access hospitals that generally have less than 25 beds will usually have only one person designated to run the infection prevention program. Often times, this same person may be responsible for several different job duties such as managing the quality department, employee health and clinical duties. On the other hand, a large teaching hospital with 750 beds may have a team of 5 IPs dedicated only to infection prevention activities. In 2002, a survey of IPs in the field recommended a ratio of 0.8 to 1.0 IPs per 100 occupied acute care beds as the optimal staffing for infection prevention programs (O'Boyle, 2012).

In addition to the number of IPs in a facility, the qualifications of the IPs may also affect the quality of a facility's infection prevention program. IPs can obtain a Certification in Infection Prevention and Control (CIC®) (demonstrating a mastery of knowledge) by passing a comprehensive examination developed by the Certification Board of Infection Control & Epidemiology (CBIC). The assumption is that those who are certified are more likely to be aware of evidence based practices and are more effective at preventing infection transmission in health care settings, when compared to their non-certified peers. A list of CIC® certified IPs can be found on the CBIC website. Table 31 shows a summary of the number of IPs throughout Texas.

Table 31. Infection Preventionist (IP) Summary

	Facility Info		IP Info			Ratios		
HSR	**# Facilities**	**# Staffed Beds**	**# All IPs**	**# CIC IPs**	**% CIC IPs**	**Total IP Hours/Wk**	**Bed to IP ratio**	**Bed to CIC ratio**
1	22	2424	32	8	25%	983	76	303
2	12	1320	13	4	31%	365	102	330
3	106	15478	149.7	87	58%	4926	103	178
4	24	3303	30.5	11	36%	976	108	300
5	14	1729	16.1	4	25%	494	107	432
6	78	13550	127.7	88	69%	3794	106	154
7	46	5706	56.5	35	62%	1712	101	163
8	44	6137	53.85	42	78%	1972	114	146
9	13	1547	18.3	6	33%	532	85	258
10	12	1839	14	5	36%	476	131	368
11	28	5204	37	15	41%	1282	141	347
Texas	**399**	**58237**	**548.65**	**305**	**56%**	**17512**	**106**	**191**

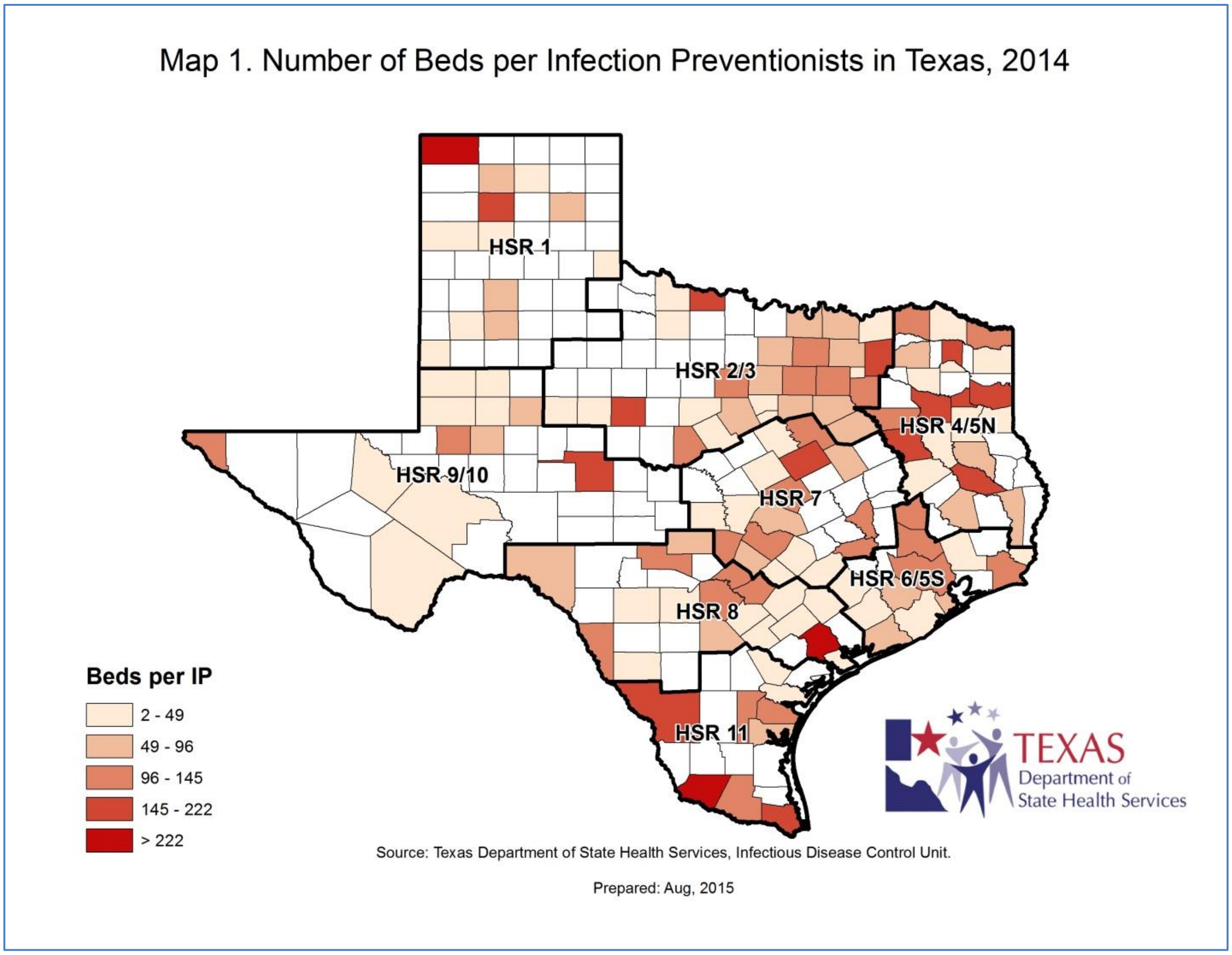
**4 CICs did not list location information and 32 facilities did not provide bed size or IP information and, therefore, these data were not included in the analysis.*

As of August 2015, there were a total of 309 CIC® certified IPs. This was 26 fewer certified IPs than there were since the last annual report was released in August 2014. Assuming that all 309 IPs are working in a reporting healthcare facility, this corresponds to approximately 188 beds per CIC® certified IP and 106 beds per IP.

On average and for each of the HSRs, the CDC recommended 100 beds per 0.8 – 1.0 IPs is not met in all regions except region 1 and region 9. However, these regions also had the lowest percent of CIC® certified IPs in the state. This indicates a need to provide general infection prevention training on a regular basis throughout the state as well as education to health care facility administrators emphasizing the need for adequate staffing in light of the increased regulatory demands (CMS and state reporting mandates) on infection prevention departments.

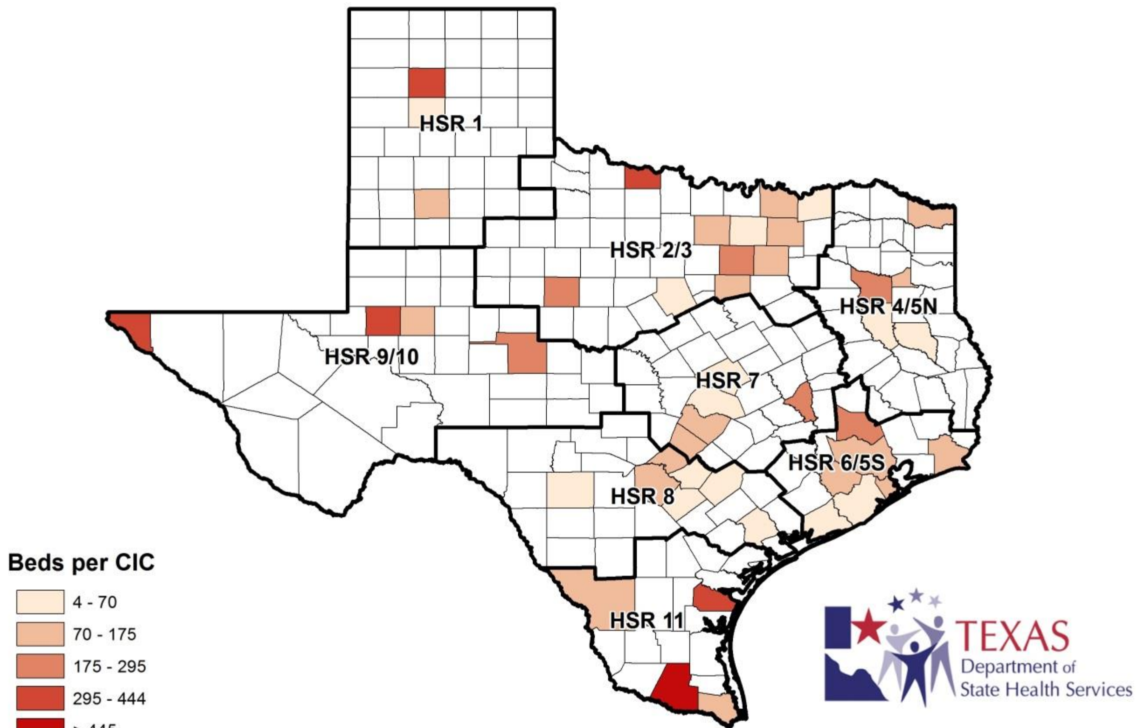
The HSRs with the lowest percent of CIC® certified IPs were HSR 1 and 5, followed by 2 and then 9. Therefore, these health service regions should be targeted for future DSHS sponsored infection prevention training and CIC® certification courses.

Map 1 illustrates the ratio of beds per IP in each county in Texas. Counties colored in dark red indicate the highest need for trained IPs. These are counties in which the bed to IP ratio greatly exceeds the CDC recommendations. In the darkest red counties, IPs are responsible for over twice as many beds as is recommended.



Map 2 shows the bed to CIC® certified IP ratio in Texas for 2014. The dark red indicates counties that have the largest ratio and therefore the greatest need for Certification training. Counties displayed in white do not have any facilities reporting HAIs through NHSN for Texas.

Map 2. Number of Beds per Certified Infection Preventionists in Texas, 2014



Source: Texas Department of State Health Services, Infectious Disease Control Unit.

Prepared: Aug, 2015

Conclusions

The 2014 calendar year was the first complete year that all the mandated HAIs were reported by facilities. Facility-specific HAI Reports for January to June 2014 and July to December 2014 were published on a public website on December 2014 and July 2015, respectively.

Data Trends

The U.S. DHHS National Action Plan to Prevent Healthcare-Associated Infections called for a 50% reduction in CLABSI occurrence in ICUs or a SIR of 0.5 and a 25% reduction in admission and readmission SSI or 0.75 SIR by the end of 2013 (Agency for Healthcare Research and Quality, 2008). Although Texas did not meet the goal by 2013, by 2014, Texas reduced the number of CLABSI infections (when compared to the national referent population from 2006-2008) by 55%, thereby reaching the 2013 goal. This was a reduction from the 2013 SIR of 0.534 to 0.455 (p-value = < 0.0001, 95% CI 0.425 – 0.487).

The SSI SIR for 2014 maintained the 25% reduction goal. The SIR for Texas was 0.725 (p-value = < 0.0001, 95% CI 0.698 – 0.753).

The 20% reduction in CAUTI was still not achieved for Texas in 2014. For Texas, there were approximately 8.6% more CAUTIs reported than the national baseline. However, the trend is consistent with that of the national trend showing a 6% increase in CAUTI incidence from the baseline (The Centers for Disease Control and Prevention, 2015).

DSHS has learned many lessons that will help guide the program into the next year of HAI reporting.

Use of NHSN

As the most widely used online HAI surveillance system in the United States, NHSN provides facilities with a secure and confidential data repository that enables facilities to view their data and share information with clinicians and administrators to improve health care quality. NHSN also provides the public with credible HAI data from over 12,400 health care facilities in all 50 states. Participating health care facilities include acute care hospitals, long-term acute care hospitals, rehabilitation hospitals, outpatient dialysis centers, ambulatory surgery centers, and nursing homes.

Advantages

NHSN provides a useful tool for reporting HAI data from a large number of facilities and has been an integral part of successfully implementing mandatory HAI reporting in Texas. In addition to the advantages detailed previously in this report, other benefits of using NHSN for HAI surveillance are the analytic tools that enable facilities to baseline the progress of their infection prevention efforts. The data analysis tools also enable facilities to identify opportunities to improve patient outcomes and eliminate HAIs. These data can also be analyzed on a national, state and local level to identify emerging infection trends and to measure progress toward HAI elimination.

However, along with the advantages of using NHSN, there are also some caveats to its use.

Caveats

The NHSN calculated SIR provides a means for accurately comparing health care facilities to the national experience by taking into account variations in types of facilities and patient populations. CDC conducts continuous analyses of potential risk factors to determine which factors affect HAI occurrence and adjusts risks as needed. However, these risk adjustment methods may not account for all differences between health care facilities and populations. Therefore, it is important for the public to understand this shortcoming when reviewing the facility-specific HAI data reports and the data presented in this and future annual Texas summary reports. The SIR is only one tool that can be used to make informed health care decisions. It is also important to note that health care facilities with higher SIRs do not necessarily have better performance than those with lower SIRs. The SIR only provides an accurate comparison of a health care entity's HAI experience to that of the national HAI experience, and not to other facilities.

Also important to note is that because the referent data for the SIR calculations was collected before many state's implementation of HAI reporting, many of the facility types and infection types do not have sufficient baseline data to use for comparison. Because of this, Texas is unable to obtain SIR data for (1) SSIs related to heart transplants, (2) any SSI data from ASCs and (3) SIR data from Oncology ICUs. This will only be remedied when NHSN chooses a new referent period that contains enough baseline data for these HAIs.

Updates to the NHSN system occur frequently. Occasionally, these changes require modifications to the TxHSN data upload process or even the application's structure. While most of these modifications are minor, others are critical changes and adversely affect Texas' reporting process. One such critical change will affect future trending of HAI data. The standardized HAI surveillance definitions were revised for 2014 and will likely cause artificial fluctuations in case counts for HAIs and therefore, to the SIR calculations. This change and any subsequent changes to the NHSN HAI surveillance definitions must be taken into account when tracking HAI temporal variation over several years.

As a look ahead, the 2015 HAI data reported to NHSN will be used by CDC to create new benchmarks. New SIR calculations will use the 2015 benchmark starting in 2017. When this occurs, DSHS anticipates that many facilities will find that when compared to the new, updated referent population, their SIR values will increase and there will be more facilities that have statistically significantly high SIRs.

Next Steps

Here are a few goals we hope to accomplish in the coming years.

Training

DSHS will continue to partner with various professional organizations to provide education and training to health care professionals throughout the state. In the coming years, DSHS plans to provide continuing education for health care facilities via webinars and newsletters. The purpose of which will be to provide reporting updates to facilities and review HAI definitions via case study discussion. This will also allow DSHS staff to field questions from health care professionals.

As discussed previously, targeted CAUTI prevention training needs to be performed for the health service regions with the highest CAUTI SIRs. These regions, in order of priority, are 8, 7 and 11.

In addition to targeted CAUTI training, there is also a need to train and hire more Infection Preventionists as well as encouraging existing Infection Preventionists to obtain their CIC® certifications. In most of the regions in Texas, the bed to IP ratio far exceeds the CDC recommended ratio. This indicates a need to provide general infection prevention training on a regular basis throughout the state as well as education to health care facility administrators emphasizing the need for adequate staffing in light of the increased regulatory demands (CMS and state reporting mandates) on infection prevention departments.

Reporting

In 2015, DSHS will continue to track the same indicators that were reported in 2014. However, in 2015, the first phase of Preventable Adverse Event (PAE) data will be reported from all general hospitals and ambulatory surgery centers in Texas. More information on PAE reporting can be found at www.PAETexas.org.

Data Quality

DSHS will continue to monitor HAI data for unusual pathogen clusters and perform any necessary follow-up activities to determine the cause of such occurrences. Site visits to facilities with significantly high SIRs will continue in order to ensure accurate use of NHSN case definitions. In 2015, DSHS plans to utilize the NHSN CLABSI validation protocol to select facilities for data validation. In doing this, DSHS will be able to identify facilities that may be under-reporting CLABSI data and perform any necessary follow-up and education.

The Department is committed to providing useful HAI data for the health care community and the public. DSHS will continue to work with the Health Care Safety Advisory Panel, Infection Preventionists and health care professional organizations to collect quality data from health care facilities around the state and will work together to enhance data accuracy and promote HAI reduction measures.

Appendices

Appendix A: Glossary of Terms and Abbreviations

Acute Care Facility: Defined by Texas Administrative Code Chapter 353 as a facility/hospital that provides acute care services such as medical, surgical, and/or psychological services.

American Society of Anesthesiologists (ASA) Score: A system for assessing the physical health of patients before surgery. These are:

1. A normal healthy patient.
2. A patient with mild systemic disease.
3. A patient with severe systemic disease.
4. A patient with severe systemic disease that is a constant threat to life.
5. A moribund patient who is not expected to survive without the operation.

Ambulatory Surgical Centers (ASCs): This is defined by the Texas Health and Safety Code Chapter 243 as a facility that operates primarily to provide surgical services to patients who do not require overnight hospital care.

Catheter-Associated Urinary Tract Infection (CAUTI): Infection involving any part of the urinary system, including urethra, bladder, ureters, and kidney that is caused by the insertion of a urinary catheter.

Central line-associated blood stream infection (CLABSI): The National Healthcare Safety Network (NHSN) defines a CLABSI as a blood stream infection in a patient that had a central line in place at the time of or within 48-hours before the development of the bloodstream infection.

Central line catheter: A long flexible tube that is inserted near a patient's heart or into one of the large blood vessel near the heart. A central line can be used to administer fluids, antibiotics, or medical treatments such as chemotherapy. Central lines are also sometimes called central venous lines, central venous catheters and C-lines.

Central line days: A daily count of the number of patients with a central line in a patient care location during a specific time period. For each day of the month, the number of patients who have a central line is recorded. At the end of the month the sum of the daily counts is used as the central line days for the given month.

Central Line Utilization Ratio: This ratio comes from dividing the number of central line-days by the number of patient days. It is sometimes used to monitor appropriate use of central lines.

CLABSI Infection Rate: This is the total number of central line-associated bloodstream infections divided by the number of central line days. That result is then multiplied by 1,000.

***Clostridium difficile* associated disease (CDAD)/*Clostridium difficile* Infections (CDI):** *Clostridium difficile (C. difficile)* is responsible for a spectrum of *C. difficile* infections (CDI) or *C. difficile* associated disease (CDAD), including uncomplicated diarrhea, pseudomembranous colitis, and toxic megacolon which can, in some instances, lead to sepsis and even death.

Confidence Interval (CI): This is a statistical measure that determines statistical significance. If the CI contains the value 1.0, then there is no significance and the null hypothesis (which indicates there is no difference between test and control populations) can be accepted. If the CI does not contain the value 1.0, then the difference between the test and control populations is statistically significant. Example: (CI 0.02 – 1.2) is not significant and (CI 0.02 – 0.08) is significant

Contamination: To make impure, infected, corrupt, etc., by contact with or addition of something; to pollute something. This occurs when foreign material invades another material either intentionally, by accident, or as a consequence of another set of actions. Cross contamination is where someone or something that is already contaminated transfers the contamination to another person or object.

Critical Access Hospital (CAH): A small, generally geographically remote facility that provides outpatient and inpatient hospital services to people in rural areas. The designation was established by law, for special payments under the Medicare program. To be designated as a CAH, a hospital must be located in a rural area, provide 24-hour emergency services; have an average length-of-stay for its patients of 96 hours or less; be located more than 35 miles (or more than 15 miles in areas with mountainous terrain) from the nearest hospital or be designated by its State as a "necessary provider". Hospitals may have no more than 25 beds.

Denominator: This is the number of people (population) who are potentially capable of experiencing the event or outcome of interest. The denominator, along with the numerator, is used to calculate rates. The denominator is the bottom half of a fraction.

Dialysis facility: An outpatient facility where dialysis is given to people with end stage kidney disease.

Health care-associated infection (HAI): Health care-associated infections are infections that patients acquire during the course of receiving treatment for other conditions within a health care setting. For an infection to qualify as an HAI there must be no evidence that it was present or incubating at the time of hospital admission.

HAI Prevention Collaborative: A group of facilities that are engaged in an effort to improve an outcome, in this case to reduce HAIs. The group members discuss progress regularly and share lessons learned in real time so that others in the group can benefit from the experience of each facility.

ICD-9-CM: ICD-9-CM (sometimes referred to as just ICD-9) stands for the "International Classification of Diseases - 9th revision - Clinical Modification." All diagnoses (or conditions) and all procedures that patients receive in the hospital are assigned an ICD-9-CM code. The coding and terminology provide a uniform language that permits consistent communication on claim forms.

Intensive Care Unit (ICU): A nursing care area that provides intensive observation, diagnosis, and therapeutic procedures for adults and/or children who are critically ill.

Infection: An infection occurs when a pathogen (e.g. viruses, bacteria, parasites, etc.) enters the body and causes harm.

Infection control/prevention: This is how infection preventionists prevent health care associated infections and other adverse outcomes in the health care setting. Examples include the use of hand washing, gown, gloves, masks, special cleaning products and isolation of people with contagious diseases in order to prevent another patient from contracting the disease and becoming sicker.

Infection Preventionist (IP): Previously known as an Infection Control Practitioner (ICP). This is a health care professional who is responsible for preventing infection transmission within health care facilities.

Infection Rate: An infection rate is the number of infections reported in a specified period of time (the numerator) divided by the number of exposures to an infection during the same specified period of time (the denominator).

Knee Replacements, Total or Partial: Knee replacement surgery (arthroplasty) is an elective procedure for people with severe knee damage and pain related to osteoarthritis, rheumatoid arthritis, and traumatic arthritis. A total knee replacement involves removing the damaged cartilage and bone from the surface of the knee joint and replacing them with a man-made surface of metal and plastic. A partial knee replacement involves replacing only part of the knee joint.

Mandate: A law or rule issued by a state or federal government agency about the way a public issue is to be carried out. (e.g., a facility must report health care-associated infections to NHSN).

Methicillin-resistant *Staphylococcus Aureus* (MRSA): MRSA causes an infection that is resistant to several common antibiotics. There are two types of infection. Hospital-associated MRSA happens to people in health care settings. Community-associated MRSA can occur to people who have close skin-to-skin contact with others, such as athletes involved in football and wrestling.

National Healthcare Safety Network (NHSN): The data reporting system that Texas health care facilities must use to send HAI reports to DSHS. NHSN is a secure, internet-based surveillance (monitoring and reporting) system.

Neonatal Intensive Care Unit (NICU): An intensive care unit designed with special equipment to care for premature or seriously ill newborns.

Nosocomial: Originating or taking place in a hospital.

Numerator: The number of individuals who actually experience the event or outcome of interest. The numerator, along with the denominator, is used to calculate rates. The numerator is the top half of a fraction.

P-value: This is a statistical measure that determines statistical significance. If the p-value is $\geq$ 0.05, then there is no significance and the null hypothesis (which indicates there is no difference between test and control populations) can be accepted. If the p-value is < 0.05, then the difference between the test and control populations is statistically significant.

Pathogens: Bacteria, viruses, parasites, or fungi that can cause disease; a specific organism that causes a disease, such as bacterium or a virus.

Preventable Adverse Event (PAE): A preventable adverse event or PAE is defined as an adverse health care-associated condition or event for which the Medicare program will not provide additional payment to the facility under a policy adopted by the federal Centers for Medicare and Medicaid Services; or an event included in the list of adverse events identified by the National Quality Forum.

Protocol: A written set of rules to follow.

Standardized Infection Ratio (SIR) Statistical Method: The SIR is a number that compares the number of HAIs that occur in a facility to a predicted number of infections based on historical data and risk adjusted. A SIR is the number of observed infections divided by the number of expected infections. A SIR of 1.0 means the observed number of infections is equal to the number of expected infections. SIRs above 1.0 mean that the infection rate is higher than that found in the "standard population.” SIRs below 1.0 mean that the infection rate is lower than that found in the "standard population.” For HAI reports, the standard population comes from data reported by the hundreds of U.S. hospitals that use the National Healthcare Safety Network (NHSN) system.

Surgical Site Infection (SSI): SSIs are infections that occur as the result of surgical procedures.

Surveillance: A process for ongoing monitoring of information (data) about a specific topic, problem, or disease (such as health care-associated infections) where data are gathered, analyzed, and interpreted. Surveillance data are often used to identify areas for improvement, guide actions to improve the quality of health care delivery, and monitor whether those interventions result in better outcomes.

List of Abbreviations/Acronyms	
Acronym	**Description**
AAA	Abdominal Aortic Aneurism repair surgery
APIC	Association for Professionals in Infection Control and Epidemiology
ASA	American Society of Anesthesiologists
ASC	Ambulatory Surgery Center
CARD	Cardiac Surgery
CAUTI	Catheter associated urinary tract infections
CBGB	Coronary Artery Bypass Graft with both chest and donor site incisions
CBIC	Certification Board of Infection Control and Epidemiology
CBGC	Coronary Artery Bypass Graft with chest incision only
CDAD	*Clostridium difficile* associated disease
CDC	Centers for Disease Control and Prevention
CEA	Carotid Endarterectomy
CI	Confidence Interval
CIC	Certification in Infection Prevention and Control
CLABSI	Central Line-Associated Blood Stream Infection
CMS	Centers for Medicare and Medicaid Services
COLO	Colon Surgery
DSHS	Texas Department of State Health Services
DHHS	Department of Health and Human Services (U.S)
DHQP	Division of Healthcare Quality Promotion at the CDC
FUSN	Spinal Fusion surgery
HAI	Health care-associated infection
HICPAC	Healthcare Infection Control Practices Advisory Committee
HPRO	Hip Prosthesis surgery
HSR	Health Service Region
HTP	Heart Transplant surgery
HYST	Abdominal Hysterectomy
ICD-9	International Classification of Diseases, Ninth Revision
ICU	Intensive Care Unit
IP	Infection Preventionist
KPRO	Knee Prosthesis surgery
LAM	Laminectomy surgery
MDRO	Multidrug Resistant Organism
MRSA	Methicillin Resistant *Staphylococcus aureus*
NHSN	National Healthcare Safety Network
NICU	Neonatal Intensive Care Unit
PAE	Preventable Adverse Event
POA	Present on Admission
PVBY	Peripheral Vascular Bypass Surgery

List of Abbreviations/Acronyms	
Acronym	**Description**
QIO	Quality Improvement Organization
RFUSN	Re-fusion of Spine surgery
SHEA	Society for Healthcare Epidemiologists of America
SSI	Surgical site infection
TAHQ	Texas Association for Healthcare Quality
TASCS	Texas Ambulatory Surgery Center Society
THAF	Texas Hospital Association Foundation
THAQ	Texas Association for Healthcare Quality
TMA	Texas Medical Association
THCIC	Texas Health Care Information Collection
TMF	Texas Medical Foundation
TSICP	Texas Society of Infection Control and Prevention
TXHSN	Texas Healthcare Safety Network
UTHSC	University of Texas Health Science Center
VHYS	Vaginal Hysterectomy surgery
VSHN	Ventricular Shunt surgery

Appendix B: Accomplishments of the Advisory Panel for Public Reporting of Healthcare-Related Infections and Preventable Adverse Events

1. 2005-2006: Recommended and advised on development of survey that was distributed to Texas Hospitals to determine capabilities, (e.g., IP&C, computer/IT), needed for public reporting of HAIs
2. 2006: Developed white paper describing the state of public reporting of HAIs with recommendations for the Texas state program that included the importance of:
    a. A robust system for data collection and analysis
    b. Using consistent NHSN definitions
    c. Risk stratification
    d. Validation with feedback to individuals at reporting institutions
    e. Re-evaluation
3. 2006-'07: Participated in drafting plan for public reporting of HAIs for legislative review. The plan adopted by the state in 2007 was based on the contents and recommendations in the white paper described in #2. In accordance with the advisory panel's recommendations, DSHS is required to
    a. Establish and implement the Texas HAI Reporting System
    b. Provide education and training to stakeholders
    c. Verify the accuracy and completeness of data reported
    d. Compile and make available to the public a data summary by health care facility at least annually
    e. Allow health care facilities to submit concise written comments regarding their HAI reports for public view and
    f. Enforce reporting mandates.
4. 2008: Recommended conference calls that were held with Rachel Stricof (NY State) and Theresa Horan (NHSN) when evaluating various data systems before NHSN expanded capacity to manage many states' public reporting. Advised when working through the pros and cons of using NHSN vs. other systems and on research into various state website presentations available and on choices made. NHSN was designated as the web-based electronic reporting system for the state of Texas public reporting of HAIs in 2011.
5. 2009: Legislation expanded the responsibilities of the panel to include PAE reporting. In response, the Panel advised assessment of PAE reporting in other states.
6. 2012-'13: Developed white paper on public reporting of PAEs that included a tiered system of introduction of PAEs. The plan adopted by the state in 2013 was based on the information and recommendations in this paper.

General Comments:

Since its inception in 2005, the Texas State Advisory Panel on Public Reporting of HAIs and PAEs has continuously provided input from the variety of experienced, real world, front line individuals who have served on the panel. Panel members have communicated with a variety of stakeholder organizations and delivered presentations to highly respected national audiences. The two annual reports of the data submitted and analyzed for the years 2012 and 2013 prepared by Jennifer Vinyard in the Department provide excellent summaries of the work that has been accomplished in the Department with input from the Advisory Panel. The Panel has continued to fulfill the requirements of Senate Bill 288 and 203 and, in accordance with the statutes on HAI and PAE, to

1) Ensure coordination with appropriate agency staff;

2) Maintain standard operating procedures related to the statutes; and

3) Assure accurate comparison of HAI data to the public that helps individuals make informed decisions. In Texas, the law for public reporting of HAIs and PAEs is evidence-based, consistent with the current national state of the art and adheres to rigorous methodology.

The greatest challenges facing the Program for Public Reporting of HAIs and PAEs in 2014 are:

1) Developing and sustaining a system to **validate** the data received to assure the citizens of Texas that the data posted are meaningful and actionable

2) Developing systems to act in a timely fashion on the data received and analyzed and to demonstrate to the public improvement in the quality of care received in Texas hospitals

3) Responding to the current crisis of antimicrobial resistance in order to reduce the risk of healthcare-associated infections caused by multidrug resistant organisms, (e.g., *C. difficile*, Carbapenmase-resistant *Enterobacteriaceae* [CRE]). This effort requires strong antimicrobial stewardship programs in addition to infection prevention and control programs.

4) Increasing exposure of the public to the publicly reported HAI data, especially the annual reports, via media announcements. This will apply to PAE reporting once that program is established.

5) Developing a meaningful system for PAE reporting. Unlike HAI reporting where HAIs have been defined and risk adjusted by NHSN, there are no, validated definitions, risk adjustments or established impact of PAE reporting. This Advisory Panel current panel is well positioned to advise the Department in the development of a PAE reporting system that produces actionable data to improve patient safety in the state of Texas.

The work of the Panel is just beginning. Considering the talent of the individuals who have and continue to serve on this Advisory Panel, there is the potential for this Advisory Panel to continue to contribute significantly to improve the quality of healthcare in the State of Texas.

Appendix C: Texas 2014 Advisory Panel Members

Physicians:

- Edward Septimus, MD, Medical Director, Infection Prevention and Epidemiology, Hospital Corporation of America, Inc., Houston
- Charles Lerner, MD, Medical Director, Infection Control and Hospital Epidemiology, Methodist Healthcare System, San Antonio
- Jane Siegel, MD, Professor of Pediatrics, UT Southwestern Medical Center, Dallas

Infection control professionals:

- Susan Sebazco RN, MBA, CIC, Infection Prevention Director, Texas Health Arlington Memorial Hospital, Arlington
- Amy Beasley, RN, MSN, CIC, Director of Infection Prevention for Hospitals and Clinics, Trinity Mother Frances, Tyler
- Barbara Hodo, RN, BSN, CIC, Infection Preventionist, East Texas Medical Center, Tyler.
- Patricia Jackson, BSN, CIC, Director of Infection Control with Methodist Dallas Medical Center, Dallas.

Officer of a general hospital:

- Laurence Donovan, MD, Chief Medical Officer, Texas A&M Health Science Center, Round Rock

Officer of an ambulatory surgical center:

- Richard Bays, RN, MBA, Chief Nursing Officer, Memorial Surgical Solutions, Houston

Quality assurance/performance improvement professionals:

- Darlene Adams, MSN, BSN, RN, Director of Quality Management, United Regional Health Care System, Wichita Falls
- Susan Mellott, PhD, Associate Professor, Texas Woman's University, Houston
- Linda Scribner, BA CPHQ, Director of Quality Service, Methodist Dallas Medical Center, Flower Mount
- Debora Simmons, PhD, Senior Vice President & Chief Quality Officer, CHI – St. Luke's Health System, Pearland

Members representing the public as consumers:

- John James, PhD, MA, Chief Toxicologist, Federal Agency, Houston
- Therese Conner. PhD, President of Impera Consulting, LLC. Austin.

Public health professionals:

- Bruce Burns, DC, Center for Health Statistics, DSHS, Austin
- Allison Hughes, RN, Health Facilities Rules Coordinator, Regulatory Services, DSHS, Austin,
- Bobbiejean Garcia, MPH, Epidemiologist, Infectious Disease Control Branch, DSHS, Austin

Appendix D: Missing/Incomplete Alerts List

1. **Incomplete Events:** This alert will list any in-plan events with missing required data elements.

2. **Incomplete Procedures:** This alert will list those procedure records that have missing or incomplete data.

3. **Incomplete Summary Data:** This alert will list months of summary data in which a required field is missing. This may occur when a monthly reporting plan is updated to include an additional event(s) for a location after summary data have been entered initially.

4. **Missing Procedures:** This alert will list those months in which NHSN operative procedure categories were listed in your monthly reporting plan and no procedures have been reported to NHSN.

5. **Missing Procedure Associated Events:** This alert will list those months in which NHSN operative procedures were reported in-plan and no in plan procedure associated events have been reported to NHSN.

6. **Missing Events:** This alert will list months in which events from the device-associated modules were entered in the monthly reporting plan and summary data have been reported to NHSN, but no events have been reported.

7. **Missing Summary Data:** This alert will list months in which events from the device-associated modules were entered in the monthly reporting plan, but no summary data have been entered.

(The Centers for Disease Control and Prevention, 2011)

Appendix E: Sample Health Care Safety Report

The Facility-Specific Health Care Safety Report is created for each healthcare facility on a semi-annual basis. These reports may be lengthy and difficult to understand. In order to understand what the report is telling us, it is important to know what each of the data elements on the report means.

Below is a sample of what a non-existent General Hospital's reports would look like. The first screenshot shows the Consumer version of the report and the second screenshot shows the Technical Version of the report. Different parts of the report are labeled. See below for an explanation of each numbered part of the report.

GENERAL TEXAS FACILITY
123 Main Street
Austin, Texas 78756 A

Facility-Specific Health Care Safety Report – Consumer Version
Reported by the Texas Department of State Health Services
Time Period: January – June [Final] 2014
Report current as of: 10/01/2015 09:25 AM

Data shown in this report came from the National Healthcare Safety Network (NHSN).

Central Line-Associated Bloodstream Infection (CLABSI)				
Hospital Unit	Number of Infections (I, J)		National Comparison (L)	No. of CLABSIs that Contributed to the Patient's Death (M)
	Actual	Predicted		
C — Intensive Care Unit	1	0	Cannot Compare — Data were reported, but not enough to compare to the national baseline.	0

* NOTE: CLABSIs are infections in the blood that happen after a central line is inserted in a patient. The facility is responsible for providing any additional explanation regarding deaths and if provided, can be found below in the Facility Comments Section.

Catheter-Associated Urinary Tract Infection (CAUTI)**				
Hospital Unit	Number of Infections		National Comparison	No. of CAUTIs that Contributed to the Patient's Death
	Actual	Predicted		
Intensive Care Unit	7	0	Cannot Compare — Data were reported, but not enough to compare to the national baseline.	0

** NOTE: CAUTIs are Urinary Tract Infections (UTIs) that happen after a urinary catheter is placed in a patient. The facility is responsible for providing any additional explanation regarding deaths and if provided, can be found below in the Facility Comments Section.

Surgical Site Infections (SSI)***				
D — Surgical Procedure	Number of Infections		National Comparison	No. of SSIs that Contributed to the Patient's Death
	Actual	Predicted		
Abdominal hysterectomy				
E — Inpatient	0	0.012	Cannot Compare — Data were reported, but not enough to compare to the national baseline.	0

*** NOTE: SSIs are infections that occur inthe body after a surgery is performed on a patient. The facility is responsible for providing any additional explanation regarding deaths and if provided, can be found below in the Facility Comments Section.

Facility Comments on NHSN data: N

Facility-Specific Health Care Safety Report - Technical Version

Reported by the Texas Department of State Health Services
Time Period: January - June [Final] 2014
Report current as of: 09/02/2014 09:59 AM

Data shown in this report came from the National Healthcare Safety Network (NHSN).

F K O

Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratio (SIR)

Unit Type	No. of Central Line Days	Number of Infections		SIR and 95% Confidence Interval			SIR Interpretation	No. of CLABSIs that Contributed to the Patient's Death
		Observed	Predicted	SIR	Lower	Upper		
B NICU	4976	1	0				N/A The SIR is not calculated when the number of predicted infections is less than 1	0

* NOTE: The SIR Statistical Interpretation only takes into consideration the SIR values. The facility is responsible for providing any additional explanation regarding deaths and if provided, can be found below in the Facility Comments Section.

G

Catheter-Associated Urinary Tract Infection (CAUTI) Standardized Infection Ratio (SIR)

Unit Type	No. of Urinary Catheter Days	Number of Infections		SIR and 95% Confidence Interval			SIR Interpretation	No. of CAUTIs that Contributed to the Patient's Death
		Observed	Predicted	SIR	Lower	Upper		
ICU	4557	7	0				N/A The SIR is not calculated when the number of predicted infections is less than 1	0

* NOTE: The SIR Statistical Interpretation only takes into consideration the SIR values. The facility is responsible for providing any additional explanation regarding deaths and if provided, can be found below in the Facility Comments Section.

A. **Facility Address –** This is the physical address of the health care facility.

B. **Neonatal Intensive Care Unit (NICU)** – This is a composite of all the Neonatal Intensive Care Unit (NICU) locations for this facility. If there is only one NICU in this facility, then only that NICU's data are displayed in this row.

C. **Intensive Care Units (ICU)** – This is a composite of all the Intensive Care Units (ICU) locations for this facility. If there is only one ICU in this facility, then only that ICU's data are displayed in this row.

D. **Surgery Type** – This is the type of surgical procedure.

E. **Inpatient or Outpatient** – This indicates whether they are Inpatient procedures (meaning the patient was admitted and discharged on different dates) or if they were performed as an outpatient procedure (meaning the patient went to an Ambulatory Surgery Center or the operation was performed on the same day they were admitted and discharged from a hospital).

F. **No. of Central Line Days** – This is the number of days that a central line was in place for each patient that was in this unit. This number is calculated by counting the number of patients with a central line each day. Each day's count is then totaled for the entire reporting time period to get this number.

G. **No. of Urinary Catheter Days** – This is the number of days that a urinary catheter was in place for each patient that was in this unit. This number is calculated by counting the number of patients with a urinary catheter each day. Each day's count is then totaled for the entire reporting time period to get this number.

H. **No. of Procedures** – This is the number of surgical procedures performed at this facility for the given time period.

I. **Actual/Observed Number of Infections** – This is the number of infections for the specified infection type that occurred in this facility for the given time period.

J. **Predicted Number of Infections –** This is the estimated number of infections that was predicted to occur if this facility has the same infection rate as the national benchmark.
    a. If the Observed number of infections > Predicted number of infections, then this facility has a higher rate of infection than the national benchmark
    b. If the Observed number of infections < Predicted number of infections, then this facility has a lower rate of infection than the national benchmark
    c. If the Observed number of infections = Predicted number of infections, then this facility has the same rate of infection as the national benchmark.
    d. **NOTE:** If the Predicted number of infections is less than 1, then there is not enough data to calculate a SIR.

K. **SIR** – This is a ratio of the Observed number of infections to the Predicted number of infections.
    a. If the SIR > 1, then the facility has a higher rate of infection than the national benchmark

b. If the SIR < 1, then the facility has a lower rate of infection than the national benchmark
c. If the SIR = 1, then the facility has the same rate of infection as the national benchmark
d. **NOTE:** If the Predicted number of infections is less than 1, then there is not enough data to calculate a SIR. For more information about the SIR, go to Understanding the Data.

L. **Statistical Interpretation/National Comparison:** This interpretation takes into account whether the difference between the facility and the national experience is significantly different. If it is not statistically significant, then the facility is considered to have about the same experience as that of the nation.
    a. (green down pointing arrow) Significantly fewer infections observed than predicted, based on the national baseline: this means that the facility has a lower rate of infection than the average health care facility and therefore doing better than the average health care facility in the nation.
    b. (gray circle) No significant difference between the numbers of observed and predicted infections, based on the national baseline: this means that the facility about the same rate of infection than the average health care facility.
    c. (red upward pointing arrow) Significantly more infections observed than predicted, based on the national baseline: this means that the facility has a higher rate of infection than the average health care facility and therefore is doing worse than the average health care facility in the nation.
    d. (white box) The SIR is not calculated when the number of predicted infections is less than 1: Data were reported, but not enough to compare to the national baseline and be able to reliably determine whether they are doing better, worse or the same as the nation.

For more information about the data, go to Understanding the Data.

M. **Number of Infections that Contributed to the Patient's Death** – Of the actual/observed number of infections reported by this facility for the given time period, this is the proportion of those that contributed to the death of the patient.

N. **Facility Comments on NHSN data** – In this section, any comments by the facility regarding the Healthcare Associated Infection (HAI) data reported are displayed here.

O. **Upper and Lower 95% Confidence Interval** – The confidence interval is a measure of how certain we can be that the SIR value is true and not just a sampling error. The confidence interval is represented as a range of possible SIR results given the data collected. If the range of numbers includes 1.0, (meaning the number of observed infections and the number of predicted infections was the same), then there are no differences between the reported infections and the national baseline. Any apparent differences in the reported data and the baseline/benchmark may be a result of chance error.

Appendix F: Predictive Risk Factors from the All SSI Logistic Regression Models	
NHSN Operative Procedure‡	**Risk Factor(s) – ALL SSIs**
AAA	duration
CBGB/C	age, ASA, duration, gender, number of beds*
CARD	age, ASA, duration
CEA	There were insufficient data for the following procedures in order to detect significant differences in risk, thus overall incidence will be used in the SIR calculations.
COLO	age, anesthesia, ASA, duration, endoscope, medical school affiliation*, number of beds*, wound class
FUSN	approach, ASA, diabetes, duration, medical school affiliation*, spinal level, trauma, wound class
HPRO	age, anesthesia, ASA, duration, HPRO type, number of beds*, trauma
HTP	There were insufficient data for the following procedures in order to detect significant differences in risk, thus overall incidence will be used in the SIR calculations.
HYST	age, anesthesia, ASA, duration, endoscope, number of beds*
KPRO	age, anesthesia, ASA, duration, gender, KPRO type, number of beds*, trauma
LAM	anesthesia, ASA, duration, endoscope
PVBY	age, ASA, duration, gender, medical school affiliation*
RFUSN	approach, diabetes, duration
VHYS	age, ASA, duration, medical school affiliation*
VSHN	age, medical school affiliation*, number of beds*, wound class

*These risk factors originate from the Patient Safety Annual Facility Survey

†All SSI = superficial incision, deep incisional, and organ/space SSI detected during admission, readmission, or post-discharge

(The Centers for Disease Control and Prevention, 2010)

Appendix G: HAI Antibiograms

Texas Health Service Region 1 Antibiogram, 2014

Antimicrobial Class	Aminoglycosides		Beta-lactam penicillins	Cephalosporins			Fluoroquinolones		Glycopeptide	Lincosamide	Macrolides	Oxazolidinone	Penicillins	TMP/SMX
Antimicrobial	**Amikacin**	**Gentamicin**	**Piperacillin/ Tazobactam**	**Ceftazidime**	**Ceftriaxone**	**Cefuroxime**	**Ciprofloxacin**	**Levofloxacin**	**Vancomycin**	**Clindamycin**	**Erythromycin**	**Linezolid**	**Ampicillin**	**Trimethoprim/ Sulfamethoxazole**
Escherichia coli	28 **100%**	38 **84%**	26 **77%**	27 **78%**	36 **89%**	34 **88%**	25 **52%**	38 **55%**					39 **41%**	38 **74%**
Enterococcus faecalis									27 **100%**			27 **100%**		
Staphylococcus aureus		26 **100%**						26 **65%**	29 **100%**	31 **65%**	31 **48%**			27 **100%**

Note: Antimicrobials 25 or fewer isolates tested per pathogen were excluded from this antibiogram. The number on top indicates the total number of isolates and the percent susceptible is shown in bold.

Texas Health Service Region 2/3 Antibiogram, 2014

Antimicrobial Class	Aminoglycosides					Beta-lactam penicillins	Beta-lactam penicillins		Carbapenems				Cephalosporins						Fluoroquinolones			Glycopeptide	Lincosamide	Lipopeptides	Macrolide		Monobactams	Oxazolidinone	Penicillins		Tetracyclines		TMP/SMX
Antimicrobial	**Amikacin**	**Gentamicin**	**Gentamicin-High Level Test**	**Streptomycin-High Level Test**	**Tobramycin**	**Ampicillin/ Sulbactam**	**Amoxicillin/ Clavulanic Acid**	**Piperacillin/ Tazobactam**	**Doripenem**	**Ertapenem**	**Imipenem**	**Meropenem**	**Cefazolin**	**Cefepime**	**Cefotaxime**	**Ceftazidime**	**Ceftriaxone**	**Cefuroxime**	**Ciprofloxacin**	**Levofloxacin**	**Moxifloxacin**	**Vancomycin**	**Clindamycin**	**Daptomycin**	**Rifampin**	**Erythromycin**	**Aztreonam**	**Linezolid**	**Ampicillin**	**Oxacillin**	**Doxycycline**	**Tetracycline**	**Trimethoprim/ Sulfamethoxazole**
Escherichia coli	158 **99%**	254 **89%**			220 **85%**	196 **42%**	73 **81%**	220 **91%**	28 **100%**	120 **99%**	74 **99%**	149 **99%**	124 **83%**	144 **94%**	71 **92%**	130 **90%**	231 **92%**	89 **88%**	142 **65%**	193 **60%**							133 **93%**		237 **46%**			56 **73%**	234 **68%**
Enterobacter cloacae		41 **95%**			31 **94%**			31 **61%**				25 **96%**		31 **90%**			30 **60%**		25 **92%**	29 **90%**													36 **86%**
Enterococcus faecalis			112 **70%**	33 **76%**																34 **79%**		156 **96%**		40 **93%**				58 **91%**	69 **100%**				
Enterococcus faecium			26 **96%**																			42 **33%**						32 **97%**					
Klebsiella pneumoniae	44 **98%**	89 **96%**			70 **94%**	81 **73%**	32 **94%**	80 **93%**		43 **100%**		40 **98%**	43 **93%**	54 **100%**		47 **96%**	86 **97%**	39 **92%**	47 **94%**	65 **92%**							50 **94%**		65 **8%**				87 **91%**
Pseudomonas aeruginosa	54 **94%**	101 **83%**			84 **94%**			95 **84%**			31 **71%**	82 **84%**		76 **80%**		74 **77%**			74 **82%**	74 **85%**							41 **76%**						
Proteus mirabilis																											15 **100%**						
Staphylococcus aureus		132 94%																	65 **58%**	91 **62%**	26 **77%**	183 **99%**	171 **58%**	95 **100%**	144 **97%**	167 **35%**		106 **100%**		184 **49%**	47 **96%**	176 **91%**	174 **95%**
Staphylococcus epidermidis																						71 **100%**	32 **34%**		30 **97%**					36 **22%**		26 **92%**	
Serratia marcescens																											5 **80%**						

Note: Antimicrobials 25 or fewer isolates tested per pathogen were excluded from this antibiogram. The number on top indicates the total number of isolates and the percent susceptible is shown in bold.

Texas Health Service Region 4/5N Antibiogram, 2014

Antimicrobial Class	Aminoglycosides			Beta-lactam penicillins		Carbapenems		Cephalosporins				Fluoroquinolones		Glycopeptide	Lincosamide	Macrolide		Oxazolidinone	Penicillins		Tetracyclines	TMP/SMX
Antimicrobial	**Amikacin**	**Gentamicin**	**Tobramycin**	**Ampicillin/ Sulbactam**	**Piperacillin/ Tazobactam**	**Imipenem**	**Meropenem**	**Cefazolin**	**Cefepime**	**Ceftazidime**	**Ceftriaxone**	**Ciprofloxacin**	**Moxifloxacin**	**Vancomycin**	**Clindamycin**	**Rifampin**	**Erythromycin**	**Linezolid**	**Ampicillin**	**Oxacillin**	**Tetracycline**	**Trimethoprim/ Sulfamethoxazole**
Escherichia coli	40 **75%**	37 **89%**	34 **91%**	33 **52%**	36 **89%**	30 **47%**	27 **100%**	35 **80%**	35 **89%**	30 **87%**	36 **89%**	35 **49%**							36 **47%**			36 **64%**
Enterococcus faecalis														36 **100%**				34 **91%**				
Staphylococcus aureus		75 **96%**				61 **57%**						51 **55%**	28 **86%**	78 **100%**	71 **70%**	61 **100%**	73 **37%**	59 **98%**		77 **49%**	76 **95%**	66 **95%**

Note: Antimicrobials 25 or fewer isolates tested per pathogen were excluded from this antibiogram. The number on top indicates the total number of isolates and the percent susceptible is shown in bold.

Texas Health Service Region 6/5S Antibiogram, 2014

Antimicrobial Class	Aminoglycosides				Beta-lactam penicillins				Carbapenems			Cephalosporins						Fluoroquinolones			Glycopeptide	Lincosamide	Lipopeptides	Macrolide		Monobactams	Oxazolidinone	Penicillins		Tetracyclines	TMP/SMX
Antimicrobial	**Amikacin**	**Gentamicin**	**Gentamicin-High Level Test**	**Tobramycin**	**Ampicillin/ Sulbactam**	**Amoxicillin/ Clavulanic Acid**	**Piperacillin**	**Piperacillin/ Tazobactam**	**Ertapenem**	**Imipenem**	**Meropenem**	**Cefazolin**	**Cefepime**	**Cefotaxime**	**Ceftazidime**	**Ceftriaxone**	**Cefuroxime**	**Ciprofloxacin**	**Levofloxacin**	**Moxifloxacin**	**Vancomycin**	**Clindamycin**	**Daptomycin**	**Rifampin**	**Erythromycin**	**Aztreonam**	**Linezolid**	**Ampicillin**	**Oxacillin**	**Tetracycline**	**Trimethoprim/ Sulfamethoxazole**
Enterobacter cloacae	43 **93%**	39 **100%**		38 **100%**	28 **36%**			40 **83%**			31 **100%**		35 **91%**			34 **41%**		25 **92%**	31 **94%**									29 **3%**		27 **89%**	38 **89%**
Enterococcus faecalis			67 **82%**																28 **82%**		110 **96%**		31 **94%**				65 **91%**	49 **100%**		35 **23%**	
Enterococcus faecium																					38 **34%**						29 **90%**				
Enterococcus spp.		3 **67%**	28 **86%**																		97 **84%**						44 **93%**	41 **73%**			
Escherichia coli	266 **88%**	242 **80%**	78 **99%**		207 **40%**	37 **76%**		156 **53%**	81 **100%**	216 **60%**		97 **89%**	186 **77%**	213 **85%**	146 **81%**	217 **82%**	100 **74%**	126 **61%**	183 **100%**					234 **80%**		119 **81%**		219 **37%**	241 **88%**		212 **59%**
Klebsiella pneumoniae	109 **73%**	101 **87%**	26 **81%**		90 **63%**			69 **71%**	41 **76%**	90 **74%**		40 **68%**	67 **72%**	84 **74%**	66 **73%**	83 **73%**	26 **54%**	47 **77%**	72 **85%**					88 **81%**		48 **77%**		76	97 **78%**		75 **71%**
Proteus mirabilis	27 **85%**																														
Pseudomonas aeruginosa	120 **74%**	100 **80%**								66 **71%**		38 **63%**		98 **80%**	62 **77%**			101 **81%**	84 **79%**	28 **68%**				105 **90%**					101 **88%**		
Staphylococcus aureus		104 **95%**		125 **100%**			174 **98%**	201 **91%**		144 **69%**	186 **57%**							48 **60%**				199 **69%**	31 **100%**		198 **46%**		31 **90%**			204 **100%**	169 **99%**
Staphylococcus coagulase negative																									18 **22%**					66 **100%**	
Staphylococcus epidermidis																														50 **100%**	

Note: Antimicrobials 25 or fewer isolates tested per pathogen were excluded from this antibiogram. The number on top indicates the total number of isolates and the percent susceptible is shown in bold.

Texas Health Service Region 7 Antibiogram, 2014

Antimicrobial Class	Aminoglycosides				Beta-lactam penicillins	Beta-lactam penicillins	Carbapenems			Cephalosporins				Fluoroquinolones			Glycopeptide	Lincosamide	Macrolide		Monobactams	Oxazolidinone	Penicillins		Tetracyclines	TMP/SMX
Antimicrobial	**Amikacin**	**Gentamicin**	**Gentamicin-High Level Test**	**Tobramycin**	**Ampicillin/ Sulbactam**	**Piperacillin/ Tazobactam**	**Ertapenem**	**Imipenem**	**Meropenem**	**Cefazolin**	**Ceftazidime**	**Ceftriaxone**	**Cefuroxime**	**Ciprofloxacin**	**Levofloxacin**	**Moxifloxacin**	**Vancomycin**	**Clindamycin**	**Rifampin**	**Erythromycin**	**Aztreonam**	**Linezolid**	**Ampicillin**	**Oxacillin**	**Tetracycline**	**Trimethoprim/ Sulfamethoxazole**
Escherichia coli	56 **95%**	113 **88%**		110 **86%**	103 **50%**	113 **92%**	50 **100%**	30 **100%**	80 **100%**	106 **75%**	64 **91%**	111 **93%**	71 **82%**	109 **62%**	92 **61%**	25 **64%**					57 **91%**		113 **51%**			
Enterococcus faecalis			34 **76%**														71 **99%**									
Klebsiella oxytoca				11 **91%**																			9 **0%**			
Klebsiella pneumoniae		51 **94%**		50 **94%**	48 **83%**	50 **94%**			39 **97%**	51 **92%**	28 **93%**	51 **94%**	38 **89%**	49 **92%**	38 **92%**						33 **94%**		51			50 **84%**
Pseudomonas aeruginosa	30 **93%**	52 **90%**		57 **100%**		53 **96%**			41 **90%**		30 **97%**			57 **88%**	43 **86%**						41 **80%**					
Staphylococcus aureus		53 **96%**															88 **100%**	83 **60%**	34 **97%**	82 **44%**		26 **100%**		86 **57%**	82 **91%**	87 **98%**

Note: Antimicrobials 25 or fewer isolates tested per pathogen were excluded from this antibiogram. The number on top indicates the total number of isolates and the percent susceptible is shown in bold.

Texas Health Service Region 8 Antibiogram, 2014

Antimicrobial Class	Aminoglycosides			Beta-lactam penicillins				Carbapenems	Cephalosporins				Fluoroquinolones		Glycopeptide	Lincosamide	Macrolides	Monobactams	Penicillins		Tetracyclines	TMP/SMX
Antimicrobial	**Amikacin**	**Gentamicin**	**Tobramycin**	**Ampicillin/ Sulbactam**	**Amoxicillin/ Clavulanic Acid**	**Piperacillin**	**Piperacillin/ Tazobactam**	**Meropenem**	**Cefazolin**	**Cefepime**	**Cefotaxime**	**Ceftriaxone**	**Ciprofloxacin**	**Levofloxacin**	**Vancomycin**	**Clindamycin**	**Erythromycin**	**Aztreonam**	**Ampicillin**	**Oxacillin**	**Tetracycline**	**Trimethoprim/ Sulfamethoxazole**
Escherichia coli	40 **95%**	129 **86%**	35 **86%**	85 **51%**	47 **60%**		105 **93%**	35 **100%**	103 **56%**	100 **92%**	32 **94%**	128 **88%**	116 **56%**	82 **52%**				49 **86%**	113 **33%**		50 **68%**	124 **64%**
Enterococcus faecalis															71 **100%**				46 **100%**			
Klebsiella pneumoniae		44 **95%**		28 **79%**			33 **91%**		27 **85%**	33 **91%**		41 **88%**	38 **87%**	38 **87%**					34 **6%**			42 **81%**
Pseudomonas aeruginosa		57 **93%**	25 **84%**			29 **69%**	55 **84%**	35 **89%**		55 **91%**			58 **86%**	38 **84%**								
Staphylococcus aureus		47 **94%**													80 **100%**	92 **70%**	86 **53%**			90 **66%**	43 **98%**	87 **99%**
Staphylococcus epidermidis															31 **100%**							

Note: Antimicrobials 25 or fewer isolates tested per pathogen were excluded from this antibiogram. The number on top indicates the total number of isolates and the percent susceptible is shown in bold.

Texas Health Service Region 9/10 Antibiogram, 2014

Antimicrobial Class	Aminoglycosides		Beta-lactam penicillins	Cephalosporins				Fluoroquinolones		Glycopeptide	Lincosamide	Macrolide		Monobactams	Oxazolidinone	Penicillins		Tetracyclines	TMP/SMX
Antimicrobial	**Amikacin**	**Gentamicin**	**Piperacillin/ Tazobactam**	**Cefazolin**	**Cefepime**	**Ceftazidime**	**Ceftriaxone**	**Ciprofloxacin**	**Levofloxacin**	**Vancomycin**	**Clindamycin**	**Rifampin**	**Erythromycin**	**Aztreonam**	**Linezolid**	**Ampicillin**	**Oxacillin**	**Tetracycline**	**Trimethoprim/ Sulfamethoxazole**
Escherichia coli	35 **51%**	33 **85%**	33 **97%**	34 **79%**	32 **91%**	25 **88%**	29 **90%**	27 **56%**						26 **92%**		29 **38%**			
Enterococcus faecalis										25 **100%**									
Staphylococcus aureus		33 **91%**						28 **68%**	25 **68%**	34 **100%**	29 **83%**	32 **94%**	33 **64%**		27 **100%**		33 **70%**	33 **97%**	29 **100%**

Note: Antimicrobials 25 or fewer isolates tested per pathogen were excluded from this antibiogram. The number on top indicates the total number of isolates and the percent susceptible is shown in bold.

Texas Health Service Region 11 Antibiogram, 2014

Antimicrobial Class	Aminoglycosides		Beta-lactam penicillins			Carbapenems		Cephalosporins					Fluoroquinolones		Glycopeptide	Lincosamide	Macrolide		Monobactams	Penicillins		TMP/SMX
Antimicrobial	**Gentamicin**	**Gentamicin-High Level Test**	**Ampicillin/ Sulbactam**	**Amoxicillin/ Clavulanic Acid**	**Piperacillin/ Tazobactam**	**Ertapenem**	**Meropenem**	**Cefazolin**	**Cefepime**	**Ceftazidime**	**Ceftriaxone**	**Cefuroxime**	**Ciprofloxacin**	**Levofloxacin**	**Vancomycin**	**Clindamycin**	**Rifampin**	**Erythromycin**	**Aztreonam**	**Ampicillin**	**Oxacillin**	**Trimethoprim/ Sulfamethoxazole**
Escherichia coli	71 **79%**		58 **24%**	31 **65%**	70 **80%**	25 **100%**	38 **100%**	42 **55%**	52 **85%**	26 **88%**	61 **79%**	26 **69%**	53 **47%**	40 **43%**					28 **86%**	64 **23%**		66 **48%**
Enterobacter cloacae															43 **98%**							
Enterococcus faecalis		38 **76%**																				
Enterococcus spp.																						
Pseudomonas aeruginosa	31 **84%**				26 **92%**								26 **85%**									
Staphylococcus aureus	36 **92%**														38 **100%**	37 **59%**	29 **97%**	38 **47%**			38 **45%**	38 **100%**

Note: Antimicrobials 25 or fewer isolates tested per pathogen were excluded from this antibiogram. The number on top indicates the total number of isolates and the percent susceptible is shown in bold.

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