

Epidemiology of *Clostridium Difficile* Infection (CDI) in Texas Hospitals, 2000 – 2009

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Epidemiology of *Clostridium Difficile* Infection (CDI) in Texas Hospitals, 2000 – 2009

Background and Objectives

Clostridium difficile infection (CDI) is the leading cause of infectious diarrhea in hospitalized patients¹. *Clostridium difficile* (*C. difficile*) has been a known cause of health care associated (nosocomial) diarrhea for about 30 years, and it can be acquired in both hospital and community settings. Infection is almost exclusively a complication of antibiotic use. Since antibiotic utilization is a necessary component of certain treatment regimens, the focus of CDI management in hospitals is preventing acquisition when possible and surveillance to allow for early identification and treatment of cases. Since 2000, infection rates have increased in some health care settings at the same time that an epidemic strain of *C. difficile* (B1/NAP1) appeared in the U.S. and elsewhere. Recently, almost 50 cases of CDI and 24 deaths have been linked to an outbreak at six hospitals in the Niagara Falls region of Ontario, Canada.² CDI exposure risks are increased by: use of broad-spectrum antibiotics, gastrointestinal procedures, long stays in health care facilities, serious underlying health conditions or immunocompromising conditions, and advanced age.

Texas hospitals have almost three million discharges per year. Because CDI can prolong hospital stays and increase costs, basic epidemiological information regarding the characteristics of these infections in Texas hospitals is needed. The purpose of this report, which represents the first part of the study of CDI in Texas hospitals, is to present and describe the epidemiology of CDI in Texas hospitals over the 10-year period 2000 to 2009. The remainder of the study will focus on the utilization and costs associated with inpatients with CDI in Texas hospitals. The final report and related documents will be completed by December 31, 2011.

¹ Source: Kelly CP, LaMont JT. *Clostridium difficile* – more difficult than ever. *N Engl J Med* 2008;359:1932-1940.

² Source: <http://www.cbc.ca/news/health/story/2011/07/17/ont-c-difficile.html>. Accessed 7/38/2011

This report presents the number of CDI discharges and CDI discharge rates by certain characteristics of the inpatients and facilities. The main text of the report focuses on CDI incidence and discharge rates in 2009 and for the combined ten-year period, 2000 to 2009. Data for the other years (2000 – 2008, individually) and selected supplemental tables are provided in the Appendix¹. Because patients with CDI represent only 0.6%, of total discharges in Texas hospitals, comparisons are made between patients with CDI and all discharges, not just patients without CDI.

Inpatients with CDI and Ten-Year Trends in Texas Hospitals

Patients with CDI were identified using ICD-9-CM codes recorded as part of the hospital discharge record. Discharges with a principal or any secondary diagnoses as “Intestinal infection due to *Clostridium difficile*,” (ICD-9-CM code 008.45) were included as CDI cases. Patients with only an admitting diagnosis of CDI were not classified as a patient with CDI, since there was no confirmation of the initial diagnosis recorded on the discharge record.

Table 1 describes the categories used to characterize CDI hospitalizations over 10 years of discharge data. The overall number of discharges classified as CDI increased every year, with an average annual growth rate of 9.1%. The percentage of cases with a principal discharge diagnosis of CDI ranged from 20% to 30% of CDI cases during the study years. For 2000 – 2003, there were up to 8 secondary diagnoses codes that could be used to identify a patient with CDI; however, the number of diagnoses available was expanded to 24 in 2004 – 2009. Therefore, increases in patients with CDI between the first four years and the last six may be due, in part, to the additional diagnoses available. In 2009, the most frequent *admitting* diagnosis for CDI inpatients was Diarrhea (ICD-9-CM 787.91), accounting for 8.9% of the CDI discharges. CDI was second, accounting for 6.5% of the discharges.

¹ An Appendix of supplemental tables has been provided to DSHS as a separate document.

Table 2 presents CDI discharges and discharge rates in Texas and the U.S. from 2000-2009. The overall number of discharges from Texas hospitals increased from almost 2.6 million to over 2.9 million discharges. The rate of CDI discharges increased substantially from 3.054 per 1,000 discharges in 2000 to 6.360 per 1,000 discharges in 2009, with a peak rate of 6.777 per 1,000 discharges in 2008. The overall U.S. CDI discharge rate, calculated using data from the Agency for Healthcare Research and Quality (AHRQ) Nationwide Inpatient Sample (NIS) that is similar in structure to the Texas-specific data, was higher for all data years. However, the trends in growth were similar for Texas and the U.S. as a whole during this time frame, including a slight decrease in the CDI discharge rate in 2009.

Figure 1 presents the information from Table 2 using an indexed trend line with 2000 as the index year for relative comparisons. CDI discharges and discharge rates are compared to the State's total discharges and U.S. CDI discharge rate. CDI discharges grew at a faster pace than overall hospital discharges in Texas; and, the CDI discharge rate in Texas was generally lower than the CDI discharge rate for the U.S.

Table 1. Discharges classified as CDI¹ and discharges with principal or admitting diagnoses of CDI for Texas hospitals, 2000-2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	10-Year Total
Discharges Classified as CDI ¹	7,862	8,462	10,632	12,430	15,700	17,293	17,798	17,691	19,780	18,744	146,392
Percentage Growth		7.6%	25.6%	16.9%	26.3%	10.1%	2.9%	-0.6%	11.8%	-5.2%	9.1% ²
Percentage with CDI as:											
Principal Diagnosis (Dx)	23.5%	21.6%	21.3%	21.1%	20.5%	20.5%	24.2%	27.9%	28.9%	28.8%	24.4%
Other (except admitting) Dx	76.5%	78.4%	78.7%	78.9%	79.5%	79.5%	75.8%	72.1%	71.1%	71.2%	75.6%
Discharges with CDI as Admitting Dx	681	688	842	966	1,212	1,216	1,313	1,186	1,328	1,253	10,685
% of Discharges Classified as CDI ¹	8.7%	8.1%	7.9%	7.8%	7.7%	7.0%	7.4%	6.7%	6.7%	6.7%	7.3%
# Not Classified as CDI ¹	10	15	9	18	15	17	32	34	47	44	241
# without CDI as Principal Dx	44	47	46	55	68	66	92	74	128	110	730

¹For purposes of this report, discharges classified as CDI must have a principal or secondary (any of 8 diagnoses for 2000-2003, and any of 24 diagnoses for 2004-2009) diagnosis of "Intestinal infection due to *Clostridium difficile*," ICD-9-CM code of 008.45. The admitting diagnosis is not considered in classifying a discharge as CDI.

²Average annual growth rate, 2000 – 2009.

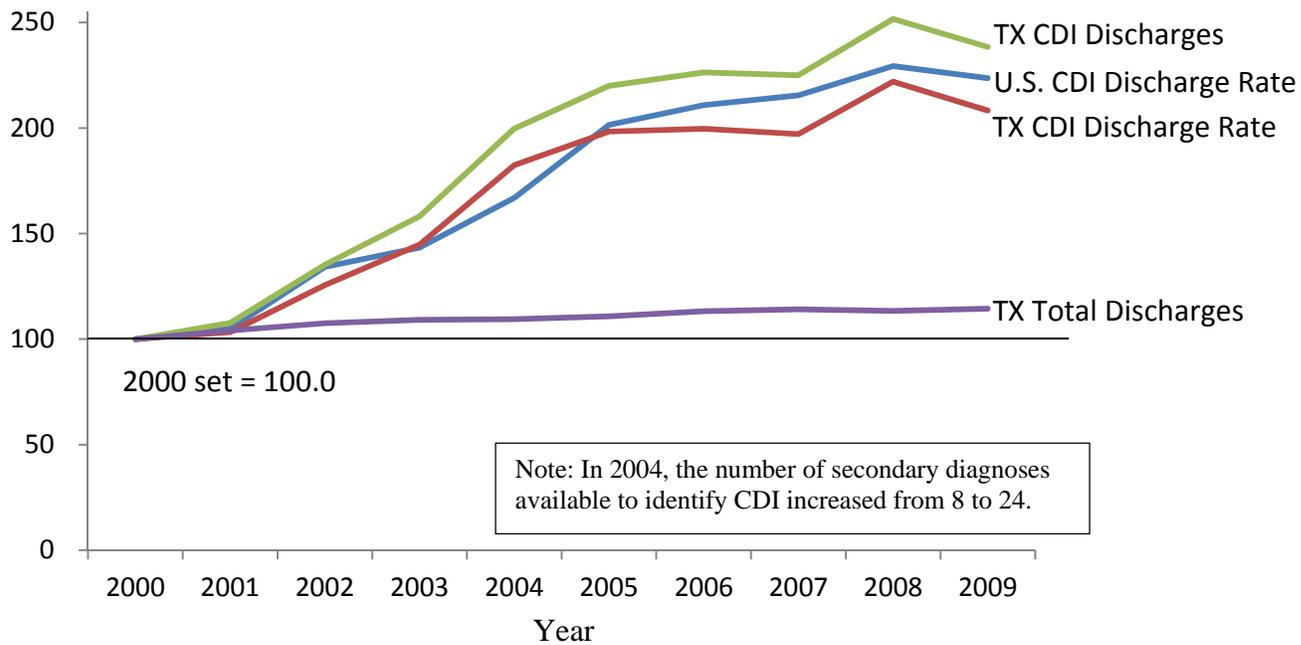
Table 2. Total discharges, CDI discharges, and CDI discharge rates from Texas hospitals, and U.S. CDI discharge rates, 2000-2009

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Texas Hospitals¹										
Total Discharges	2,574,159	2,679,321	2,770,312	2,810,524	2,818,460	2,854,337	2,917,188	2,937,770	2,918,553	2,947,155
% Change from Prior Year	--	4.1%	3.4%	1.5%	0.3%	1.3%	2.2%	0.7%	-0.7%	1.0%
CDI Discharges	7,862	8,462	10,632	12,430	15,700	17,293	17,798	17,691	19,780	18,744
% Change from Prior Year	--	7.6%	25.6%	16.9%	26.3%	10.1%	2.9%	-0.6%	11.8%	-5.2%
CDI Discharge Rate (per 1,000)	3.054	3.158	3.838	4.423	5.570	6.058	6.101	6.022	6.777	6.360
% Change from Prior Year	--	3.4%	21.5%	15.2%	26.0%	8.8%	0.7%	-1.3%	12.5%	-6.2%
United States										
U.S. CDI Discharge Rate ²	3.816	4.003	5.121	5.469	6.366	7.691	8.044	8.220	8.749	8.535
% Change from Prior Year	--	4.9%	27.9%	6.8%	16.4%	20.8%	4.6%	2.2%	6.4%	-2.4%

¹In 2004, the number of diagnoses, other than the principal diagnosis, available to identify CDI increased from 8 to 24.

²U.S. CDI rates per 1,000 discharges calculated based on weighted national estimates from HCUP Nationwide Inpatient Sample (NIS), 2009, Agency for Healthcare Research and Quality (AHRQ), based on data collected by individual States and provided to AHRQ by the States. Total number of weighted discharges in the U.S. based on HCUP NIS.

Figure 1
Relative changes in total discharges, CDI discharges, and CDI discharge rates
from Texas hospitals and in U.S. CDI discharge rates , 2000-2009



Epidemiology of CDI in Texas Hospitals

CDI discharges and CDI discharge rates per 1,000 discharges of any type from Texas hospitals between 2000 and 2009 were examined within the following areas: patient demographic characteristics; rurality and county of patients; facility information; source of admission, discharge status, and lengths of stay; and co-diagnoses, procedures, and use of specialty units.

Patient Demographic Characteristics

Table 3 presents demographic characteristics of CDI and other discharges from Texas hospitals in 2009 and for combined 2000-2009 discharges. Other individual year tables (2000 through 2008) are presented in the Appendix. The rate of CDI discharges per thousand discharges, 6.36, was higher in 2009 compared to the combined 10-years of data, 5.19. Compared to overall hospital discharges, a higher percentage of patients with CDI were Caucasian, non-Hispanic, and in the older age categories.

Figure 2 tracks CDI discharge rates by gender over time; the CDI rate is higher for males with an increasing disparity by gender beginning in 2002. However, the overall pattern of increasing CDI rates over time is clear for both genders. Figure 3 tracks CDI discharge rates by race of the patients over the 10 years of data. Two categories, Asian or Pacific Islander and American Indian/Eskimo/Aleutian Islander, had relatively small numbers of discharges, which resulted in more fluctuations in the CDI discharge rates over time. The overall trend across race categories indicates a steady increase in CDI discharge rates over time, with a higher rate for white patients compared to others. Figure 4 tracks CDI discharge rates according to ethnicity. The rate of increase for non-Hispanic patients was higher (i.e., had a steeper slope) compared to patients classified as Hispanic. Figure 5 indicates increasing CDI rates according to age categories. Patients age 85 and older consistently had the highest CDI rate. Children and younger adults (under age 44) had the lowest CDI rate with little increase over the 10 years of data.

Table 3. CDI discharge rates, CDI discharges, and total discharges from Texas hospitals by demographic characteristics, 2009 and combined 2000-2009

	2009					Combined 2000-2009				
	CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges		CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges	
		n	%	n	%		n	%	n	%
Totals	6.36	18,744	100.0	2,947,155	100.0	5.19	146,392	100.0	28,227,779	100.0
Gender										
Female	6.12	10,763	57.4	1,758,854	59.7	5.04	85,872	58.7	17,032,312	60.3
Male	6.73	7,978	42.6	1,185,478	40.2	5.41	60,496	41.3	11,188,289	39.6
<i>Missing or Invalid</i>	1.06	3	0.0	2,823	0.1	3.34	24	0.0	7,178	0.0
Race										
White	7.00	12,778	68.2	1,825,626	62.0	5.64	100,624	68.7	17,834,048	63.2
Other	5.50	3,508	18.7	637,588	21.6	4.26	25,988	17.8	6,104,829	21.6
Black	5.55	2,123	11.3	382,263	13.0	4.64	16,502	11.3	3,553,812	12.6
Asian or Pacific Islander	3.38	170	0.9	50,302	1.7	4.72	2,202	1.5	466,552	1.7
American Indian/Eskimo/ Aleut	2.47	103	0.6	41,728	1.4	3.09	632	0.4	204,284	0.7
<i>Missing or Invalid</i>	6.43	62	0.3	9,648	0.3	6.91	444	0.3	64,254	0.2
Ethnicity										
Not of Hispanic Origin	7.17	15,066	80.4	2,099,849	71.3	5.90	119,193	81.4	20,216,516	71.6
Hispanic Origin	4.30	3,612	19.3	840,208	28.5	3.39	26,988	18.4	7,972,243	28.2
<i>Missing or Invalid</i>	9.30	66	0.4	7,098	0.2	5.41	211	0.1	39,020	0.1
Age										
0 -1 year	0.54	238	1.3	439,422	14.9	0.39	1,666	1.1	4,242,493	15.0
1-17 Years	2.85	510	2.7	178,821	6.1	2.10	3,567	2.4	1,695,919	6.0
18-44 Years	2.09	1,718	9.2	821,103	27.9	1.80	14,504	9.9	8,051,032	28.5
45-64 Years	7.15	4,754	25.4	664,606	22.6	5.71	33,979	23.2	5,953,629	21.1
65-74 Years	11.61	4,051	21.6	348,820	11.8	9.19	31,115	21.3	3,385,130	12.0
75-84 Years	14.73	4,678	25.0	317,632	10.8	12.03	39,685	27.1	3,298,403	11.7
85 + Years	16.47	2,792	14.9	169,557	5.8	13.74	21,865	14.9	1,591,258	5.6
<i>Missing or Invalid</i>	0.42	3	0.0	7,194	0.2	1.11	11	0.0	9,915	0.0

Figure 2
CDI discharge rates from Texas hospitals by gender, 2000 – 2009

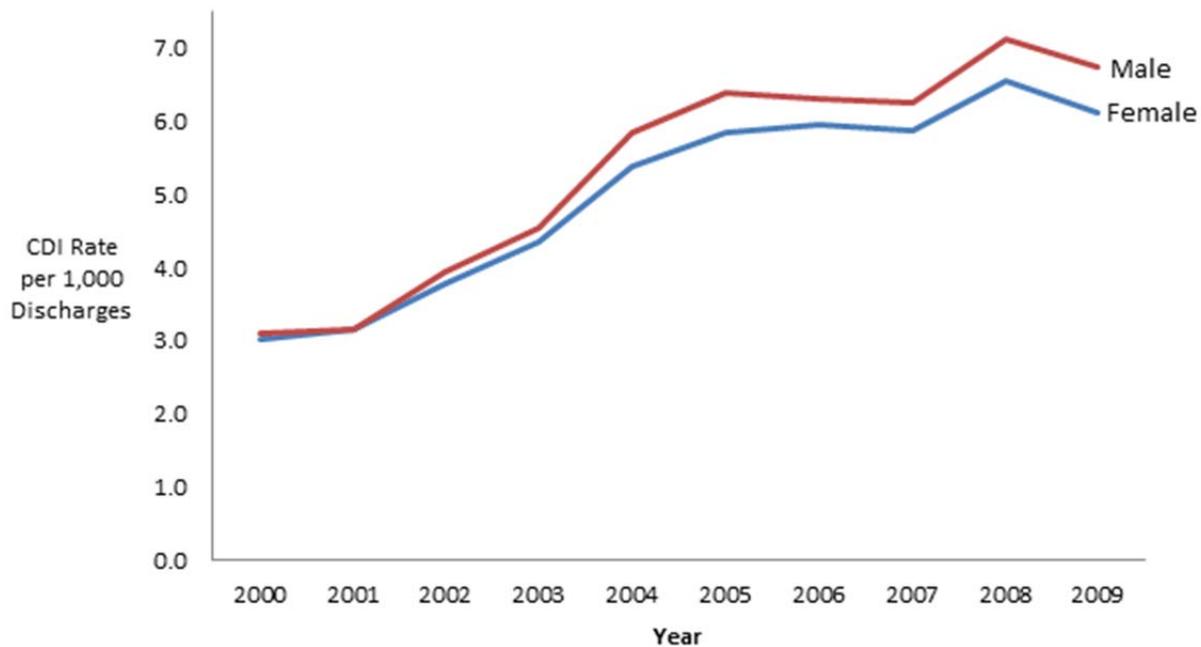


Figure 3
CDI discharge rates from Texas hospitals by race, 2000-2009

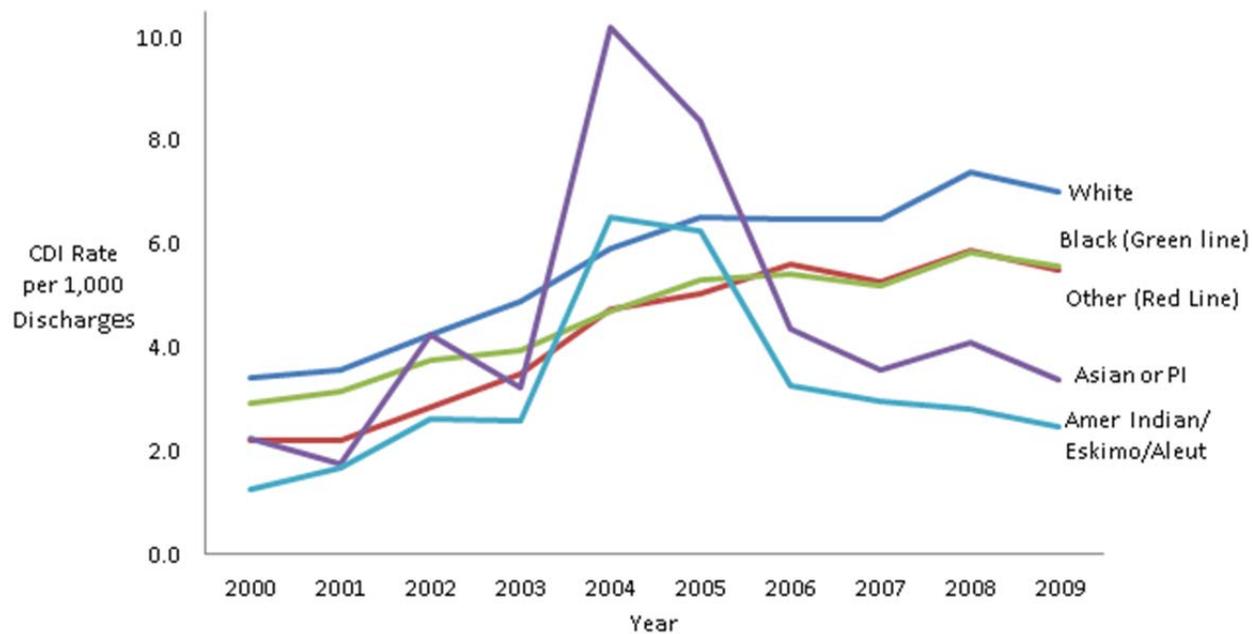


Figure 4
CDI discharge rates from Texas hospitals by ethnicity, 2000-2009

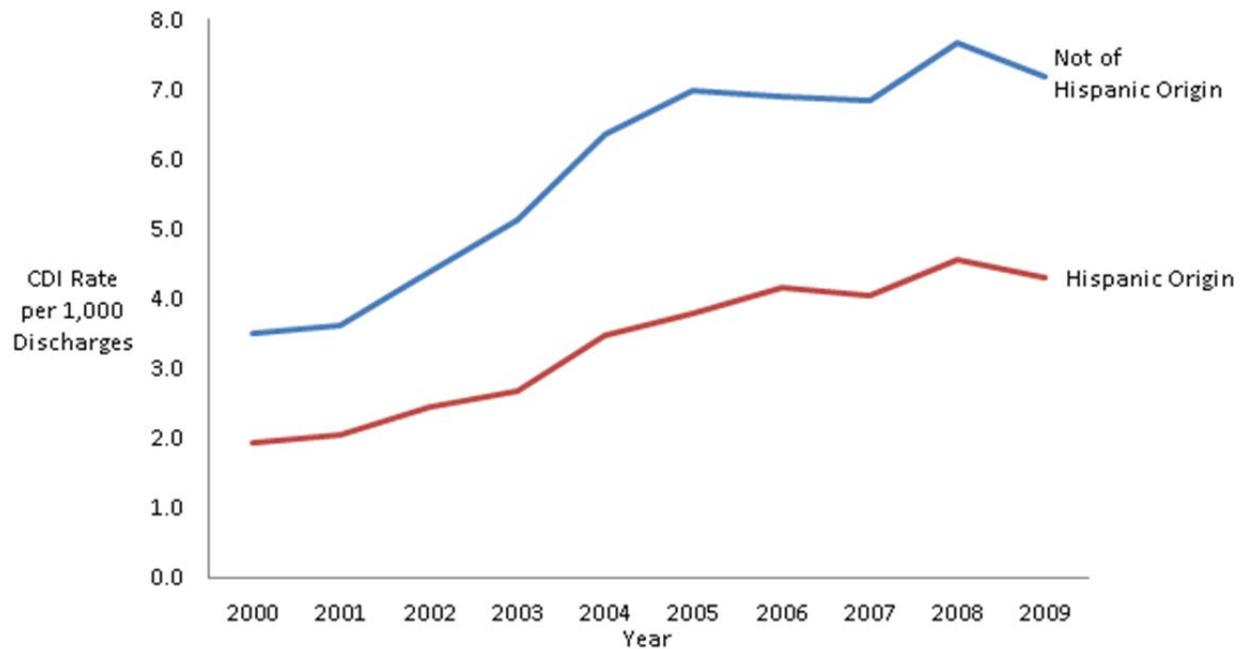
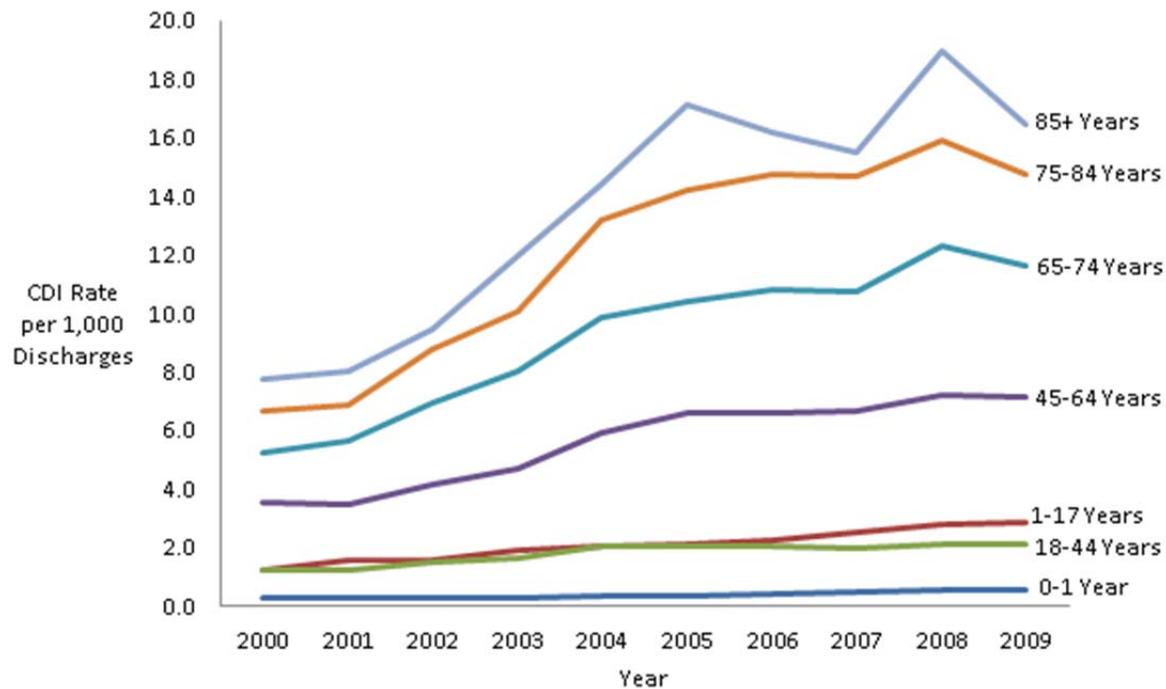


Figure 5
CDI Discharge rates from Texas hospitals by age group, 2000-2009



Rurality and County of Patient

To examine CDI incidence by classification of the rural versus urban residence of the patients, we used two types of classifications. Table 4 presents CDI discharge rates, CDI discharges, and total discharges by Urban Influence Code groupings and Table 5 presents this information by Rural Urban Commuting Area groupings. Geographic distribution for patients with CDI and overall discharges was similar in 2009 and for the combined overall sample (2000-2009) using a rural/urban specification. Likewise, geographic distribution for patients with CDI and overall discharges was similar in 2009 and for the combined overall samples (2000-2009) using the UIC specification. Similar tables for 2000-2008 are provided in the Appendix.

Maps of CDI discharges, changes in three-year discharge rates, and discharge rates compared to the Texas mean rate by county are presented in Figures 6-8. In addition, incidence data by individual county are provided in the Appendix, sorted by number of CDI discharges, CDI discharge rates, and alphabetical by county name.

Of the 254 Texas counties, 54 (21.3%) had 50 or more CDI discharges in 2009, representing 87% of total CDI discharges in that year. The combined 10-year CDI discharge rates for this subset of counties were examined and compared to the State mean of 5.19 CDI discharges per 1,000 total discharges. Twenty-three of the 54 counties had a combined CDI rate greater than the State mean. The 10 counties with the highest rates were Galveston (7.91), Montgomery (7.57), Bowie (7.26), Walker (7.17), Ellis (7.11), Wharton (7.10), Polk (6.87), Liberty (6.51), Fort Bend (6.25), and Brazoria (6.14). The 10-year combined rates for some of the largest counties were: Harris (6.00), Bexar (5.52), Tarrant (5.30), Dallas (5.02), and Travis (4.92).

Table 4. CDI discharge rates, CDI discharges, and total discharges from Texas hospitals by Urban Influence Code groupings, 2009 and combined 2000-2009

	2009					Combined 2000-2009				
	CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges		CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges	
		n	%	n	%		n	%	n	%
Totals	6.36	18,744	100.0	2,947,155	100.0	5.19	146,392	100.0	28,227,779	100.0
Urban Influence Code Grouping										
Metropolitan ¹	6.32	15,665	83.6	2,477,912	84.1	5.21	122,993	84.0	23,595,678	83.6
Micropolitan ²	6.33	1,291	6.9	204,819	7.0	4.81	9,754	6.7	2,028,942	7.2
Rural ³	6.64	1,147	6.1	178,465	6.1	4.75	8,703	6.0	1,809,974	6.4
Missing	7.46	641	3.4	85,959	2.9	6.23	4,942	3.4	793,185	2.8

Note: A “micropolitan” is an urban area in the United States based around a core city or town with a population of 10,000 to 49,999. The micropolitan area designation was created in 2003. Like the better-known metropolitan area, a micropolitan area is a geographic entity used for statistical purposes based on counties and county-equivalents (<http://www.census.gov/population/www/metroareas/metroarea.html> accessed 8-2-2011).

¹Includes large-metropolitan, 1 million+ residents and small-metropolitan, less than 1 million residents

²Includes micropolitan, adjacent to large metropolitan; micropolitan, adjacent to small metropolitan; and micropolitan, not adjacent to metropolitan area.

³Includes noncore, adjacent to large metropolitan; noncore, adjacent to small metropolitan area with town 2,500+ residents; noncore, adjacent to small metropolitan area without town 2,500+ residents; noncore, adjacent to micropolitan area with town 2,500+ residents; Noncore, adjacent to micropolitan area without town 2,500+ residents; noncore, not adjacent metropolitan/micro area with town 2,500+ residents; and noncore, not adjacent metropolitan/micropolitan area without town 2,500+ residents.

Table 5. CDI discharge rates, CDI discharges, and total discharges from Texas hospitals by Rural Urban Commuting Area groupings, 2009 and combined 2000-2009

	2009					Combined 2000-2009				
	CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges		CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges	
		n	%	n	%		n	%	n	%
Totals	6.36	18,744	100.0	2,947,155	100.0	5.19	146,392	100.0	28,227,852	100.0
Rural Urban Commuting Areas										
Urban ¹	6.30	15,050	80.3	2,388,938	81.1	5.21	118,452	80.9	22,728,124	80.5
Rural ²	6.47	3,033	16.2	468,513	15.9	4.87	22,988	15.7	4,716,038	16.7
<i>Non Texas or Missing</i>	7.37	661	3.5	89,704	3.0	6.32	4,952	3.4	783,690	2.8

¹Includes metropolitan area core: primary flow within an urbanized area (UA) and Secondary flow 30% to 50% to a larger UA; metropolitan area high commuting: primary flow 30% or more to a UA and secondary flow 30% to 50% to a larger UA; metropolitan area low commuting: primary flow 5% to 30% to a UA; micropolitan area core: primary flow within an urban cluster (UC) of 10,000 to 49,999 (large UC) with secondary flow 30% to 50% to a UA; micropolitan high commuting: primary flow 30% or more to a large UC with secondary flow 30% to 50% to a UA; Small town core: primary flow within an Urban Cluster of 2,500 to 9,999 (small UC) with secondary flow 30% to 50% to a UA; Small town high commuting: primary flow 30% or more to a small UC with secondary flow 30% to 50% to a UA; and rural areas: primary flow to a tract outside a UA or UC with secondary flow 30% to 50% to a UA.

²Includes micropolitan area core: primary flow within an Urban Cluster of 10,000 to 49,999 (large UC) and secondary flow 10% to 30% to a UA; micropolitan high commuting: primary flow 30% or more to a large UC and secondary flow 10% to 30% to a UA; micropolitan low commuting: primary flow 10% to 30% to a large UC and secondary flow 10% to 30% to a UA; Small town core: primary flow within an Urban Cluster of 2,500 to 9,999 (small UC) and secondary flow 30% to 50% to a UA, secondary flow 10% to 30% to a UA, and secondary flow 10% to 30% to a large UC; Small town high commuting: primary flow 30% or more to a small UC and secondary flow 30% to 50% to a large UC, secondary flow 10% to 30% to a UA, secondary flow 10% to 30% to a large UC; Small town low commuting: primary flow 10% to 30% to a small UC and secondary flow 10% to 30% to a UA, and secondary flow 10% to 30% to a large UC; and rural areas: primary flow to a tract outside a UA or UC and secondary flow 30% to 50% to a large UC, secondary flow 30% to 50% to a large UC, secondary flow 30% to 50% to a small UC, secondary flow 10% to 30% to a UA, secondary flow 10% to 30% to a large UC, and secondary flow 10% to 30% to a small UC.

Figure 6
Map of CDI discharges by county of patient
2009

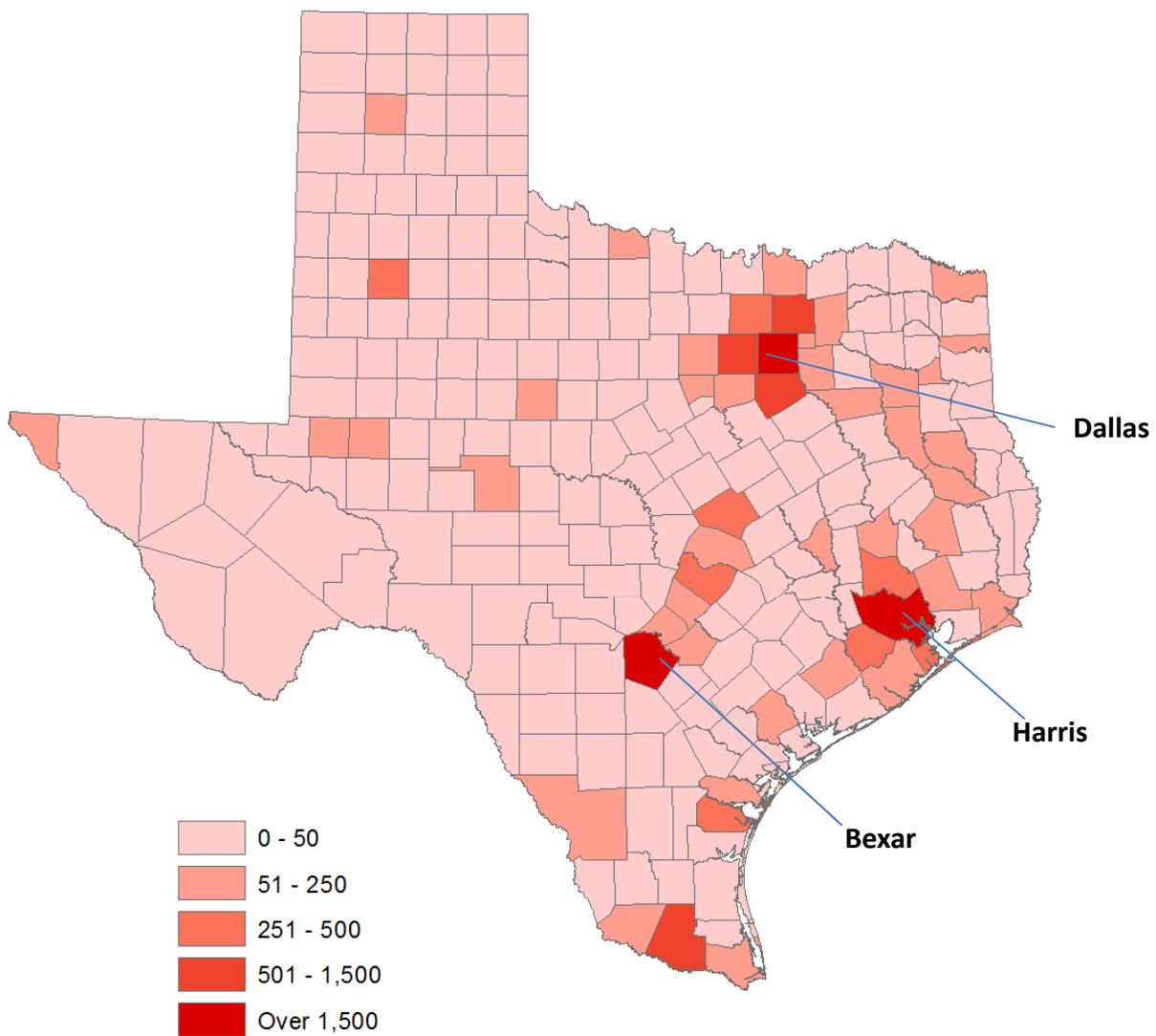


Figure 7
Map of percentage change in three-year average CDI discharge rates by county of patient
2004-2006 to 2007-2009

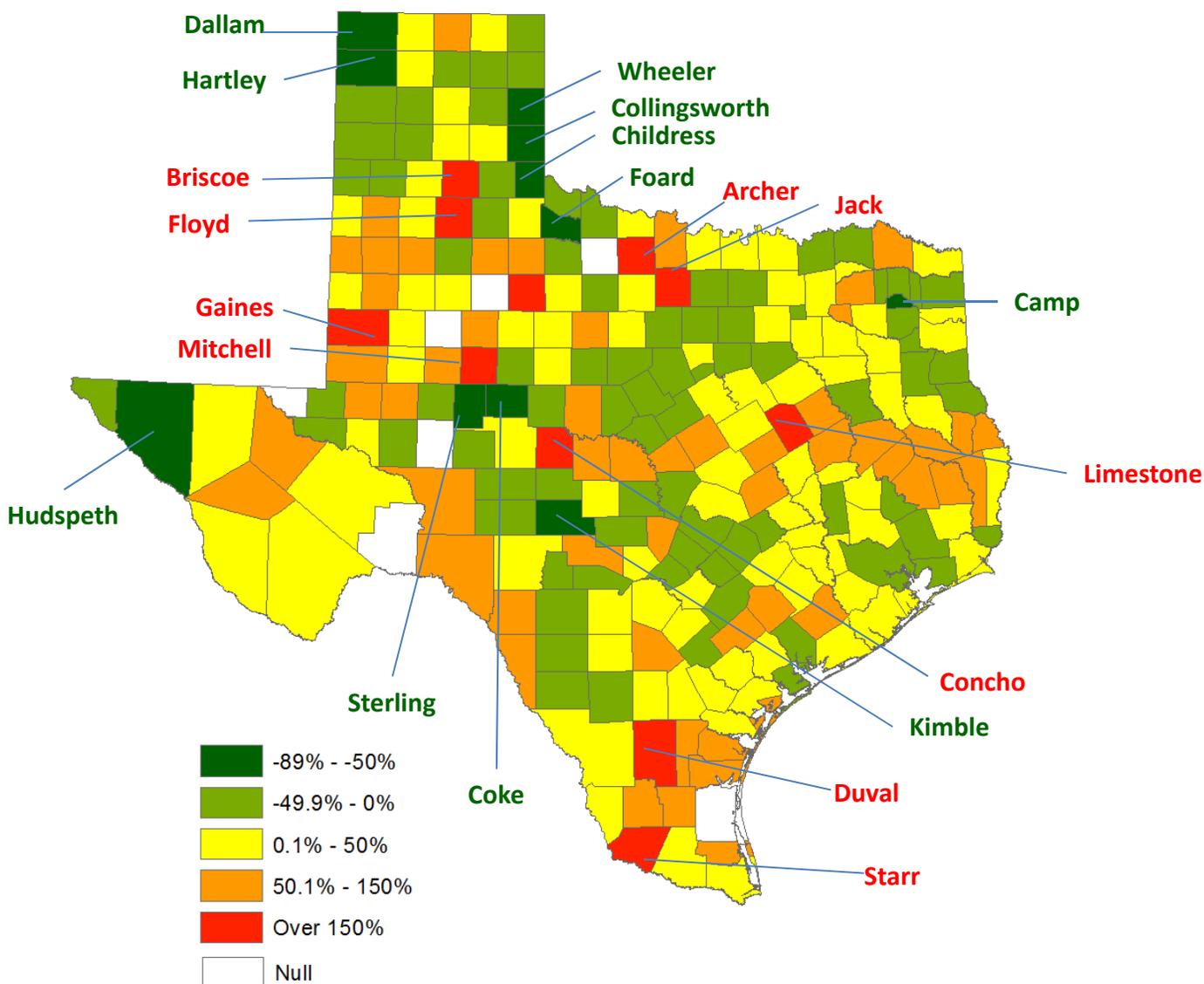
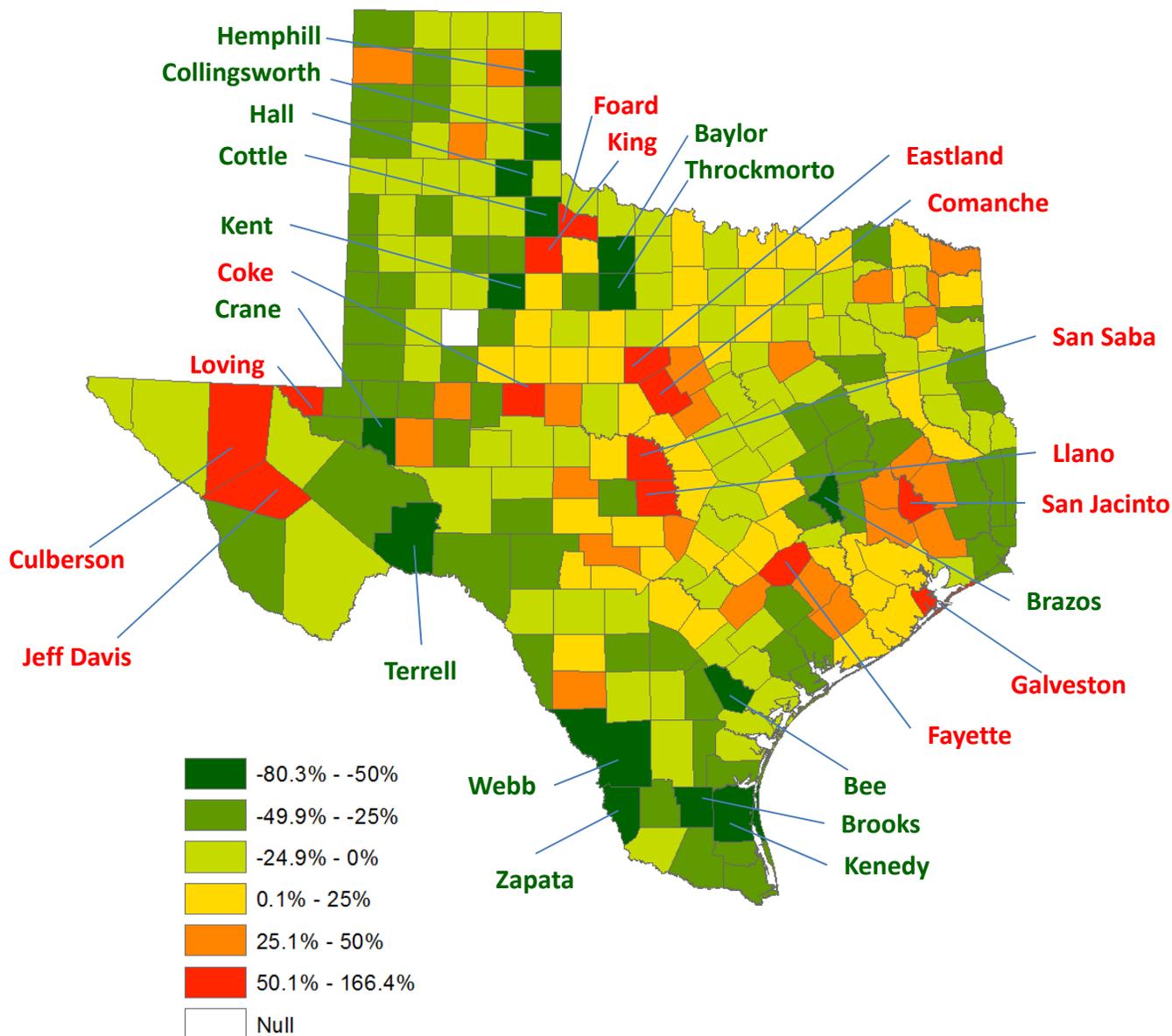


Figure 8
Map of CDI discharge rates compared to Texas mean rate by county of patient
combined 2000 – 2009
 (percentage above or below mean Texas rate)



Facility Information

Table 6 presents the CDI discharge rate, CDI discharges, and total discharges by type of inpatient facility. The CDI discharge rate for long-term care facilities, of which 66 of the 73 are long-term acute care hospitals (LTACs), was more than 10 times that of the overall Texas rate in 2009. CDI discharges represented 11% of the discharges from these long-term care facilities which accounted for just over 1% of all Texas discharges in 2009. Rehabilitation hospitals had the second highest discharge rate in 2009.

Tables 7 and 8 present trends in CDI rates for the top 12 facilities with the highest ratios of observed to expected (O/E), age-adjusted CDI rates; facilities in Table 7 are listed according to 2000 CDI rates and facilities in Table 8 are listed according to 2009 CDI rates. The expected (E) rate is the State average of 6.36 CDI cases per 1,000 discharges. Almost all of the hospitals with the highest O/E ratio are LTACs. Some regression to the mean is evident as those facilities with the highest O/E rates in 2000 had much lower CDI rates in subsequent years. Similarly, those facilities with the highest O/E rates in 2009 were not necessarily among the highest in prior years.

Table 9 presents trends in CDI discharge rates for the 14 general and teaching hospitals, excluding children's hospitals, that had a ratio of observed to expected (O/E), age-adjusted CDI rate greater than or equal to 1.5 in 2009. The ratios for these hospitals are in general much lower than those for the long-term care and rehabilitation facilities presented in Tables 7 and 8. In 2009, Baptist Medical Center, San Antonio, had the highest O/E ratio, 3.00, among these hospitals.

Figure 9 plots the 2009 O/E ratios for all the facilities, from lowest to highest. More than half of the facilities had a 2009 O/E ratio less than 1.0. Less than one-quarter of the facilities had an O/E ratio greater than 2.0. The highest O/E ratios of age-adjusted CDI rates were among the long-term care and rehabilitation facilities.

Table 6. CDI discharge rates, CDI discharges, and total discharges from Texas hospitals by type of facility, 2009

	CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges	
		n	%	n	%
Totals	6.36	18,744	100.0	2,947,155	100.0
Type of Facility					
General/Other	6.05	12,432	66.3	2,054,896	69.7
Teaching	5.13	3,424	18.3	666,800	22.6
Long-term Care ¹	65.27	2,063	11.0	31,608	1.1
Rehabilitation	14.48	533	2.8	36,810	1.3
Children's	3.93	291	1.6	74,044	2.5
Psychiatric	0.01	1	0.0	82,997	2.8

¹66 of the 73 Long-term Care facilities are long-term acute care hospitals (LTACs).

Table 7. Trends in observed/expected (O/E) age-adjusted CDI rates for top 12 facilities, ranked by 2000 O/E CDI rates, for facilities with more than 100 discharges in 2000

Facility Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
East Texas Medical Center Specialty Hospital	16.75	16.11	8.26	7.68	3.55	4.20	5.14	7.18	6.69	5.95
Hendrick Center for Extended Care	13.42	8.89	13.75	4.52	3.52	6.39	5.52	5.57	6.25	3.11
Kindred Hospital – Houston	13.33	14.29	8.60	9.72	16.92	5.71	4.70	4.99	6.17	4.19
Our Children's House Baylor	12.65	12.30	34.48	21.09	6.82	11.96	18.84	11.34	10.37	6.64
Baylor Center Restorative Care	12.61	15.15	15.57	11.61	11.88	9.32	7.46	9.09	4.08	3.82
Kindred Hospital - Tarrant County	12.04	5.93	3.96	6.10	6.35	6.42	7.44	6.08	4.23	5.56
The Institute for Rehabilitation & Research	11.51	9.43	7.99	8.06	13.08	7.18	8.11	3.72	6.14	4.98
Kindred Hospital - Houston Northwest	11.45	4.37	9.02	10.78	7.51	6.60	6.62	5.82	9.03	4.46
Kindred Hospital – Dallas	11.03	10.64	9.12	5.40	4.06	5.36	4.90	6.20	4.56	3.92
Children's Hospital of Austin	9.14	9.92	7.17	6.08	3.79	2.75	3.62	2.35	--	--
Plum Creek Specialty Hospital	8.72	6.86	8.91	10.09	10.40	7.20	2.92	2.73	1.67	6.24
Mesa Hills Specialty Hospital	8.16	4.49	2.62	3.40	8.82	9.31	12.22	4.80	4.07	10.71

Notes: For each year, the “Expected” CDI rate is the statewide average for that year. Five facilities with less than 100 discharges were omitted.

Table 8. Trends in observed/expected (O/E) age-adjusted CDI rates for top 12 facilities, ranked by 2009 O/E CDI rates, for facilities with more than 100 discharges in 2009

Facility Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Select Specialty Hospital - San Antonio	--	0.59	6.81	10.94	13.02	13.30	10.96	10.40	20.47	17.34
Texas NeuroRehab Center	--	3.03	4.96	11.62	29.73	11.70	10.41	9.40	9.30	14.22
Compass Hospital San Antonio	1.18	8.05	4.99	10.28	6.50	9.53	15.18	5.94	5.65	13.37
Memorial Specialty Hospital	1.50	3.16	3.93	3.29	1.59	2.39	3.20	3.48	6.87	12.21
HealthBridge Children’s Hospital-Houston	--	--	--	--	--	--	--	--	7.02	11.49
Kindred Hospital - White Rock	5.68	5.68	6.06	8.30	9.98	9.26	14.14	7.33	7.11	10.81
Corpus Christi Specialty Hospital	--	--	2.40	4.93	2.76	3.01	4.64	5.69	12.23	10.72
Mesa Hills Specialty Hospital	8.16	4.49	2.62	3.40	8.82	9.31	12.22	4.80	4.07	10.71
Triumph Hospital - Northwest	--	--	--	11.91	10.30	9.28	7.77	10.79	6.96	10.40
Ethicus Hospital – Dallas/Fort Worth	--	--	--	--	--	--	--	--	10.27	10.28
Triumph Hospital - El Paso	--	--	--	11.73	10.25	18.06	15.09	16.65	14.46	10.16
Nexus Specialty Hosp. Shenandoah Campus	0.00	0.00	0.00	1.10	10.12	5.71	6.31	7.92	6.72	10.00

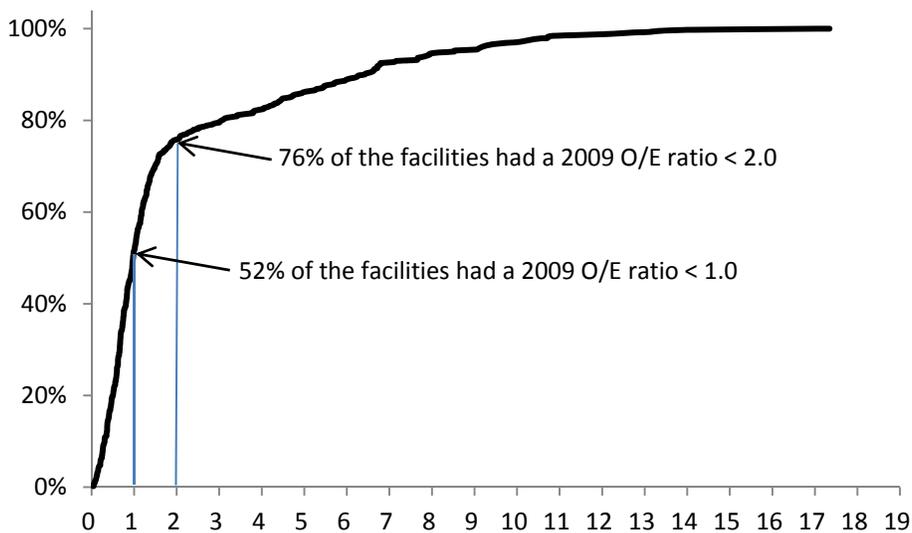
Notes: For each year, the “Expected” CDI rate is the statewide average for that year. Two facilities with less than 100 discharges were omitted.

Table 9. Trends in observed/expected (O/E) age-adjusted CDI rates for teaching and general hospitals with 2009 O/E CDI rate > 1.50, ranked by 2009 O/E CDI rates

Hospital Name	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Baptist Medical Center (San Antonio)	--	--	--	0.56	0.93	1.20	1.59	1.55	2.96	3.00
Methodist Hospital (Houston)	0.68	0.46	--	--	0.74	0.68	1.03	1.16	0.89	2.28
Edinburg Regional Medical Center	--	--	--	--	0.75	0.83	1.44	1.09	2.56	2.06
Woodland Heights Medical Center (Lufkin)	--	--	--	--	1.15	0.84	0.92	1.94	1.40	1.84
CHRISTUS St Michael Health System (Texarkana)	--	--	--	--	1.13	0.87	0.90	0.85	1.37	1.82
Scott & White Memorial Hospital (Temple)	--	--	--	--	0.89	1.37	1.34	1.18	1.39	1.79
East Texas Medical Center-Trinity	--	--	--	--	0.16	0.57	0.35	0.63	1.55	1.76
Covenant Hospital-Levelland	--	--	--	--	0.86	1.12	0.49	1.55	1.38	1.70
Lake Pointe Medical Center (Rowlett)	--	--	--	--	0.94	0.77	1.20	1.01	1.33	1.59
Gulf Coast Medical Center (Wharton)	--	--	--	--	--	--	0.62	2.37	2.16	1.58
Las Palmas Medical Center (El Paso)	--	1.14	1.18	1.65	2.20	1.55	1.66	1.54	1.51	1.57
Memorial Hermann The Woodlands Hospital	--	--	--	--	1.04	1.26	1.19	1.40	1.24	1.55
Doctors Hospital at Renaissance (Edinburg)	--	--	--	--	--	0.17	0.81	0.95	0.93	1.54
Doctors Hospital-White Rock Lake (Dallas)	--	--	--	--	--	--	--	1.09	1.49	1.50

Notes: For each year, the “Expected” CDI rate is the statewide average for that year. Excludes children’s hospitals.

Figure 9
Facility observed/expected CDI discharge rates, ranked from lowest to highest
for facilities with at least 1 CDI discharge, 2009
(n = 440 of 545 facilities)



Source of Admission, Discharge Status, and Lengths of Stay

Patients with CDI in Texas hospitals had a distribution of admission sources that differed from overall patients (see Tables 10-12). Table 10 demonstrates that for the combined data from 2000-2009, over half of overall discharges were admitted by a provider (physician, HMO, or Clinic referral) and around 38% were admitted through the emergency department (ED). However, almost half of CDI cases were admitted through the ED, with 28% admitted by a provider and almost 19% transferred from another hospital. In examining the most-recent year of data, 2009, over 52% of CDI cases were admitted through the ED, with around 18% transferred from another hospital and less than a quarter referred by a clinician. As presented in Table 11, patients with CDI were much less likely to be discharged home compared to overall discharges from Texas hospitals between 2000 and 2009. The rate of discharge to home for patients with CDI in 2009 was just over 50%, with over 41% discharged to other care facilities of any type, and almost 8% dying during the hospital stay compared to less than 2% for all discharged patients. Patients with CDI tended to have longer lengths of stay than overall discharges for Texas hospitals, as presented in Table 12. Whereas over half of overall discharges were 3 days or less (both in 2000-2009 combined and in 2009), less than 14% of CDI discharges occurred within 3 days. Figure 10 shows the difference in lengths of stay according to CDI diagnosis in 2009. Patients with CDI who had another principal discharge diagnosis had the longer hospital stays compared to those with a CDI principal diagnosis or no CDI diagnosis.

Tables in the Appendix provide information analogous to Tables 10, 11, and 12 for other individual data years, 2000 through 2008.

Table 10. CDI discharge rates, CDI discharges, and total discharges from Texas hospitals by source of admission, 2009 and combined 2000-2009

	2009					Combined 2000-2009				
	CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges		CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges	
		n	%	n	%		n	%	n	%
Totals	6.36	18,744	100.0	2,947,155	100.0	5.19	146,392	100.0	28,227,779	100.0
Source of Admission										
Physician, Clinic, or HMO referral	3.88	4,328	23.1	1,115,139	37.8	2.84	41,561	28.4	14,619,937	51.8
Transfer from a hospital	23.17	3,351	17.9	144,645	4.9	20.26	27,428	18.7	1,354,101	4.8
Transfer from a skilled nursing facility	1.39	584	3.1	419,055	14.2	1.65	1,537	1.1	929,897	3.3
Transfer from another health care facility ¹	8.20	365	2.0	44,511	1.5	5.35	2,334	1.6	436,004	1.5
Emergency Room	8.30	9,822	52.4	1,183,283	40.2	6.82	72,562	49.6	10,632,574	37.7
<i>Missing or invalid</i>	7.26	294	1.6	40,522	1.4	3.80	970	0.7	255,266	0.9

¹Includes transfer from another health care facility, court/law enforcement, transfer from psychiatric, substance abuse, rehabilitation hospital, or transfer from a Critical Access Hospital.

Table 11. CDI discharge rates, CDI discharges, and total discharges from Texas hospitals by patient discharge status, 2009 and combined 2000-2009

	2009					Combined 2000-2009				
	CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges		CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges	
		n	%	n	%		n	%		
Totals	6.36	18,744	100.0	2,947,155	100.0	5.19	146,392	100.0	28,227,779	100.0
Patient discharge status										
Discharge to Home ¹	3.75	9,477	50.6	2,526,798	85.7	3.20	77,850	53.2	24,321,841	86.2
Discharge to Other Facility ²	21.80	7,709	41.1	353,700	12.0	17.11	56,360	38.5	3,293,593	11.7
Expired ³	28.46	1,479	7.9	51,962	1.8	21.42	11,723	8.0	547,265	1.9
<i>Missing, Invalid, or Still in Facility</i>	5.38	79	0.4	14,695	0.5	7.05	459	0.3	65,080	0.2

¹Includes discharge to home or self-care, discharge to care of home health service, discharge to care of Home IV provider, discharge to hospice-home, discharge to outpatient care, and left against medical advice.

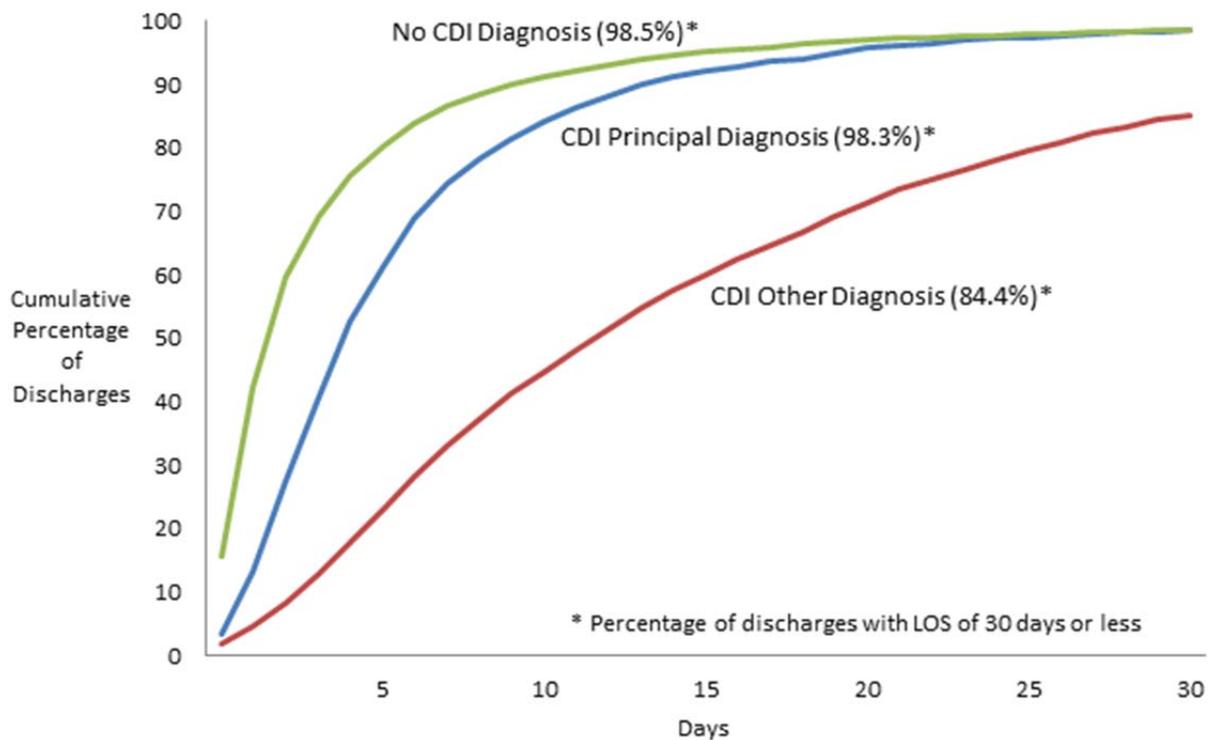
²Includes discharge to other short term general hospital, discharge to skilled nursing facility, discharge to intermediate care facility, discharge to other inpatient care facility, discharge/transferred to federal health care facility, discharge to hospice-medical facility, discharge/transferred to inpatient rehabilitation facility, discharge/transferred to Medicare-certified long-term care hospital, discharge/transferred to Medicaid-certified nursing facility, discharge/transferred to psychiatric hospital or psychiatric distinct part of a hospital, or discharge/transferred to Critical Access Hospital (CAH)

³Includes expired in facility, expired at home, expired in a medical facility, and expired, place unknown.

Table 12. CDI discharge rates, CDI discharges, and total discharges from Texas hospitals by length of stay, 2009 and combined 2000- 2009

	2009					Combined 2000-2009				
	CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges		CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges	
		n	%	n	%		n	%		
Totals	6.36	18,744	100.0	2,947,155	100.0	5.19	146,392	100.0	28,227,779	100.0
Length of Stay										
1 day	0.92	422	2.3	457,747	15.5	0.62	2,915	2.0	4,673,359	16.6
2 days	1.14	891	4.8	779,152	26.4	0.90	6,660	4.6	7,391,334	26.2
3 days	2.49	1,273	6.8	511,277	17.4	2.01	9,439	6.5	4,707,073	16.7
4 days	4.59	1,304	7.0	284,403	9.7	3.61	9,720	6.6	2,695,053	9.6
5 days	7.06	1,306	7.0	184,910	6.3	5.20	9,165	6.3	1,762,335	6.2
6 days	8.50	1,163	6.2	136,766	4.6	6.48	8,450	5.8	1,304,182	4.6
7 days	10.20	1,115	6.0	109,357	3.7	7.63	8,044	5.5	1,054,589	3.7
8 days	12.19	957	5.1	78,518	2.7	9.45	7,231	4.9	764,793	2.7
9 days	13.84	801	4.3	57,893	2.0	10.96	6,151	4.2	561,188	2.0
10 days	14.52	669	3.6	46,068	1.6	12.26	5,485	3.8	447,307	1.6
11 days	16.63	610	3.3	36,679	1.2	13.84	4,995	3.4	360,936	1.3
12 days	19.32	572	3.1	29,602	1.0	15.39	4,425	3.0	287,459	1.0
13 days	20.11	530	2.8	26,351	0.9	16.75	4,251	2.9	253,836	0.9
14 days	21.85	551	2.9	25,214	0.9	17.74	4,298	2.9	242,213	0.9
15 days	23.02	452	2.4	19,633	0.7	19.38	3,671	2.5	189,427	0.7
16-18 days	25.95	1,061	5.7	40,892	1.4	22.33	8,688	5.9	389,160	1.4
19-21 days	33.65	1,028	5.5	30,554	1.0	28.16	8,032	5.5	285,241	1.0
22-25 days	38.80	979	5.2	25,233	0.9	33.51	8,054	5.5	240,335	0.9
26-30 days	43.54	886	4.7	20,351	0.7	37.88	7,333	5.0	193,590	0.7
31-40 days	55.67	1,034	5.5	18,575	0.6	46.56	8,517	5.8	182,933	0.7
41-50 days	54.51	472	2.5	8,659	0.3	51.61	4,549	3.1	88,141	0.3
51-60 days	57.45	249	1.3	4,334	0.2	52.75	2,359	1.6	44,722	0.2
61-90 days	45.99	259	1.4	5,632	0.2	46.24	2,725	1.9	58,928	0.2
91-180 days	36.71	127	0.7	3,460	0.1	31.59	1,059	0.7	33,521	0.1
181-360 days	34.27	28	0.2	817	0.0	19.84	158	0.1	7,964	0.0
More than 360 days	0.98	5	0.0	5,078	0.2	2.21	18	0.0	8,160	0.0

Figure 10
Cumulative percentage of discharges for patients with and without CDI
by length of stay, 2009



Co-Diagnoses, Procedures, and Use of Specialty Units

Table 13 presents the most frequent principal diagnoses (ICD-9-CM) for patients with CDI. The 10 principal diagnosis codes that were most-commonly listed for patients with CDI are less-common for hospital discharges overall, representing 54.4% of the CDI discharges and 10.0% of total discharges, respectively. CDI was the principal diagnosis in 28.8% of the CDI discharges. Other than CDI, common principal diagnoses included septicemia, rehabilitation, acute respiratory failure, pneumonia, acute renal failure, and urinary tract infection. In comparison, the most frequent *admitting* diagnosis for CDI inpatients in 2009 was Diarrhea (ICD-9-CM 787.91), accounting for 8.9% of the CDI discharges; and CDI was second, accounting for 6.5% of the discharges (admitting data not shown in tables).

Table 14 presents the most frequent procedures (ICD-9-CM) for patients with CDI. As with the principal diagnosis, the 10 procedures that were most-commonly listed for patients with CDI are less-common for hospital discharges overall, representing 47.9% of the CDI discharges and 13.5% of total discharges, respectively. Venous catheterization was the most common procedure among patients with CDI (12.3%) who had at least 1 procedure. Other common procedures included transfusion, mechanical ventilation, and hemodialysis.

Table 15 and Table 16 present the 10 most frequent medical and surgical diagnosis related groups (DRGs), respectively, for Texas inpatients with CDI in 2009. In 2009, 82.4% of patients with CDI had a medical DRG compared to 73.2% for all inpatients. The 3 DRGs representing major gastrointestinal disorders and peritoneal infections accounted for more than one-third (34.4%) of the patients with CDI and a medical DRG. Three septicemia-related DRGs accounted for 13.0% of the CDI discharges (among medical DRGs); rehabilitation accounted for 6.6%; and 2 respiratory DRGs accounted for 4.6% of the CDI discharges (with a medical DRG). These 10 most frequent medical DRGs accounted for 60% of the patients with CDI and a medical DRG. Patients with CDI and a surgical DRG, 17.6% of patients with CDI, reflected a variety of procedures and body systems. The 10 most frequent surgical DRGs accounted for 45% of patients with CDI and a surgical DRG.

Table 17 presents the primary specialty units accessed by Texas inpatients. The primary specialty unit is defined as the specialty unit in which most days of the patient stayed occurred outside of the general medical/surgical unit. A stay in a specialty unit was reported in almost half of the discharges. In general, patients with CDI had a higher percentage of most days in the intensive care unit (ICU) compared to patients without CDI. For example, for patients 75 to 84 years of age with a stay in a specialty unit, 71.6% of patients with CDI had the most days in the ICU compared to 65.7% for patients without CDI.

Table 13. CDI discharge rates, CDI discharges, and total discharges from Texas hospitals for the 10 most frequent principal diagnoses (ICD-9-CM) for patients with CDI, 2009

	CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges	
		n	%	n	%
Totals	6.36	18,744	100.0	2,947,155	100.0
Top 10 Principal Diagnosis					
Intestinal Infection – <i>Clostridium Difficile</i> ¹	1,000.00	5,393	28.8	5,393	0.2
Septicemia Not Otherwise Specified	43.61	1,656	8.8	37,969	1.3
Rehabilitation Procedure Not Elsewhere Classified	15.82	1,038	5.5	65,614	2.2
Acute Respiratory Failure	25.34	487	2.6	19,219	0.7
Pneumonia, Organism Not Otherwise Specified	6.43	400	2.1	62,197	2.1
Food/Vomit Pneumonitis	26.16	327	1.7	12,499	0.4
Acute Renal Failure Not Otherwise Specified	12.73	293	1.6	23,013	0.8
Urinary Tract Infection Not Otherwise Specified	7.70	237	1.3	30,776	1.0
Acute and Chronic Respiratory Failure	29.02	202	1.1	6,960	0.2
Obstructive Chronic Bronchitis with (Acute) Exacerbation	4.99	158	0.8	31,677	1.1
Pressure Ulcer, Low Back	54.86	158	0.8	2,880	0.1
Subtotal	34.51	10,191	54.4	295,317	10.0
<i>Other Principal Diagnoses</i>	3.23	8,553	45.6	2,651,838	90.0

¹Rate of CDI discharges is 1,000 since a patient with this principal diagnosis is classified as a patient with CDI.

Table 14. CDI discharge rates, CDI discharges, and total discharges from Texas hospitals for 10 most frequent procedures (ICD-9-CM) for patients with CDI, 2009

	CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges	
		n	% ¹	n	% ¹
Totals	6.36	18,744	100.0	2,947,155	100.0
Total Procedures	6.58	12,411	100.0	1,887,082	100.0
Top 10 Procedure Codes					
Venous Catheterization, Not Elsewhere Classified (38.93)	28.79	1,528	12.3	53,065	2.8
Packed Cell Transfusion (99.04)	16.90	1,013	8.2	59,928	3.2
Continuous Invasive Mechanical Ventilation, 96+ Hours (96.72)	47.37	722	5.8	15,242	0.8
Hemodialysis (39.95)	18.67	643	5.2	34,437	1.8
Closed Biopsy of the Large Bowel (45.25)	72.52	465	3.7	6,412	0.3
Esophagogastroduodenoscopy [EGD] with Closed Biopsy (45.16)	12.91	375	3.0	29,047	1.5
Excisional Debridement of Wound, Infection, or Burn (86.22)	25.97	318	2.6	12,246	0.6
Injection of Antibiotic (99.21)	53.16	304	2.4	5,719	0.3
Physical therapy, Not Elsewhere Classified (93.39)	18.95	298	2.4	15,727	0.8
Continuous Invasive Mechanical Ventilation, <96 Hours (96.71)	12.73	285	2.3	22,394	1.2
Subtotal	23.41	5,951	47.9	254,217	13.5
<i>Other Procedures</i>	3.96	6,460	52.1	1,632,865	86.5
<i>Other Discharges</i>	5.97	6,333	33.8	1,060,073	36.0

¹Among discharges with at least one procedure (except for Totals in first row).

Table 15. CDI discharge rates, CDI discharges, and total discharges from Texas hospitals for the 10 most frequent medical DRGs for patients with CDI, 2009

	CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges	
		n	%	n	%
Totals	6.36	18,744		2,947,155	
Total Medical DRGS		15,445 ¹	100.0	2,157,780 ²	100.0
Top 10 Medical DRGs (Codes)					
Major Gastrointestinal Disorders & Peritoneal Infections with CC (372)	634.19	2,200	14.2	3,469	0.2
Major Gastrointestinal Disorders & Peritoneal Infections with MCC (371)	580.75	1,949	12.6	3,356	0.2
Septicemia or Severe Sepsis without MV 96+ Hours with MCC (871)	42.23	1,539	10.0	36,442	1.7
Major Gastrointestinal Disorders & Peritoneal Infections without CC/MCC (373)	475.22	1,170	7.6	2,462	0.1
Rehabilitation with CC/MCC (945)	19.19	1,020	6.6	53,148	2.5
Respiratory System Diagnosis w Ventilator Support 96+ Hours (207)	47.83	402	2.6	8,404	0.4
Respiratory Infections & Inflammations with MCC (177)	31.93	314	2.0	9,835	0.5
Septicemia or Severe Sepsis with MV 96+ Hours (870)	58.84	237	1.5	4,028	0.2
Septicemia or Severe Sepsis without MV 96+ Hours without MCC (872)	20.57	234	1.5	11,376	0.5
Renal Failure with MCC (682)	16.26	233	1.5	14,328	0.7
Subtotal	63.32	9,298	60.2	146,848	6.8
<i>Other Medical DRGs</i>	3.06	6,147	39.8	2,010,932	93.2

Note: CC = complication or comorbidity. MCC = major complication or comorbidity. MV = mechanical ventilation.

¹Medical DRGs account for 82.4% of CDI discharges.

²Medical DRGs account for 73.2% of total discharges.

Table 16. CDI discharge rates, CDI discharges, and total discharges from Texas hospitals for the 10 most frequent surgical DRGs for patients with CDI, 2009

	CDI Rate per 1,000 Discharges	CDI Discharges		Total Discharges	
		n	%	n	%
Totals	6.36	18,744		2,947,155	
Total Surgical DRGs	4.18	3,299 ¹	100.0	789,375 ²	100.0
Top 10 Surgical DRGs					
Infectious & Parasitic Diseases with O.R. Procedure w MCC (853)	49.36	319	9.7	6,463	0.8
Tracheotomy w MV 96+ Hours or PDX Excluding Face, Mouth & Neck without Major O.R. procedure (004)	52.36	220	6.7	4,202	0.5
ECMO or Tracheotomy with MV 96+ Hours or PDX Excluding Face, Mouth & Neck w Major O.R. (003)	46.27	209	6.3	4,517	0.6
Major Small & Large Bowel Procedures with MCC (329)	24.18	169	5.1	6,990	0.9
Other Respiratory System O.R. Procedures with MCC (166)	30.77	124	3.8	4,030	0.5
Extensive O.R. Procedure Unrelated to Principal Diagnosis with MCC (981)	27.38	106	3.2	3,871	0.5
Major Small & Large Bowel Procedures with CC (330)	10.34	103	3.1	9,965	1.3
Other Digestive System O.R. Procedures with MCC (356)	71.43	90	2.7	1,260	0.2
Other Vascular Procedures with MCC (252)	11.44	70	2.1	6,117	0.8
Skin Graft &/or Debridement for Skin Ulcer or Cellulitis w MCC (573)	44.16	70	2.1	1,585	0.2
Subtotal	30.20	1,480	44.9	49,000	6.2
<i>Other Surgical DRGs</i>	2.46	1,819	55.1	740,375	93.8

Note: CC = complication or comorbidity. MCC = major complication or comorbidity. MV = mechanical ventilation.

¹Surgical DRGs account for 17.6% of CDI discharges.

²Surgical DRGs account for 26.8% of total discharges.

Table 17. Primary specialty unit¹ accessed by patients with CDI and patients without CDI by age group², 2009

Primary Specialty Unit	1 – 44 Years		45 – 64 Years		65 – 74 Years		75 – 84 Years		85 Years & Older	
	CDI	w/o CDI	CDI	w/o CDI	CDI	w/o CDI	CDI	w/o CDI	CDI	w/o CDI
Intensive Care Unit	62.2%	22.7%	74.9%	64.6%	74.1%	67.4%	71.6%	65.7%	70.3%	64.5%
Coronary Care Unit	6.6	3.0	14.3	16.5	14.5	19.9	15.6	21.1	16.8	20.7
Other Specialty Unit	<u>31.2</u>	<u>74.3</u>	<u>10.8</u>	<u>18.9</u>	<u>11.4</u>	<u>12.7</u>	<u>12.8</u>	<u>13.2</u>	<u>12.9</u>	<u>14.8</u>
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Number of Discharges	1,151	543,281	2,422	295,776	2,098	160,356	2,222	148,969	1,265	76,178
% with No Unit Specified	48.4	45.9	49.1	55.2	48.2	53.5	52.5	52.4	54.7	54.3

¹The primary specialty unit is defined as the specialty unit in which most days of the patient stay occurred outside of the general medical/surgical unit.

²Excludes patients ages 0 to 1 years (newborns and infants). “w/o” = Without.

Summary

This descriptive report provides characteristics of CDI discharges from Texas hospitals between 2000 and 2009. Over these 10 years of data, CDI discharges accounted for 0.52% of total Texas discharges; and in 2009, CDI discharges were 0.64% of total discharges. The increase in CDI cases in Texas over this timeframe reflects national and international trends. Analyses of data according to year, demographic, geographic, facility, and diagnostic characteristics confirms that **CDI is an increasing problem in Texas hospitals that disproportionately impacts older adults, patients in long-term and specialty care facilities, and patients diagnosed with other serious health problems.**

Just of one-fifth (21.3%) of Texas' 254 counties had 50 or more CDI discharges in 2009, representing 87% of total CDI discharges in that year. Over the 10 years of data, 50% of patients with CDI were admitted via the ED compared to 38% of all patients. In addition, almost 9 of 10 inpatients were discharged to home compared to just over half of the patients with CDI. The severity of illness of patients with CDI is also evident in the mortality rates: 8% of inpatients with CDI died during their hospital stay compared to less than 2% for all patients.

Patients with CDI had higher average lengths of stay than all patients. Almost 60% of all patients had a length of stay of 3 days or less; however, less than 14% of patients with CDI had lengths of stay of 3 days or less. Also, almost 12% of the patients with CDI had hospital lengths of stay greater than 30 days, compared to less than 2% for all patients. The next step for this research will be to use statistical and econometric methods to estimate the marginal impact of CDI on hospital lengths of stay and costs.

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