

Clostridium Difficile Infections

IN TENNESSEE HOSPITALS

2002-2011

Tennessee Department of Health

Office of Health Statistics

Introduction

March 2013

Each hospital licensed by the Tennessee Department of Health, by law (Tennessee Code Annotated, Section 68-1-108), quarterly reports selected information on each inpatient discharged during the period. This data is included in the Tennessee Hospital Discharge Data System (HDDS). The annual number of reported inpatient records is approximately 900,000.

The increase in drug resistant disease strains, such as extensive drug-resistant tuberculosis or methicillin-resistant staphylococcus aureus (MRSA), has received considerable attention in the mass media. Another problematic interaction between antibiotics and infectious disease is now occurring, but this problem has received less attention. This occurs when the antibiotic treatment for a harmful bacteria kills off other harmless bacteria. When these harmless bacteria are inhibiting the growth of a second harmful bacteria, this allows that second bacteria to become a danger.

One example of this is the development of an infection of Clostridium difficile (C-diff), after antibiotic treatment. C-diff is found in soil and is very common in the intestines of infants and young children. It is generally less common in adults where other intestinal bacteria keep it in check. In situations where antibiotic use is common, such as in hospitals, C-diff can become a problem in persons of any age.

Once C-diff is present in an environment it can be difficult to eradicate. It produces spores that are resistant to most disinfectants. Those containing bleach are generally more effective at destroying the spores than standard disinfectants. Also, many newer strains of C-diff have developed that are resistant to many antibiotics.

Examination of inpatient data from the Tennessee Hospital Discharge Data System indicates a considerable increase in C-diff diagnoses. From 1997 until 1999, the number of diagnosed cases of C-diff for inpatients was fairly stable

(2,043 in 1997; 2,031 in 1998; and 2,059 in 1999). Then the number of cases began to rise (2,452 in 2000; and 2,769 in 2001) appearing to level off around 2008, but with a small blip in 2011.

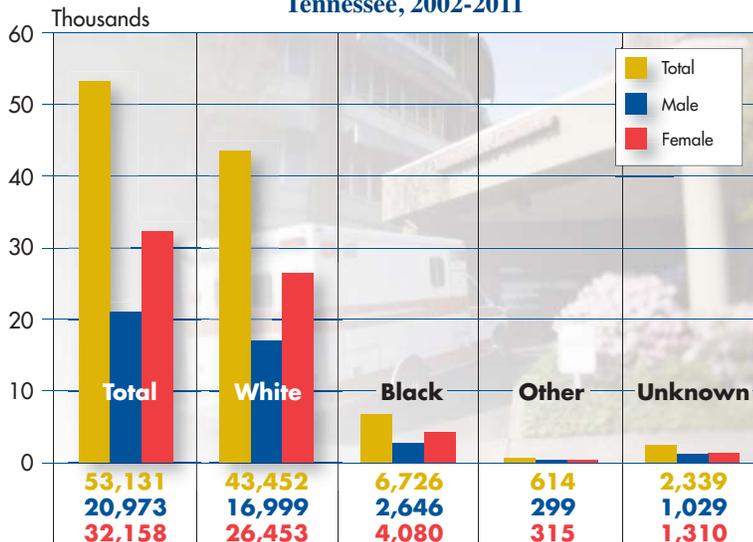
Table 1 gives the number of diagnoses of C-diff from 2002 through 2011. Those listed as principal diagnoses are cases where C-diff is the most important condition faced by the patient. Those listed as other diagnoses are cases where a problem with C-diff is in addition to some other condition diagnosed as principal.

Table 1. Clostridium Difficile Inpatient Cases by Principal and Other Diagnoses, Tennessee, 2002-2011

Year	Diagnosis		Total
	Principal	Other	
2002	898	2,534	3,432
2003	972	2,495	3,467
2004	1,246	3,062	4,308
2005	1,535	3,831	5,366
2006	1,813	3,917	5,730
2007	2,134	3,797	5,931
2008	2,244	3,882	6,126
2009	2,304	3,880	6,184
2010	2,305	3,793	6,098
2011	2,529	3,960	6,489
Total	17,980	35,151	53,131

Source: Tennessee Hospital Discharge Inpatient Data

Figure 2. Number of Inpatient Cases with Clostridium Difficile as a Principal or Other Diagnosis by Race and Gender, Tennessee, 2002-2011



Source: Tennessee Hospital Discharge Inpatient Data

Figure 2 gives a frequency of C-diff as either a principal or other diagnosis for the total cases from 2002-2011 by race and gender. Nearly 61 percent of the total number of cases were diagnosed in females.

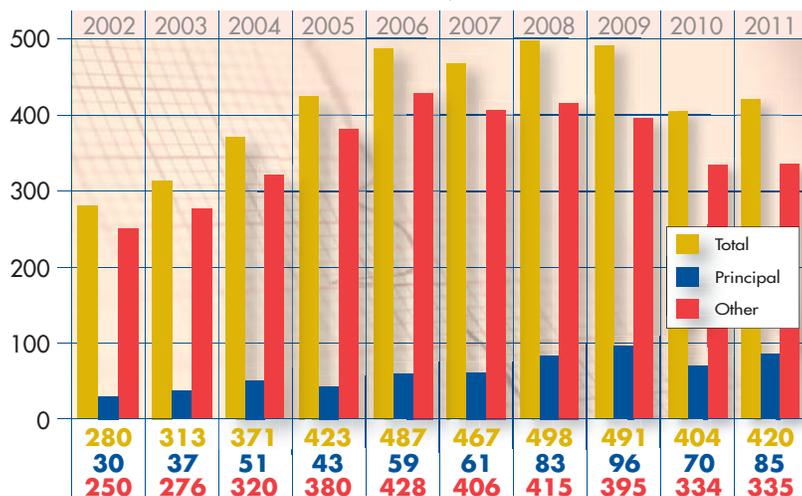
Table 3. Clostridium Difficile Inpatient Cases by Age Group and Gender, Tennessee, 2002-2011

Age	Gender			Total
	Male	Female	Unknown	
0-9	1,095	850	-	1,945
10-19	447	378	-	825
20-29	470	720	-	1,190
30-39	775	1,216	-	1,991
40-49	1,610	2,185	-	3,795
50-59	2,724	3,521	-	6,245
60-69	4,095	5,250	-	9,345
70-79	5,060	7,812	-	12,872
80-89	3,924	8,067	-	11,991
90-99	755	2,109	-	2,864
100+	18	50	-	68
Unknown	-	-	-	-
Total	20,973	32,158	-	53,131

Source: Tennessee Hospital Discharge Inpatient Data

Table 3 shows the frequency of C-diff as a principal or other diagnosis for the total number of cases from 2002-2011 by gender and age. The higher frequency of C-diff in females over males occurs over all age groups except the two youngest groups of 0-9 and 10-19.

Figure 4. Inpatient Deaths Involving Clostridium Difficile by Principal and Other Diagnoses by Year of Discharge, Tennessee, 2002-2011

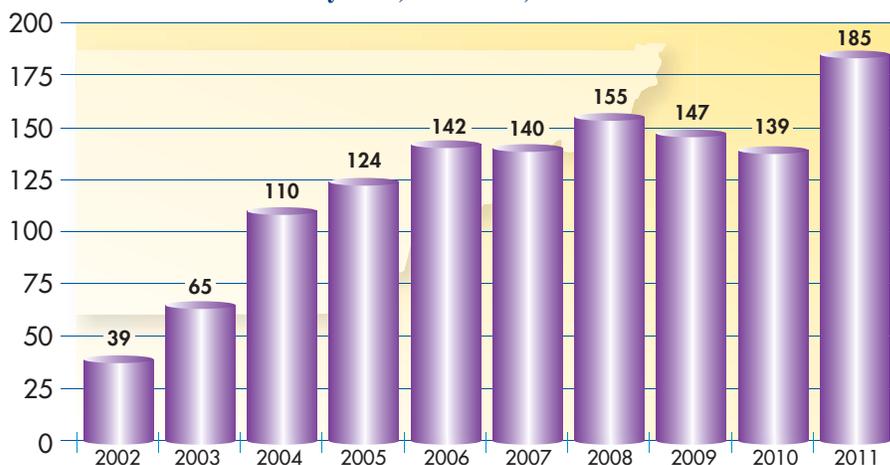


Source: Tennessee Hospital Discharge Inpatient Data

Figure 4 shows the deaths of persons diagnosed with C-diff from 2002-2011. Over the 10-year period, there were 4,154 inpatient deaths with 615 having C-diff as the principal diagnosis and 3,539 deaths for which C-diff was not the principal diagnosis. These are all deaths that occurred in the hospitalizations shown in Table 1. These were all cases with a patient status of “deceased”. However, these patients would not necessarily have died of C-diff; the underlying cause of death could have been from some other condition, particularly among those for which C-diff was not the principal diagnosis.

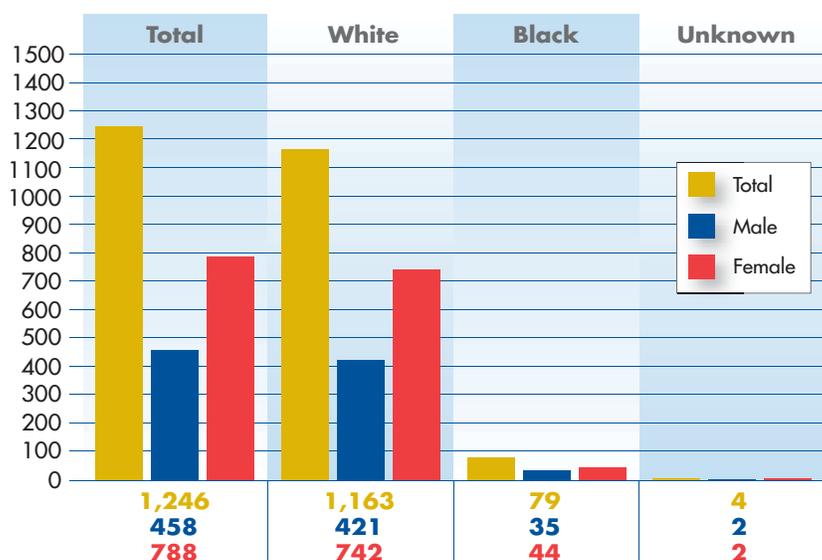
An alternate source of information on deaths is from death certificate data compiled by Tennessee's Office of Vital Records. Figure 5 gives the number of recorded deaths by year with an underlying cause of C-diff. Since the data in Figures 4 and 5 are from two independent sources, the deaths do not match on a case by case basis. However, it would appear that most of the deaths diagnosed with a principal diagnosis of C-diff in the HDDS data would also be found with a diagnosis of C-diff in the death certificate data. The greater number in the death certificate data would appear to be those where the principal cause of hospitalization was some other cause, but the

Figure 5. Recorded Deaths from Clostridium Difficile* by Year, Tennessee, 2002-2011



Source: Tennessee Death Certificate Data
*Some counts have been revised from previous version.

Figure 6. Recorded Deaths from Clostridium Difficile by Race and Gender, Tennessee, 2002-2011



Source: Tennessee Death Certificate Data

underlying cause of death was from C-diff. Also, a few cases in the death certificate data may be for deaths outside the hospital setting.

Figure 6 and Table 7 give information comparable to Figure 2 and Table 3 but are based on deaths from death certificate data, for 2002-2011, rather than hospitalizations. Deaths from C-diff among females are about 63 percent of the total. This parallels the higher female hospitalizations (61 percent) shown in Figure 2 and Table 3.

Table 7. Total Clostridium Difficile Recorded Deaths by Age Group and Gender, Tennessee, 2002-2011

Age	Gender		Total
	Male	Female	
0-9	-	1	1
10-19	-	-	-
20-29	-	2	2
30-39	2	3	5
40-49	4	9	13
50-59	15	20	35
60-69	55	74	129
70-79	160	191	351
80-89	172	329	501
90-99	48	156	204
100+	2	3	5
Total	458	788	1,246

Source: Tennessee death certificate data

In summary, an examination of both hospital discharge and death certificate data shows a steady increase in Clostridium difficile through 2008, then a possible leveling off. This infectious disease has become a problem of considerable magnitude and concern. Hopefully current efforts to contain C-diff will succeed, and this drug resistant disease strain will diminish in the future.

Please visit the **Office of Health Statistics** pages on the Tennessee Department of Health website by selecting Statistics and Reports at: tennessee.gov/health

Recorded deaths are compiled according to the geographic place where the event occurred without regard to residence. Tennessee recorded deaths include deaths which took place within the state, irrespective of the residences of the persons to whom the death occurred.

The mission of the Department of Health is to protect, promote and improve the health and prosperity of people in Tennessee.

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