

INCREASE IN DEATHS RELATED TO ENTEROCOLITIS DUE TO CLOSTRIDIUM DIFFICILE IN THE UNITED STATES, 1999-2002

A review of U.S. death certificate data for the period 1999 through 2002, the latest year for which statistics are available, indicates an increase in the annual number of deaths attributed to enterocolitis due to *Clostridium difficile*, ICD-10 code A04.7. In 1999, there were 793 deaths of 2.39 million total deaths in which this code was listed as the underlying cause of death and 2,195 of 2.44 million deaths in 2002, a 2.7-fold increase in the age-adjusted rates (Table). Similarly, the number of deaths with enterocolitis due to *C. difficile* listed on death certificates as total mentions (combined number of the immediate cause, underlying cause, contributing to the underlying cause, or as a significant condition not contributing to the underlying cause) increased from 1,545 in 1999 to 3,514 in 2002, a 2.3-fold increase.¹

Age- and sex-specific rates for males and females (Table) based on underlying cause of death on certificates¹ and population census data also show considerable increases for 1999 through 2002. Rates increased

with age and the overall rate for females was higher than for males, while elderly males and females had similarly high rates.

Anti-infective medications,² gastric acid suppressive agents,³ and chemotherapeutic drugs⁴ have been implicated as likely or possible causes of enterocolitis due to *C. difficile* in hospital- and community-acquired settings. It is not possible to determine if medications are mentioned as causes of enterocolitis on death certificates without obtaining copies of them. Recent studies have also reported the identification of a severe epidemic strain of the bacterium in the U.S.,⁵ but it is not known if this strain contributed to the increase in deaths during this period. Also, although toxigenic *C. difficile* detection by tissue culture cytotoxin assay is often considered as the "gold standard," a rapid sensitive and specific assay has been developed,⁶ which if widely adopted, might have contributed to diagnosis and the increase in the number of deaths.

In summary, death certificate data indicate recent increases in deaths associated with enterocolitis due to *C. difficile*. Continued surveillance of mortality related to this infection using death certificate data indicates national trends and would help determine the need for increased emphasis on prevention, early detection, and treatment.

Table. Age- and sex-specific rates^a of enterocolitis due to *Clostridium difficile* (as the underlying cause of death) in the United States, 1999 through 2002

	1999	2000	2001	2002
All ages ^b	0.29	0.39	0.47	0.77
Males	0.23	0.31	0.35	0.60
Females	0.35	0.47	0.58	0.92
1-39 years	0.003	0.007	0.007	0.008
Males				
40-49	0.02	0.04	0.03	0.06
50-59	0.07	0.14	0.12	0.25
60-69	0.33	0.54	0.50	1.00
70-79	1.45	1.93	2.30	3.66
80-89	4.17	5.80	6.58	11.0
≥90	11.68	12.58	14.92	26.8
Females				
40-49	0.02	0.04	0.03	0.08
50-59	0.04	0.11	0.17	0.23
60-69	0.35	0.43	0.61	0.84
70-79	1.18	1.74	2.08	2.15
80-89	4.50	3.63	7.02	11.3
≥90	10.02	12.38	15.81	23.0

Sources: Public Use Data Tape Documentation. Multiple cause of death for ICD-10 1999-2002 data. Department of Health and Human Services (US), Public Health Service, National Center for Health Statistics: Hyattsville (MD): 2002.

Population census data.

^aAge- and sex-specific rates per 100,000 population. Rates are based on enterocolitis due to *Clostridium difficile* as the underlying cause of death and on population census data.

^bAge-adjusted rates per 100,000 population using the year 2000 standard.

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