Clostridium difficile Surveillance Report

2017

Minnesota Department *of* Health
EMERGING INFECTIONS PROGRAM

***Clostridium difficile* Surveillance Report 2017**

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In 2009 the Minnesota Commissioner of Health designated sentinel surveillance for *Clostridium difficile* in Benton, Morrison, Stearns, and Todd Counties under the authority of the Communicable Disease Rule, Chapter 4605. In 2012, surveillance was expanded to include Olmsted County. This population-based active laboratory surveillance for *Clostridium difficile* infection (CDI) is conducted by the Minnesota Department of Health (MDH) Emerging Infections Program (EIP) in collaboration with the Centers for Disease Control and Prevention (CDC). The surveillance includes all patients at least 1 year of age, with a positive *C. difficile* test, residing in Benton, Morrison, Stearns, Todd, or Olmsted Counties. Patients are categorized into three epidemiologic classifications depending on the location and timing of the *C. difficile* positive sample in relation to their healthcare exposure. The definitions are as follows.

Epidemiologic classifications:

- **Community-Associated (CA)**: a patient who developed CDI while in the community and had no overnight stay in a healthcare facility in the prior 12 weeks; or developed CDI within the first 3 days of admission to a healthcare facility.
- **Community-Onset, Healthcare Facility Associated (CO-HCFA)**: a patient who developed CDI while in the community and had an overnight stay in a healthcare facility in the prior 12 weeks.
- **Healthcare Facility-Onset (HCFO)**: a patient who developed CDI while in a healthcare facility and had a *C. difficile* specimen collected ≥4 days after admission to a healthcare facility.

A healthcare facility is defined as an acute care hospital, long-term acute care hospital, or long-term care facility.

Specimen classification definitions:

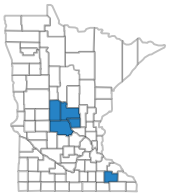
- **Duplicate**: a positive *C. difficile* test collected less than 2 weeks after a previous positive *C. difficile* test.
- **Recurrent**: a positive *C. difficile* test collected between 2 and 8 weeks after a previous positive *C. difficile* test.
- **Incident**: a positive *C. difficile* test collected greater than 8 weeks after any previous positive *C. difficile* test.

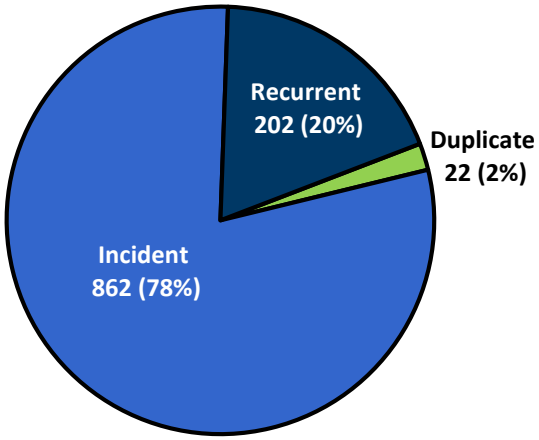
This document summarizes the surveillance data collected during 2017.

In 2017, 1086 case reports from residents within the catchment area who were at least 1 year of age were submitted to MDH; Figure 1 below shows the proportion of incident, recurrent, and duplicate specimens.

Figure 1

Classification of *Clostridium difficile* Reports Submitted to MDH, 2017 (n=1,086)

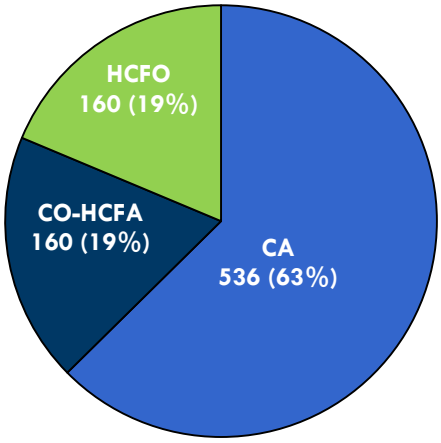




Of the 862 incident reports with medical records available, 536 (63%) were classified as community-associated. Figure 2 below shows the proportion of the epidemiologic classifications.

Figure 2

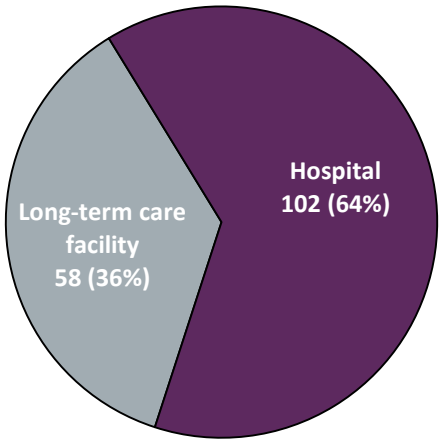
Minnesota *Clostridium difficile* Incident Cases by Epidemiologic Classification, 2017 (n=862)



Of the 160 HCFO cases, 102 (64%) cases were likely acquired in a hospital setting and 58 (36%) were likely acquired in a long-term care facility (Figure 3).

Figure 3

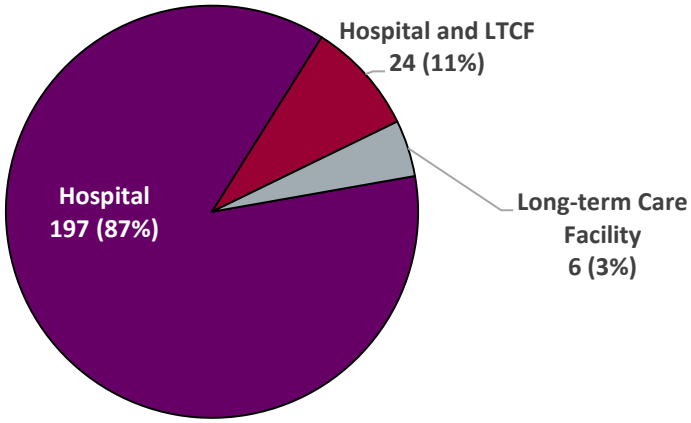
Minnesota *Clostridium difficile* HCFO Cases by Facility Type, 2017 (n=160)



Of the 160 CO-HCFA cases, 137 (86%) had a prior overnight hospital stay, 14 (9%) had both an overnight hospital and long-term care facility stay, 7 (4%) had only a prior long-term care facility stay, and no cases had a prior hospital, long-term acute care hospital, and long-term care facility stay (Figure 4).

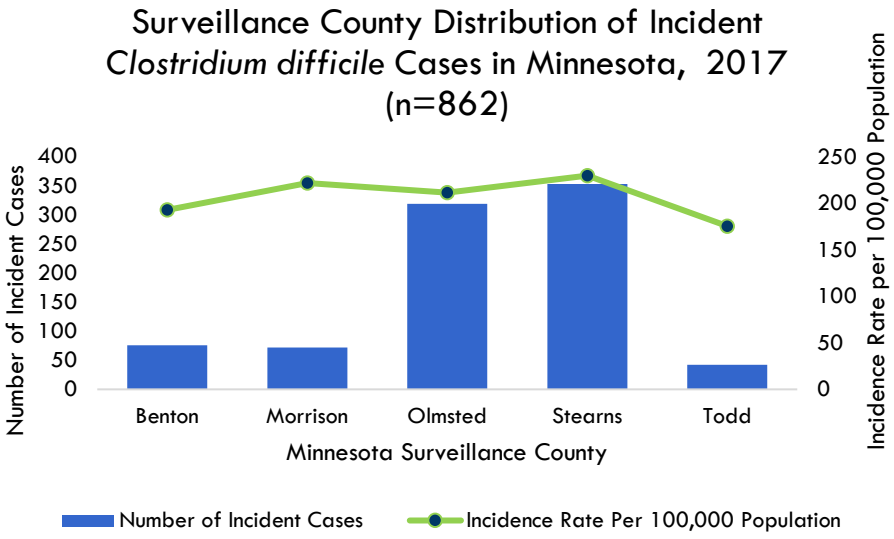
Figure 4

Minnesota *Clostridium difficile* CO-HCFA Cases by Associated Facility Type, 2017 (n=160)



Although the number of incident cases varies from county to county, the incidence rate is approximately the same across all counties (Figure 5). Females and those aged 65 years and older have the highest incidence rate of CDI (Table 1).

Figure 5



**Rates are based upon estimated 2017 population (ages ≥1 yr.) data for Benton, Morrison, Olmsted, Stearns, and Todd Counties*

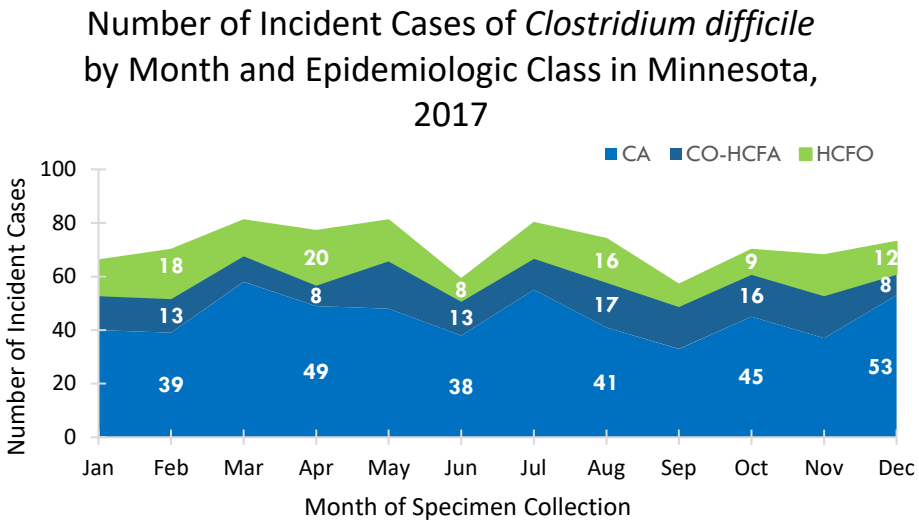
Table 1: Number of Cases and Rates of Incident *Clostridium difficile* by Gender and Age Group in Minnesota, 2017

	Incident Cases n (%)	Incidence Rate per 100,000 population*
Gender		
Male	360 (42)	180
Female	502 (58)	250
Age		
1-17 years	69 (7)	65
18-44 years	194 (23)	134
45-64 years	242 (28)	234
65+ years	367 (43)	598
Totals	862	215

**Rates are based upon estimated 2017 population (ages ≥1 yr.) data for Benton, Morrison, Olmsted, Stearns, and Todd Counties*

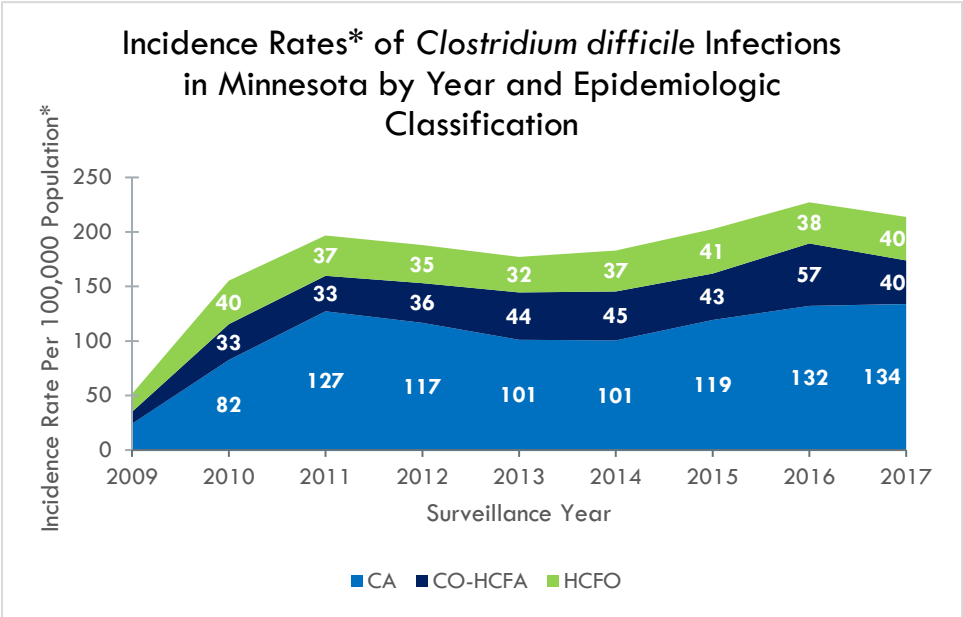
CDI shows slight seasonality, with the highest number of cases reported March-May (Figure 6).

Figure 6



As with previous years, in 2017, CA-CDI cases are the most common epidemiologic class (Figure 7). The incidence rate (213 cases/100,000 population) decreased slightly from the all-time peak in 2016 (227/100,000 population).

Figure 7



**Rates are based upon estimated 2017 population (ages ≥1 yr.) data for Benton, Morrison, Olmsted, Stearns, and Todd Counties*

*** One major clinical laboratory switched laboratory testing methods from EIA to PCR in 2010*

The medical records of all incident cases were reviewed to assess antibiotic use in the prior 12 weeks. The percent of cases prescribed antibiotics according to their medical record varied across epidemiological classes, with fewer CA cases prescribed antibiotics than CO-HCFA and HCFO cases (Table 2).

Table 2

Percent of Cases Prescribed Antibiotics in Previous 12 weeks, According to Medical Record, 2017 (n=862)

Total	**57%**
CA	46%
CO-HCFA	74%
HCFO	76%

Attempts to contact all CA cases were made to administer a health interview inquiring about risk factors in the previous 12 weeks, including antibiotic use. In 2017, 343 health interviews were completed, 170 (50%) cases reported taking antibiotics in the 12 weeks prior to symptom onset or stool collection. Of the 343 interviewed CA cases, 62 (18%) had no outpatient healthcare and no antibiotic exposure documented in their medical record or reported on interview.

Of those cases who reported an antimicrobial prescription in the 12 weeks prior to being diagnosed with CDI, 50(29%) reported taking them for ear, sinus, or upper respiratory infections (Figure 8). The next most common indications for antimicrobials were dental work (12%) and urinary tract infections (11%). The most commonly reported antibiotic classes were penicillins (41%) and cephaloporins (20%) (Table 3)

Figure 8

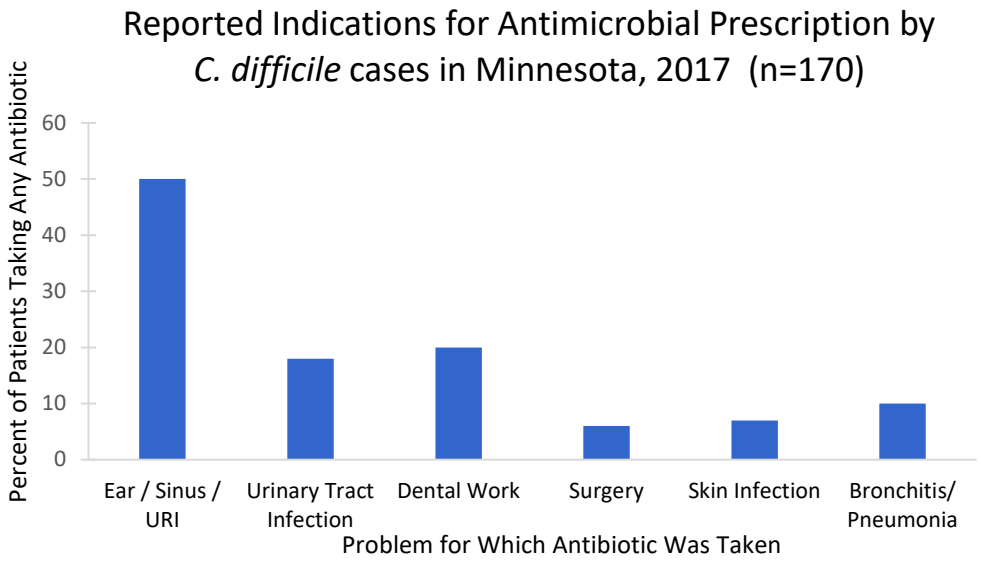


Table 3

Antibiotic Classes Reported by *C. difficile* Cases in Previous 12 Weeks According to Interview, 2017 (n=170)

Antibiotic Class	Percent of cases
Penicillin	41%
Cephalosporin	20%
Fluoroquinolone	9%
Glycopeptide	9%
Macrolide	5%
Other	17%

Discussion

Clostridium difficile infections are an important public health concern in Minnesota; the incidence is highest in people age 65 years and older, and women are more often affected than men. A majority of Minnesota's CDI cases have no inpatient or overnight healthcare exposure, and at least 18% of interviewed CA patients had no documented healthcare or antibiotic exposure, the main modifiable risk factors for *C. difficile* infection. This signifies further investigation of community-associated CDI is needed to identify risk factors for acquiring *C. difficile*.

Antibiotic use is a known risk factor for CDI; overall, 56% of Minnesota cases in 2017 were prescribed an antibiotic prior to their *C. difficile* infection. Attention to appropriate antibiotic prescribing practices, especially in the case of asymptomatic bacteriuria, upper respiratory illnesses, and dental treatment and prophylaxis, could be an important avenue for CDI prevention.

Publications Utilizing Minnesota *Clostridium difficile* Surveillance Data

1. **DEATH DUE TO COMMUNITY-ASSOCIATED *CLOSTRIDIUM DIFFICILE* IN A WOMAN RECEIVING PROLONGED ANTIBIOTIC THERAPY FOR SUSPECTED LYME DISEASE**

Holzbauer S, Kemperman M, Lynfield R. Death due to community-associated *Clostridium difficile* in a woman receiving prolonged antibiotic therapy for suspected Lyme disease. Clin Infect Dis. August 1, 2010;51(1):369-70. Available at: http://cid.oxfordjournals.org/content/51/3/369.long

2. **EPIDEMIOLOGY OF COMMUNITY-ASSOCIATED *CLOSTRIDIUM DIFFICILE* INFECTION, 2009 THROUGH 2011**

Chitnis AS, Holzbauer SM, Belflower RM, Winston LG, Bamberg WM, Lyons C, Farley MM, Dumyati GK, Wilson LE, Beldavs ZG, Dunn JR, Gould LH, Maccannell DR, Gerding DN, McDonald LC, Lessa FC. Epidemiology of community-associated *Clostridium difficile* infection, 2009 through 2011. JAMA Intern Med. 2013 Jul; 173(14): 1359-67. Available at: http://archinte.jamanetwork.com/article.aspx?articleid=1697791

3. **EFFECT OF NUCLEIC ACID AMPLIFICATION TESTING ON POPULATION-BASED INCIDENCE RATES OF *CLOSTRIDIUM DIFFICILE* INFECTION**

Gould CV, Edwards JR, Cohen J, Bamberg WM, Blark LA, Farley MM, Johnsonton H, Nadle J, WIndston L, Gerding DN, McDonald LC, Lessa FC. Effect of nucleic acid amplicfication testing on population-based incidence rates of *Clostridium difficile* infection. Clin Infect Dis. 2013 November; 57(9):1304-1307. Available at: http://cid.oxfordjournals.org/content/57/9/1304.long

4. **IMPACT OF CHANGES IN *CLOSTRIDIUM DIFFICILE* TESTING PRACTICES ON STOOL REJECTION POLICIES AND *C. DIFFICILE* POSITIVITY RATES ACROSS MULTIPLE LABORATORIES IN THE UNITED STATES**

Cohen J, Limbago B, Dumyati G, Holzbauer S, Johnston H, Perlmutter R, Dunn J, Nadle J, Lyons C, Phipps E, Beldays Z, Clark LA, Lessa FC and Investigators CDC's *Clostridium difficile* Infection Surveillance. Impact of changes in *Clostridium difficile* testing practices on stool rejection policies and *C. difficile* positivity rates across multiple laboratories in the United States. J Clin Microbiol. 2014 Feb; 52(2): 632-4. Available at: http://jcm.asm.org/content/52/2/632.short

5. ***CLOSTRIDIUM DIFFICILE* INFECTION AMONG CHILDREN ACROSS DIVERSE U.S. GEOGRAPHIC LOCATIONS**

Wendt JM, Cohen JA, Mu Y, Dumyati GK, Dunn JR, Holzbauer SM, Winston LG, Johnston HL, Mek JI, Farley MM, Wilson LE, Phipps EC, Beldavs ZG, Gerding DN, McDonald LC, Gould CV, Lessa FC. *Clostridium difficile* infection among children across diverse U.S. geographic locations. Pediatrics. 2014 April; 133(4): 1-8. Available at: http://pediatrics.aappublications.org/content/early/2014/02/25/peds.2013-3049

6. **NAP1 STRAIN TYPE PREDICTS OUTCOMES FROM *CLOSTRIDIUM DIFFICILE* INFECTION**

See I, Mu Y, Cohen J, Beldav ZG, Winston LG, Dumyati G, Holzbauer S, Dunn J, Farley MM, Lyons C, Johnston H, Phipps E, Perlmutter R, Anderson L, Gerding DN, Lessa FC. NAP1 strain type

predicts outcomes from *Clostridium difficile* infection. Clin Infect Dis. 2014 May 15; 58(10): 1394-1400. Available at: http://cid.oxfordjournals.org/content/58/10/1394.long

7. **DETERMINANTS OF *CLOSTRIDIUM DIFFICILE* INFECTIONS ACROSS DIVERSE U.S. GEOGRAPHIC LOCATIONS**

Lessa FC, Mu Y, Winston LG, Dumyati GK, Farley MM, Beldavs ZG, Kast K, Holzbauer SM, Meek JI, Cohen J, McDonald LC, Fridkin SK. Determinants of *Clostridium difficile* infections across diverse U.S. geographic locations. Open Forum Infect Dis (Summer 2014) 1 (2): doi:10.1093/ofid/ofu047. Available at: http://ofid.oxfordjournals.org/content/1/2/ofu048.full

8. **BURDEN OF *CLOSTRIDIUM DIFFICILE* INFECTION IN THE UNITED STATES**

Lessa FC, Mu Y, Bamberg WM, Beldavs ZG, Dumyati GK, Dunn JR, Farley MM, Holzbauer SM, Meek JI, Phipps EC, Wilson LE, Winston LG, Cohen JA, Limbago BM, Firdkin SK, Gerding DN, McDonald LC. Burden of *Clostridium difficile* infections in the United States. N Engl J Med. 2015 Feb 26; 372(9): 825-834. Available at: http://www.nejm.org/doi/full/10.1056/NEJMoa1408913

9. ASSOCIATION BETWEEN OUTPATIENT ANTIBIOTIC PRESCRIBING PRACTICES AND COMMUNITY-ASSOCIATED CLOSTRIDIUM DIFFICILE INFECTION.

Dantes R, Mu Y, Hicks LA, Cohen J, Bamberg W, Beldavs ZG, Dumyati G, Farley MM, Holzbauer S, Meek J, Phipps E, Wilson L, Winston LG, McDonald LC, Lessa FC. Open Forum Infect Dis. 2015 Aug 11;2(3):ofv113. doi: 10.1093/ofid/ofv113. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4551478/

10. **BURDEN OF NURSING HOME ONSET CDI IN THE UNITED STATES**

Hunter JC, Mu Y, Dumyati GK, et al. Burden of Nursing Home-Onset *Clostridium difficile* Infection in the United States: Estimates of Incidence and Patient Outcomes. Open Forum Infect Dis. 2016 Jan 18; 3(1): 1-8. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4719744/

11. **RISK FACTORS FOR COMMUNITY-ASSOCIATED *CLOSTRIDIUM DIFFICILE* INFECTION IN ADULTS: A CASE-CONTROL STUDY**

Guh AY, Adkins SH, Li Q, et al. Risk Factors for Community-Associated *Clostridium difficile* Infection in Adults: A Case-Control Study. Open Forum Infect Dis. 2017 August 8; 4(4): 1-8. Available at: https://doi.org/10.1093/ofid/ofx171

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