

## Emerging Infections Program Healthcare-Associated Infections–Community Interface Report: *Clostridioides difficile* infection, 2020

**Note:** The COVID-19 pandemic caused significant delays in 2020 case identification, data collection, data entry, data cleaning, and isolate collection and submission in all EIP sites. However, overall completeness of data collection for *Clostridioides difficile* infection cases in 2020 was similar to pre-pandemic years.

### Surveillance Catchment Areas

California (1 county San Francisco area), Colorado (5 county Denver area); Connecticut (1 county New Haven area); Georgia (8 county Atlanta area); Maryland (9 eastern shore and 2 western counties); Minnesota (5 counties); New Mexico (1 county Albuquerque area); New York (1 county Rochester area); Oregon (1 rural county); and Tennessee (1 county Nashville area).

### Population

The surveillance area represents 12,104,962 persons.

Source: U.S. Census Bureau, Population Division, Vintage 2020 Special Tabulation.

### Case Definition

An incident case of *Clostridioides difficile* infection (CDI) was defined as a *C. difficile*-positive stool test (toxin or molecular assay) from a person  $\geq 1$  year old with no positive test in the prior 8 weeks.

### Methods

Case finding was active, laboratory-based, and population-based. Laboratories serving the surveillance catchment areas reported all positive *C. difficile* tests to EIP staff and were routinely audited to ensure complete case ascertainment.

An initial chart review was performed on all CDI cases in eight EIP sites and on all pediatric cases and a 1/3 random sample of cases age 18 years and older in the two remaining EIP sites with the largest surveillance catchment areas (CO and GA). A subsequent comprehensive chart review was performed on all community-associated cases and a subset of healthcare-facility onset cases.

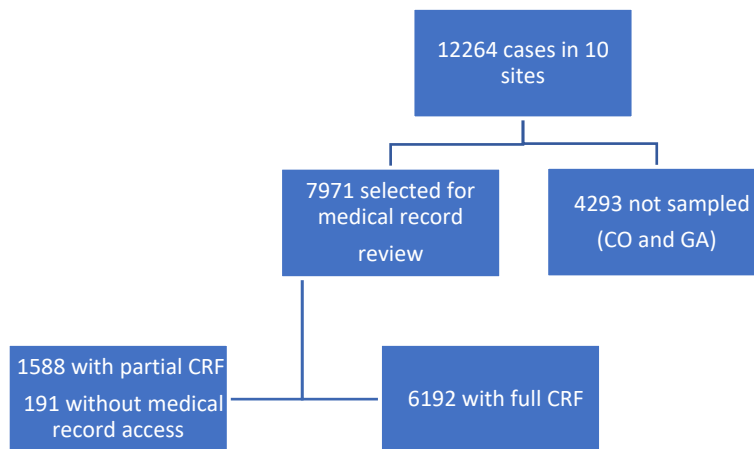
A standardized case report form (CRF) was completed for each incident case through review of medical records. Inpatient and outpatient medical records were reviewed for information on patient demographics, clinical syndrome, outcome of illness, and relevant healthcare exposures.

A convenience sample of stool specimens or swabs were sent to reference laboratories for *C. difficile* isolation. Recovered isolates were sent to CDC for molecular typing and characterization.

A CDI case was classified as community-associated (CA) if the *C. difficile*-positive stool specimen was collected on an outpatient basis or within 3 days after hospital admission in a person with no documented overnight stay in a healthcare facility in the preceding 12 weeks. All CDI cases that did not meet the aforementioned criteria were classified as healthcare-associated (HA). HA cases with disease onset outside of a healthcare facility but with documented overnight stay in a healthcare facility in the

preceding 12 weeks were classified as community-onset, healthcare-facility associated (CO-HCFA). HA cases with disease onset in a healthcare facility were classified as healthcare-facility onset (HCFO). HCFO cases were further classified into hospital onset or long-term care facility onset. Incidence rates were calculated using US Census population estimates.

CDI surveillance data undergo regular data cleaning to ensure accuracy and completeness. Patients with complete case report form data as of 12/07/2022 were included in this analysis. Because data can be updated as needed, analyses of datasets generated on a different date may yield slightly different results.



## Results

**Table 1 – Reported Number of CDI Cases and Crude Incidence by Sex, Age Group, Race, and Epidemiologic Classification Among the 10 EIP Sites**

Sex	Population ≥1 Year of Age	Community-Associated CDI <sup>a</sup> , No. <sup>c</sup>	Community-Associated CDI <sup>a</sup> , Incidence <sup>b</sup>	Healthcare-Associated CDI <sup>a</sup> , No. <sup>c</sup>	Healthcare-Associated CDI <sup>a</sup> , Incidence <sup>b</sup>	All CDI, No. <sup>c</sup>	All CDI, Incidence <sup>b</sup>
Male	5,921,841	2314	39.1	2827	47.7	5141	86.8
Female	6,183,121	3883	62.8	3240	52.4	7123	115.2

Age Group	Population ≥1 Year of Age	Community-Associated CDI <sup>a</sup> , No. <sup>c</sup>	Community-Associated CDI <sup>a</sup> , Incidence <sup>b</sup>	Healthcare-Associated CDI <sup>a</sup> , No. <sup>c</sup>	Healthcare-Associated CDI <sup>a</sup> , Incidence <sup>b</sup>	All CDI, No. <sup>c</sup>	All CDI, Incidence <sup>b</sup>
1-17 years	2,497,437	351	14.1	153	6.1	504	20.2
18-44 years	4,755,297	1551	32.6	791	16.6	2342	49.3
45-49 years	780,305	360	46.1	271	34.8	631	80.9
50-54 years	776,740	456	58.7	328	42.2	784	100.9
55-59 years	783,418	501	63.9	521	66.5	1022	130.5
60-64 years	720,234	619	85.9	609	84.6	1228	170.5
65-70 years	597,748	555	92.9	750	125.4	1305	218.3
70-74 years	480,445	588	122.3	810	168.7	1398	291.0
75-79 years	309,638	506	163.5	616	198.9	1122	362.4
80+ years	403,700	711	176.2	1217	301.4	1928	477.6

Race <sup>a</sup>	Population ≥1 Year of Age	Community-Associated CDI <sup>a</sup> , No. <sup>c</sup>	Community-Associated CDI <sup>a</sup> , Incidence <sup>b</sup>	Healthcare-Associated CDI <sup>a</sup> , No. <sup>c</sup>	Healthcare-Associated CDI <sup>a</sup> , Incidence <sup>b</sup>	All CDI, No. <sup>c</sup>	All CDI, Incidence <sup>b</sup>
White	8,052,023	4879	60.6	4456	55.3	9335	115.9
Other	4,052,939	1318	32.5	1611	39.7	2929	72.3

Total	Population ≥1 Year of Age	Community-Associated CDI <sup>a</sup> , No. <sup>c</sup>	Community-Associated CDI <sup>a</sup> , Incidence <sup>b</sup>	Healthcare-Associated CDI <sup>a</sup> , No. <sup>c</sup>	Healthcare-Associated CDI <sup>a</sup> , Incidence <sup>b</sup>	All CDI, No. <sup>c</sup>	All CDI, Incidence <sup>b</sup>
Total	12,104,962	6197	51.2	6067	50.1	12264	101.3

<sup>a</sup> The epidemiologic classification was statistically imputed for 2% of the CDI cases selected for medical record review, and race was statistically imputed for 16% of the CDI cases selected for medical record review. The weighted frequency of cases in Colorado and Georgia was based on 33% random sampling for cases aged ≥18 years.

<sup>b</sup> Cases per 100,000 persons.

<sup>c</sup> Subcategories may not add to total due to rounding.

**Table 2 – Diagnostic Assay Results of CDI Cases (N=12264)**

Diagnostic assay	N	%
Toxin positive	3901	32
Nucleic acid amplification test (NAAT) positive/toxin negative	3788	31
NAAT positive/toxin result unknown <sup>a</sup>	4560	37
Other methods <sup>b</sup>	15	<1

<sup>a</sup>Includes cases diagnosed mainly by NAAT or multiplex PCR panel (i.e., toxin enzyme immunoassay or cell cytotoxicity assay was not performed) or by NAAT as part of a multistep algorithm where the toxin result was not readily known

<sup>b</sup>Includes cases diagnosed by culture or unspecified assay

**Table 3 – CDI Cases by Epidemiologic Classification (N=12264)**

Epidemiologic classification	N	%
Hospital onset	1465	12%
LTCF onset	726	6%
COHCFA	1675	14%
CA	3914	32%
Unknown <sup>a</sup>	4484	37%

<sup>a</sup> Includes 4293 non-sampled cases

**Table 4 – CDI Cases by Race and Ethnicity (N=12264)**

Race/Ethnicity	N	%
Hispanic, any race	879	7%
Not known to be Hispanic <sup>a</sup> - White <sup>b</sup>	6003	49%
Not known to be Hispanic <sup>a</sup> - Black or African American <sup>c</sup>	1811	15%
Not known to be Hispanic <sup>a</sup> - Asian <sup>d</sup>	262	2%
Not known to be Hispanic <sup>a</sup> - Other or multiple races <sup>e</sup>	156	1%
Non-Hispanic- Unknown race	176	1%
Unknown ethnicity and race	2977	24%

<sup>a</sup> Records either indicated ethnicity was non-Hispanic, or ethnicity was not known

<sup>b</sup> 635 cases with unknown ethnicity

<sup>c</sup> 134 cases with unknown ethnicity

<sup>d</sup> 36 cases with unknown ethnicity

<sup>e</sup> American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, or ≥2 races reported; 68 cases with unknown ethnicity

**Table 5 – Location of CDI Cases on the Third Calendar Day Before Incident Specimen Collection (N=7971)**

Location of patient before incident specimen collection	N	%
Private residence	5536	69%
Long-term care facility	743	9%
Acute-care hospital (inpatient)	1373	17%
Long-term care acute care hospital	38	<1%
Homeless	83	1%
Incarcerated	5	<1%
Other	1	<1%
Unknown	192	2%

**Table 6 – Location of CDI Cases at Time of Incident Specimen Collection (N=7971)**

Location of incident specimen collection	N	%
Outpatient setting or emergency department	4056	51%
Acute care hospital	3167	40%
Long-term care facility	514	6%
Long-term acute care hospital	41	<1%
Other	1	<1%
Unknown	192	2%

**Table 7 – Selected Clinical Characteristics of CDI Cases (N=6192, except where indicated)**

Clinical characteristic	N	%
Charlson comorbidity index - 0	2487	40%
Charlson comorbidity index - 1	1136	18%
Charlson comorbidity index - $\geq 2$	2569	41%
Underlying conditions - Cardiovascular disease <sup>a,b</sup>	1319	21%
Underlying conditions - Diabetes mellitus <sup>a</sup>	1395	23%
Underlying conditions - Chronic pulmonary disease <sup>a,c</sup>	1280	21%
Underlying conditions - Gastrointestinal disease <sup>a,d</sup>	1461	24%
Underlying conditions - Gastrointestinal disease – Diverticular disease <sup>a</sup>	579	9%
Underlying conditions - Gastrointestinal disease – Inflammatory bowel disease <sup>a</sup>	459	7%
Underlying conditions - Gastrointestinal disease – Peptic ulcer disease <sup>a</sup>	164	3%
Underlying conditions - Gastrointestinal disease – Short gut syndrome <sup>a</sup>	19	<1%
Underlying conditions - Gastrointestinal disease – Liver disease <sup>a</sup>	377	6%
Underlying conditions - Chronic renal disease <sup>a</sup>	1182	19%
Underlying conditions - Neurologic condition, any <sup>a</sup>	1126	18%
Underlying conditions - Malignancy (hematologic or solid organ) <sup>a</sup>	1081	17%
Underlying conditions - Transplant (hematopoietic stem cell or solid organ) <sup>a</sup>	215	3%
Positive test for SARS-CoV-2 during hospitalization and on or before date of incident specimen collection <sup>e</sup>	94	4%

<sup>a</sup> Underlying conditions are not mutually exclusive

<sup>b</sup> Defined as myocardial infarction, congestive heart failure, congenital heart disease, stroke, transient ischemic attack, or peripheral vascular disease

<sup>c</sup> Defined as cystic fibrosis or any chronic respiratory condition resulting in symptomatic dyspnea

<sup>d</sup> Defined as diverticular disease, inflammatory bowel disease, peptic ulcer disease, short gut syndrome, or liver disease

<sup>e</sup> Among patients in the hospital on the date of incident specimen collection (N=2666). Excludes patients who were admitted to the hospital after the date of incident specimen collection. A positive SARS-CoV-2 test was defined as any positive viral test for SARS-CoV-2, including antigen and nucleic acid amplification tests.

**Table 8 – Selected Healthcare Exposures and Risk Factors of Incident CDI Cases in the 12 Weeks Before the Date of Incident Specimen Collection by Epidemiologic Classification (N=6192)**

Healthcare Exposure <sup>a</sup>	CA (N=3914), N	CA (N=3914), %	COHCFA (N=1675), N	COHCFA (N=1675), %	HCFO (N=603), N	HCFO (N=603), %
Acute care hospitalization	0	0%	1646	98%	305	51%
Long-term care facility residence	0	0%	159	9%	231	38%
Long-term acute care hospitalization	0	0%	10	<1%	16	3%
Surgery	155	4%	446	27%	172	29%
Emergency room	764	20%	666	40%	191	32%
Observation unit	55	1%	80	5%	33	5%
Chronic dialysis	112	3%	137	8%	61	10%

<sup>a</sup> Healthcare exposure categories are not mutually exclusive.

**Table 9 – Antibiotic Use in the 12 Weeks Before the Date of Incident Specimen Collection (N=6192)**

Antibiotic <sup>a</sup>	N	%
Any antibiotic	3760	61%
Aminoglycosides	76	1%
Beta-lactam / beta-lactamase inhibitor combinations	1242	20%
Carbapenems	186	3%
Cephalosporins	1889	31%
Clindamycins	461	7%
Fluoroquinolones	792	13%
Glycopeptides	1204	19%
Macrolides	262	4%
Monobactam	21	<1%
Penicillins	320	5%
Trimethoprim or Trimethoprim/Sulfamethoxazole	364	6%
Tetracyclines	256	4%
Other antibiotic	1046	17%

<sup>a</sup> Antibiotic use categories are not mutually exclusive.

**Table 10 – Treatment of Incident CDI Cases (N=6192)**

Treatment <sup>a</sup>	N	%
Any treatment <sup>b</sup>	5228	84%
Oral or rectal vancomycin (excluding vancomycin tapers)	4401	71%
Vancomycin tapers	331	5%
Metronidazole	1170	19%
Fidaxomicin	192	3%
Bezlotoxumab	9	<1%
Stool transplant	26	<1%

<sup>a</sup> Treatment categories are not mutually exclusive.

<sup>b</sup> Includes any course of CDI antibiotic therapy, bezlotoxumab, or stool transplant.

**Table 11 – Outcomes of Incident CDI Cases (N=6192, except where indicated)**

Outcome	N	%
Toxic megacolon <sup>a</sup>	20	<1%
Ileus <sup>a</sup>	142	2%
Pseudomembranous colitis <sup>a</sup>	29	<1%
White blood cell count $\geq 15,000/\mu\text{l}$ <sup>a</sup>	1071	17%
Recurrent infection <sup>a</sup>	659	11%
Hospitalization on the day of or within 6 days after the date of incident specimen collection <sup>a, b</sup>	2808	45%
ICU admission one day before, the day of, or within 6 days after the date of incident specimen collection <sup>a</sup>	407	7%
In-hospital death <sup>a</sup>	163	3%
Discharge location after acute-care hospitalization among patients who survived <sup>c</sup> - Private Residence	2114	80%
Discharge location after acute-care hospitalization among patients who survived <sup>c</sup> - Long-term care facility	423	16%
Discharge location after acute-care hospitalization among patients who survived <sup>c</sup> - Long-term acute care hospital	39	1%
Discharge location after acute-care hospitalization among patients who survived <sup>c</sup> - Other	61	2%
Discharge location after acute-care hospitalization among patients who survived <sup>c</sup> - Unknown	8	<1%

<sup>a</sup> Outcomes, except for location of discharge from acute care hospitalization, are not mutually exclusive.

<sup>b</sup> Data include 408 cases considered to be hospital-onset.

<sup>c</sup> N=2645

## Laboratory Characterization

This section will be updated once the data are available.

## Summary

Surveillance data from 2020 represent the tenth year of population-based surveillance for CDI conducted among all 10 Emerging Infections Program sites. The crude overall incidence rate of CDI in 2020 was 101.3 cases per 100,000 persons, with a slightly higher incidence of community associated cases (51.2 cases per 100,000 persons) compared with healthcare-associated cases (50.1 cases per 100,000 persons). The incidence rate of CDI increased with age and was higher in women than in men and higher in White persons than in persons of other races.

Underlying conditions were commonly reported among CDI cases, with 41 percent having a Charlson comorbidity index of  $\geq 2$ . Antibiotic use in the prior 12 weeks was reported for 61 percent of CDI cases. Eighty-four percent of CDI cases were treated, with vancomycin being the most common treatment given. CDI-related complications, such as toxic megacolon and ileus, were rare.

## Citation

Centers for Disease Control and Prevention. 2022. Emerging Infections Program, Healthcare-Associated Infections – Community Interface Surveillance Report, *Clostridioides difficile* infection (CDI), 2020. Available at: [Insert link to the report].

**For more information, visit our web sites:**

- *Clostridioides difficile* Infection (CDI) Tracking (<https://www.cdc.gov/hai/eip/cdiff-tracking.html>)
- Healthcare-Associated Infections - Community Interface Data Visualization (HAICViz) (<https://www.cdc.gov/hai/eip/haicviz.html>)
- *Clostridioides difficile* Infection ([https://www.cdc.gov/HAI/organisms/cdiff/Cdiff\\_infect.html](https://www.cdc.gov/HAI/organisms/cdiff/Cdiff_infect.html))