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**

![Surveillance County Distribution of Incident Clostridium difficile Cases in Minnesota, 2017 (n=862)](image)

*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**

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

*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**

Number of Incident Cases of *Clostridium difficile* by Month and Epidemiologic Class in Minnesota, 2017

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**

Incidence Rates* of *Clostridium difficile* Infections in Minnesota by Year and Epidemiologic Classification

*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**

<table>
<thead>
<tr>
<th></th>
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<th>57%</th>
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<tbody>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CA</td>
<td></td>
<td>46%</td>
</tr>
<tr>
<td>CO-HCFA</td>
<td></td>
<td>74%</td>
</tr>
<tr>
<td>HCFO</td>
<td></td>
<td>76%</td>
</tr>
</tbody>
</table>

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).
Table 3

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

<table>
<thead>
<tr>
<th>Antibiotic Class</th>
<th>Percent of cases</th>
</tr>
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<tbody>
<tr>
<td>Penicillin</td>
<td>41%</td>
</tr>
<tr>
<td>Cephalosporin</td>
<td>20%</td>
</tr>
<tr>
<td>Fluoroquinolone</td>
<td>9%</td>
</tr>
<tr>
<td>Glycopeptide</td>
<td>9%</td>
</tr>
<tr>
<td>Macrolide</td>
<td>5%</td>
</tr>
<tr>
<td>Other</td>
<td>17%</td>
</tr>
</tbody>
</table>

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 *CLOSTRIDUM DIFFICILE* IN A WOMAN RECEIVING PROLONGED ANTIBIOTIC THERAPY FOR SUSPECTED LYME DISEASE**

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

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

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**

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

6. **NAP1 STRAIN TYPE PREDICTS OUTCOMES FROM *CLOSTRIDIUM DIFFICILE* INFECTION**
7. **DETERMINANTS OF CLOSTRIDIUM DIFFICILE INFECTIONS ACROSS DIVERSE U.S. GEOGRAPHIC LOCATIONS**


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


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


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


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