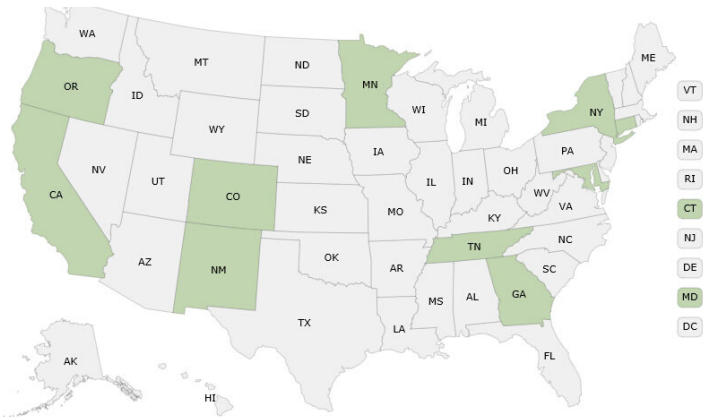


# CLOSTRIDIROIDES DIFFICILE INFECTION SURVEILLANCE

## EMERGING INFECTIONS PROGRAM, NY

The Emerging Infections Program (EIP) was established by the Centers for Disease Control and Prevention (CDC) to perform active, population-based surveillance on infections of public health importance in collaboration with 10 state health departments and academic centers across the US. In 2010, NY EIP began surveillance for *Clostridioides difficile* infections (CDI) in Monroe County. All positive CDI tests are reported to our program by the four in-catchment laboratories.

An incident CDI case is defined as a county resident  $\geq$  1 year of age with a positive *C. difficile* test and no positive test in the prior 8 weeks. Recurrence is defined as a positive test within 2 to 8 weeks of a previous positive test.



Map showing the 10 EIP Sites , CDC



Center for  
Community Health  
& Prevention

Prepared by: Rochester/New York State  
Emerging Infections Program

# CDI TRENDS

## INCIDENCE

In 2018, 1,113 incident CDI cases were identified compared to 1,566 cases in 2010 (Table 1); the number of cases increased slightly in 2011 due to the use of a more sensitive *C. difficile* assay (nucleic acid amplification tests [NAATs]) by all the labs. The overall CDI incidence since that defining year of 2011 decreased by 38% from 241 per 100,000 population to 151 in 2018. The decrease is mainly driven by a reduction in cases developing in hospitals and long term care facilities (HO and LTCO) with the largest decline noted in LTCO cases; a 70% drop between 2011 and 2018. Presently, the incidence is highest for CA cases accounting for close to half of all CDI cases (Figure 1).

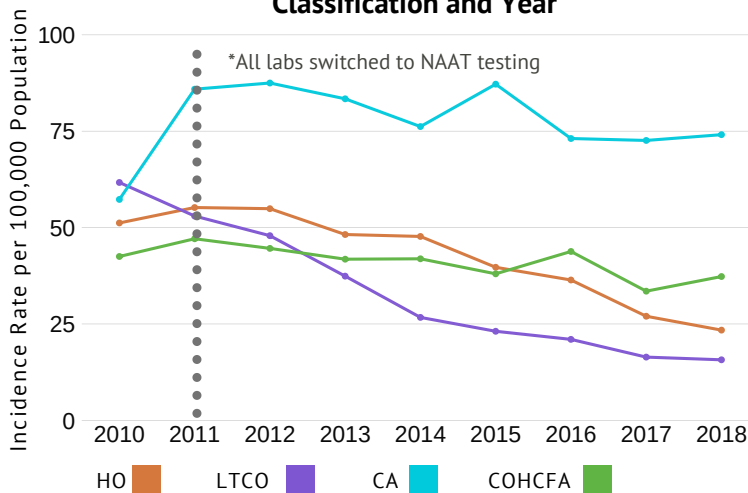
### CDI EPIDEMIOLOGIC CLASSIFICATIONS

- Hospital Onset (HO)**- positive test > 3 days after admission to a hospital.
- Long-Term Care Onset (LTCO)**- positive test collected at a nursing home (NH) or from NH resident within 3 days of hospitalization.
- Community-Onset Healthcare Facility Associated (CO-HCFA)**- an overnight stay at a NH or hospital in the 12 weeks prior to a positive test.
- Community-Associated (CA)**- no overnight stay in a NH or hospital in the 12 weeks prior to a positive test.

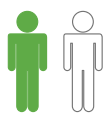
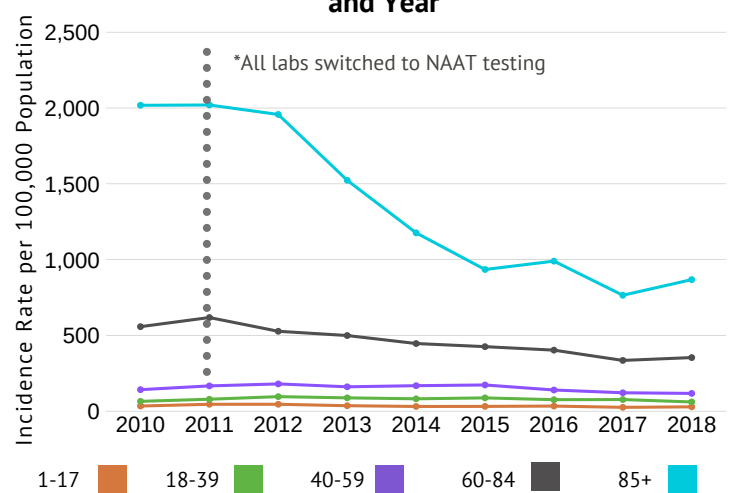
**38%** in CDI in Monroe County, NY between 2011-2018



**Figure 1: Incidence Rate of CDI by Epidemiologic Classification and Year**



**Figure 2: Incidence Rate of CDI by Age Group and Year**



**1 in 2** CDI cases are Community-Associated

When evaluating incidence by age group, a 57% decrease in incidence was noted in the population aged 85 years and older; from 2,020 per 100,000 population in 2011 to 868 in 2018 (Figure 2).

**Table 1: Total CDI cases and Incidence 2010-2018**

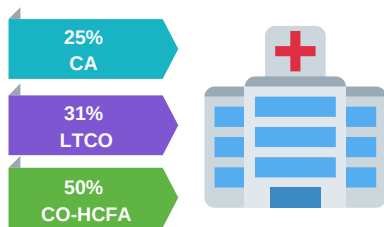
Year	Total	Incidence (per 100,000)
2010	1566	212.7
2011	1778	241.2
2012	1737	234.9
2013	1562	210.7
2014	1428	192.6
2015	1393	187.9
2016	1291	174.6
2017	1104	149.5
2018	1113	150.5

## RECURRENCE

On average, recurrent cases account for 18% of all the positive CDI tests included in surveillance. In 2018, 13% of the incident cases had at least one recurrence.

## HOSPITALIZATION

Of the 1,113 incident CDI cases that occurred in 2018, 487 (44%) were hospitalized at the time of or within 7 days of their positive test. The highest rate of hospitalization was in cases that developed CDI within 12 weeks of discharge from a hospital or NH (CO-HCFA).



## MORTALITY

In 2018, 48 of the admitted patients died during hospitalization for a crude in-hospital, all-cause mortality rate of 10%. Almost all (93%) of the deaths were in healthcare associated CDI cases (HO, LTCO, CO-HCFA).

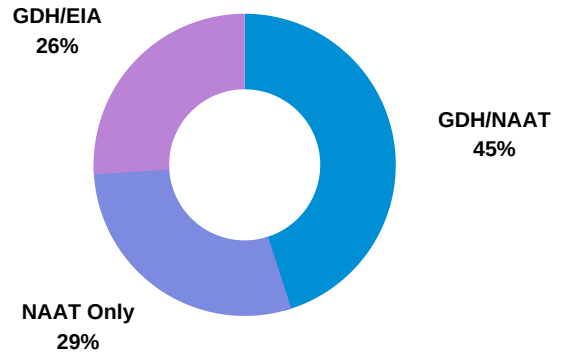


## CDI CLINICAL LABORATORY TESTING

Three of the catchment laboratories perform a multi-step testing algorithm: glutamate dehydrogenase (GDH) and toxin enzyme immunoassay (EIA) followed by NAAT for the toxin gene, if toxin EIA is negative. One laboratory performs NAAT only, but performs the GDH/toxin EIA upon request.

Figure 3 shows the proportion of CDI cases diagnosed by the different tests. In labs using the multi-step algorithm, 62% of cases were identified by positive GDH/NAAT assays.

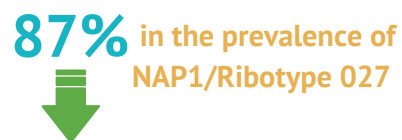
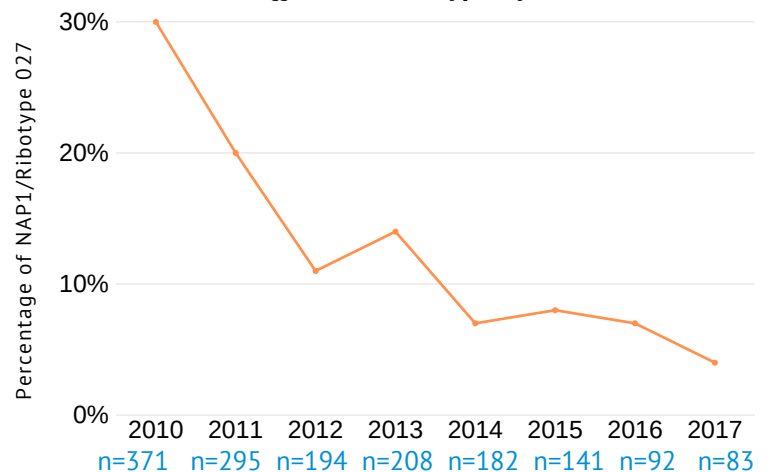
Figure 3: Distribution of Positive *C. difficile* Test Type, 2018  
N=1,113



## MOLECULAR TESTING

Between 2010 and 2017, 1,566 randomly selected *C. difficile* samples underwent molecular characterization. In 2012, strain typing shifted from pulse field gel electrophoresis to ribotyping.

Figure 4: Percentage NAP1/Ribotype 027 *C. difficile* Strain Type by Year



In 2010, the epidemic strain type NAP1/ Ribotype 027 was the most prevalent strain responsible for 30% of samples. The prevalence of this strain decreased by 87% to just 4% in 2017 (Figure 4). Of note, the total number of specimens tested over the last 2 years has decreased (Table 2). The distribution of *C. difficile* strains since 2012 is shown in Table 2.

**Table 2: C. difficile Strain Distribution by Year**

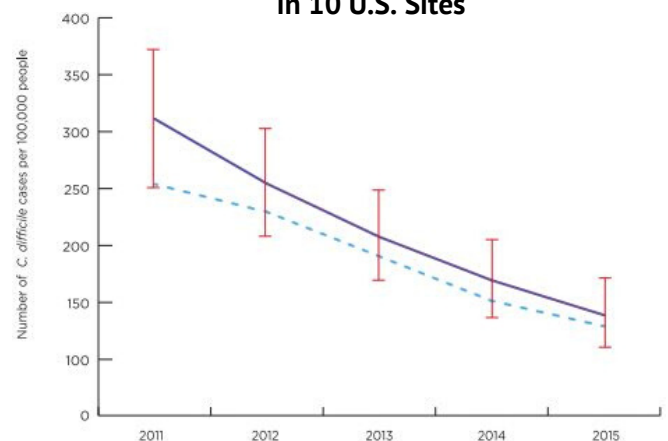
Ribotype Strains	2012 n (%)	2013 n (%)	2014 n (%)	2015 n (%)	2016 n (%)	2017 n (%)	Total n (%)
Ribotype 027	22 (11)	30 (14)	13 (7)	11 (8)	6 (7)	3 (4)	85 (9)
Ribotype 106	19 (10)	13 (6)	18 (10)	13 (9)	13 (14)	4 (5)	80 (9)
Ribotype 015	5 (3)	6 (3)	5 (3)	5 (4)	4 (4)	5 (6)	30 (3)
Ribotype 001_72	7 (4)	7 (3)	10 (5)	2 (1)	3 (3)	3 (4)	32 (4)
Ribotype 046	2 (1)	3 (1)	4 (2)	6 (4)	0 (0)	3 (4)	18 (2)
Ribotype 056	6 (3)	1 (1)	3 (2)	3 (2)	1 (1)	0 (0)	14 (2)
Ribotype 053	9 (5)	4 (2)	4 (2)	5 (4)	1 (1)	3 (4)	26 (3)
Ribotype 014	14 (7)	13 (6)	10 (5)	10 (7)	9 (10)	6 (7)	62 (7)
Ribotype 020	15 (8)	16 (8)	7 (4)	8 (6)	6 (7)	7 (8)	59 (7)
Ribotype 076	3 (2)	4 (2)	1 (1)	4 (3)	1 (1)	0 (0)	13 (1)
Ribotype 002	13 (7)	12 (6)	15 (8)	7 (5)	1 (1)	8 (10)	56 (6)
Ribotype 078	5 (3)	5 (2)	3 (2)	3 (2)	2 (2)	0 (0)	18 (2)
Ribotype 126	0 (0)	2 (1)	0 (0)	1 (1)	1 (1)	0 (0)	4 (1)
Ribotype 017	6 (3)	3 (1)	4 (2)	6 (4)	0 (0)	2 (2)	21 (2)
Others	68 (35)	89 (43)	85 (47)	57 (40)	44 (48)	39 (47)	382 (42)
<b>Total Tested (% Total Cases)</b>	<b>194 (11%)</b>	<b>208 (13%)</b>	<b>182 (13%)</b>	<b>141 (10%)</b>	<b>92 (7%)</b>	<b>83 (8%)</b>	<b>900 (9%)</b>

## CONCLUSION:

- The incidence of CDI in Monroe County has decreased by 38% since 2011. This decline is primarily driven by a reduction in healthcare associated cases, potentially due to local collaborative efforts to reduce CDI in the Rochester hospitals and NH and due to a reduction in the prevalence of the NAP1/027 strain type.
- A decrease in the incidence of CDI was noted in adults aged >65 years and in LTCO cases which mirrors national trends (Figure 5). This decline is attributed to a decrease in the prevalence of the NAP1/027 strain and in the use of fluoroquinolones in the hospitals since most of the LTCO cases occur in those recently hospitalized.

- The burden of CDI remains high in the CA cases suggesting improvement of antimicrobial use in the outpatient setting are needed.

**Figure 5: Number of LTCO C.difficile Cases in 10 U.S. Sites**



Source: Guh A, et al. Am J Infect Control. 2018 Jul;46(7):840-842

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