Published in final edited form as:
Infect Control Hosp Epidemiol. 2014 November ; 35(11): 1435–1436. doi:10.1086/678434.

Discrepancies between surveillance definition and the clinical incidence of *Clostridium difficile* infection in a VA long-term care facility

Alison Han, MD, MS[1] and **Robin L. P. Jump, MD, PhD**[2,3,*]

[1]Departments of Medicine and Pediatrics, University Hospitals Case Medical Center, Cleveland, Ohio

[2]Geriatric Research Education and Clinical Center, Division of Infectious Diseases, Louis Stokes Cleveland Veterans Affairs Medical Center, Cleveland, Ohio

[3]Division of Infectious Diseases and HIV Medicine, Department of Medicine, Case Western Reserve University, Cleveland, Ohio

Keywords

Clostridium difficile; long-term care facility; nursing home; healthcare acquired infection; older adults

Clostridium difficile infection (CDI) is common in long-term care facilities (LTCFs) but determining the clinical incidence of CDI remains challenging [1]. Currently in the United States, the National Healthcare Surveillance Network (NHSN) bases their surveillance of CDI on a proxy measure, the rate of non-duplicative positive tests per 10,000 resident days [2]. In LTCFs, the correlation of non-duplicative positive tests with the true burden of CDI as determined by clinical evaluation is unknown. Our objective was to compare the incidence of CDI using the NHSN surveillance definition, which relies upon positive *C. difficile* tests, with clinically defined CDI among residents in a VA LTCF.

We used structured query language (SQL; Microsoft SQL 2005, Redmond, WA) to collect data on a retrospective cohort of residents admitted to a 160-bed VA LTCF between 1/1/2009 and 12/31/2010. In order to identify CDI cases, we reviewed the charts of all residents with a positive *C. difficile* test, including those obtained up to one month prior to LTCF admission and 1 week after LTCF discharge, and of all residents who received metronidazole or oral vancomycin during the study period. We considered residents to have CDI if they were diagnosed by a health care provider in conjunction with documentation of persistent loose stool, diarrhea or new bowel incontinence within 1 week of a positive *C. difficile* test result. We considered residents with recent CDI (≤56 days) who developed loose stool, diarrhea or bowel incontinence with symptom resolution following

[*]Corresponding Author: Robin L. P. Jump M.D., Ph.D. GRECC 111C(W), Louis Stokes Cleveland VA Medical Center, 10701 East Blvd., Cleveland, Ohio 44106 USA; Telephone: 216-791-3800, ext 4788; Fax: 216 707-5973; robinjump@gmail.com.

Transparency Declaration

The authors report no conflicts of interest relevant to this article.

administration of metronidazole or oral vancomycin to have recurrent disease. If more than 14 days passed between completing one antibiotic course for CDI and initiation of a new course, the recurrence was counted as a separate CDI case. To identify cases of CDI that met the surveillance definition established by the NHSN, we identified LTCF residents with non-duplicate *C. difficile* positive tests (a single positive test within two weeks per individual) [2]. The laboratory methods used to test for *C. difficile* was an initial enzyme immunoassay (EIA) for glutamate dehydrogenase (TechLab/Wampole Laboratories, Blacksburg, VA) followed by a PCR for toxin B gene (Cepheid, Sunnyvale, CA). The Cleveland VA Medical Center's Institutional Review Board reviewed the study protocol for this retrospective chart review involving pre-existing data.

During the 2-year study period, 1121 veterans had 1235 admissions to the LTCF. Using our clinical definition, we found 100 cases of CDI among 92 LTCF residents while the surveillance definition found 92 cases of CDI among 74 LTCF residents. Comparing the cases identified using the two definitions, and considering the clinical definition to be the gold standard, the surveillance definition identified 76 of 100 CDI cases (76%). The greatest concordance between our clinical definition and the surveillance definition was among CDI cases with their onset and treatment at the LTCF. The surveillance definition captured all of these clinical cases (n = 68). Repeat tests obtained on some of these individuals > 2 weeks after the first positive test, however, caused to 11 additional cases to be included under the surveillance definition. While the clinical reason for the test was not always clearly stated, the majority of these seemed to be tests of cure.

The greatest discordance between the clinical definition and the surveillance definition was among residents admitted to the LTCF already diagnosed with and on therapy for CDI. Out of 25 cases, 18 (72%) were undetected by the surveillance definition. Tests obtained at the LTCF on some of these residents already known to have CDI detected the remaining 7 cases (28%) with the surveillance definition. Table I shows further details regarding the discrepancies between the clinical and surveillance definition of CDI.

In a single VA LTCF, the NHSN surveillance definition based on non-duplicative testing underestimated the clinical incidence of CDI by ~25%. The surveillance definition successfully captured CDI cases in residents with disease onset and treatment at the LTCF. The most notable inaccuracy for the surveillance definition is that it did not reliably account for CDI in residents admitted to the LTCF already on therapy, thus underestimating the incidence of disease. Modifying the surveillance definition to include residents admitted to the LTCF on therapy for CDI may offer a practical strategy to reduce this discrepancy. Additional inaccuracies stemmed from inappropriately ordered *C. difficile* tests. Tests ordered on LTCF residents already on treatment for known CDI led to overestimates of disease incidence; addressing this involves provider education. Tests ordered on residents with recurrent CDI or on those ultimately determined to be asymptomatic carriers with diarrhea due to other causes accounted for <10% of the discrepancies between the clinical and surveillance definitions. Similarly, residents with CDI that are transferred to acute care prior to being tested, and thus missed by the surveillance definition, accounted for just 4% of cases.

To our knowledge, this is the first comparison of the incidence of CDI using the NHSN surveillance definition with the clinically defined disease CDI among LTCF residents. Our study has some limitations. It is based on a retrospective cohort of residents from a single VA LTCF. Both the closed system (*i.e.*, most residents come from the affiliated VA hospital), the predominantly male population and the providers' practice patterns may limit applicability of our findings to other LTCFs. Our findings suggest that including residents admitted to the LTCF with known CDI in the surveillance definition may improve its accuracy.

Acknowledgments

The authors thank David A. Nace for his helpful comments. RLPJ gratefully acknowledges the T. Franklin Williams Scholarship with funding provided by Atlantic Philanthropies, Inc., the John A. Hartford Foundation, the Association of Specialty Professors, the Infectious Diseases Society of America and the National Foundation for Infectious Diseases. This work was supported by the National Institutes of Health (R03-AG040722 to RLPJ). This work was presented at ID Week, San Francisco, CA, October 2–6, 2013.

References

1. Simor AE, Bradley SF, Strausbaugh LJ, Crossley K, Nicolle LE. *Clostridium difficile* in long-term-care facilities for the elderly. Infect Control Hosp Epidemiol Off J Soc Hosp Epidemiol Am. 2002; 23:696–703.
2. Infection (CDI) Events for Long-term Care Facilities. 2012. Laboratory-identified Multidrug-Resistant Organism (MDRO) & *Clostridium difficile*.
3. Cohen SH, Gerding DN, Johnson S, et al. Clinical practice guidelines for *Clostridium difficile* infection in adults: 2010 update by the society for healthcare epidemiology of America (SHEA) and the infectious diseases society of America (IDSA). Infect Control Hosp Epidemiol Off J Soc Hosp Epidemiol Am. 2010; 31:431–455.

Table I

Discrepancies between *C. difficile* infection (CDI) cases in a long-term care facility (LTCF) identified using clinical parameters and the National Healthcare Surveillance Network (NHSN) surveillance definition.

Description of Clinical Scenario	Clinical definition (n = 100)	Surveillance definition	
		appropriate test (n = 72)	inappropriate test[a] (n = 20)
Resident diagnosed and treated at the LTCF	68	68	11[b]
Resident admitted to the LTCF with a known CDI diagnosis and on treatment	25		8[b]
Resident diagnosed with recurrent CDI based on clinical symptoms	3	1	1
Resident transferred to hospital for acute illness; diagnosed with CDI within 2 days of hospital transfer	4		
Asymptomatic carriers with diarrhea due to other causes[c]		3	

[a] inappropriate tests are those obtained on individuals already known to have and on treatment for CDI.

[b] some individuals received >1 inappropriate test

[c] 1 resident had norovirus; 2 residents recently started tube feeds