Clostridium difficile Colonization of Nursing Home Residents

To the Editor—Clostridum difficile is a leading cause of infectious diarrhea in nursing homes.[1] Evidence-based infection control guidelines are needed to reduce transmission of *C. difficile* in nursing homes. These guidelines should account for the prevalence of *C. difficile* in the nursing home environment. The primary objective of this project was to assess the proportion of nursing home residents colonized with toxigenic *C. difficile*.

A random sample of community-based nursing home residents (n = 40; 10%) and Veterans Affairs Community Living Center (VA CLC) residents (n = 40; 20%) were selected retrospectively from 2 cohort studies on MRSA colonization and transmission.[2,3] The studies enrolled 401 residents from 13 community-based nursing homes in Maryland and Michigan and 200 residents from 5 VA CLCs in 4 states and the District of Columbia. Selection within the community-based facilities was designed to be representative of all nursing home residents. However, in the VA CLCs, 2 groups of residents were enrolled: residents with a recent (within 1 year) history of MRSA colonization and residents without recent MRSA colonization. All VA CLC residents with recent MRSA colonization were approached for enrollment. A random sample of residents without recent MRSA colonization was approached for enrollment to provide a representative sample. Specimens from the perianal skin were taken from enrolled residents. Notably, diarrhea was reported for 2%–3% of the study participants. No *C. difficile* outbreaks were reported during the studies.

Culture-based methods were used to detect toxigenic *C. difficile* in perianal swabs. Resident swabs from the perianal skin were placed in cycloserine cefoxitin mannitol broth with taurocholate and lysozyme broth (Anaerobe Systems; Morgan Hill, CA) at 35°C in anaerobic conditions, and growth was observed at 24 hours, 48 hours, and 7 days. If growth was observed, the culture was transferred to a blood agar plate and incubated in aerobic conditions at 35°C for 48 hours. Any bacteria growth was identified using RapID Ana II system (Remel, Lenexa, KS). Toxins A and B and *C. difficile* glutamate dehydrogenase detection were determined using C Diff Quik Chek Complete kits (TechLab, Blacksburg, VA).[4]

Among the community-based nursing homes residents, 1 of 40 residents had perianal skin swabs that tested positive for toxigenic *C. difficile* (2.5%; 95% CI, 0.1%–13.2%). None of the 40 VA CLC residents tested positive for toxigenic *C. difficile* (0%; 95% CI, 0.0%–8.8%).

These rates are slightly lower than those reported in the literature. Based on data from 9 eligible studies that included 1,371 subjects, a recent systematic review found that 14.8% (95% CI, 7.6%–24.0%) of LTCF residents are asymptomatic carriers of toxigenic *C. difficile*.[5] The systematic review included 21 LTCFs across 4 countries and 4 states. In contrast, our populations covered 18 nursing homes in 6 states. The facilities in the review with the highest reported rates of *C. difficile* colonization had also experienced recent outbreaks of *C. difficile* infection, which increased their estimates. Our results should reassure nursing homes that prevalence of toxigenic *C. difficile* is low during endemic periods. Standard precautions should be sufficient to prevent transmission under nonepidemic conditions.

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REFERENCES

1. Jump RLP, Donskey CJ. *Clostridium difficile* in the long-term care facility: prevention and management. *Curr Geriatr Rep* 2015;4:60–69.
2. Roghmann MC, Johnson JK, Sorkin JD, et al. Transmission of methicillin-resistant *Staphylococcus aureus* (MRSA) to healthcare worker gowns and gloves during care of nursing home residents. *Infect Control Hosp Epidemiol* 2015;36:1050–1057.
3. Pineles L, Morgan DJ, Lydecker A, et al. Transmission of methicillin-resistant *Staphylococcus aureus* to health care worker gowns and gloves during care of residents in Veterans Affairs nursing homes. *Am J Infect Control* 2017. doi: 10.1016/j.ajic.2017.03.004.
4. Hink T, Burnham CD, Dubberke ER. A systematic evaluation of methods to optimize culture-based recovery of *Clostridium difficile* from stool specimens. *Anaerobe* 2013;19:39–43.

5. Ziakas PD, Zacharioudakis IM, Zervou FN, Grigoras C, Pliakos EE, Mylonakis E. Asymptomatic carriers of toxigenic *C. difficile* in long-term care facilities: a meta-analysis of prevalence and risk factors. *PLoS One* 2015;10:e0117195.

Comparison of Rates of Drain-Related Ventriculitis According to Definitions Used

To the Editor—We read with interest the recent comparison of ventricular drain-related ventriculitis (VDRV) according to which definitions were used.[1] Reyes et al[1] undertook a retrospective assessment of 52 cases of VDRV using 4 sets of definitions and found that using the National Healthcare Safety Network (NHSN) definitions resulted in substantially more cases of DDRV being identified.

We recently undertook a pilot study as a prelude to the introduction of a national surveillance system of VDRV, and as part of that process, we reviewed many definitions.[2] However, because overreliance on culture can occur, we categorized VDRV as either definite or probable and allowed for the fact that bacteria isolated from the cerebrospinal fluid (CSF) could represent contamination (eg, a single sample with coagulase negative staphylococci).[2] Of 45 cases of VDRV in 4 pilot centers, 20 of 28 cases categorized were definite.

Meningitis or ventriculitis following neurosurgery is complex, and the infection rate can be expressed as a percentage of patients with a drain inserted or preferably as the rate of infection per 1,000 catheter days.[3–5] The latter metric better reflects the risk associated with device duration. Ramanan et al[5] reviewed 35 studies, which included 752 infections, and found that the rate was lower for high-quality studies than for lower-quality studies. This effect contrasts with that found with most other infections, where better surveillance identifies higher rates of infection. This finding highlights the complexity of this area of study.

In a literature search of definitions used to diagnose VDRV, 16 unique definitions were retrieved.[6] A positive CSF culture was required in 50% of these definitions, but no definitions mandated that more than 1 CSF culture be positive to confirm infection. However, only 7 of 16 definitions (44%) were objective, that is, they relied on laboratory data and clinical findings that were not overly open to interpretation.[6] This finding explains, in large part, the variation in infection rates described in the literature.

The decision to start antibiotics in a neurosurgical patient with a drain in situ is largely a clinical one and must be guided by the best interest of the individual patient. This often means that more patients with suspected ventriculitis or meningitis are empirically treated than are subsequently confirmed to have the infection. In a recent study from the Netherlands, 48 of 209 patients with suspected ventriculitis (23%) were started on empirical antibiotics after subarachnoid haemorrhage.[7] However, in only 11 patients (5%) were the CSF cultures positive. A high red blood cell count in the CSF, as might perhaps be expected in this group of patients, was statistically associated with CSF culture-negative cases.[7]

While the greater availability of molecular methods to diagnose VDRV may assist in determining the microbial cause, there will always be a need to assess a combination of clinical features, microbiological results, and other CSF parameters such as a protein levels, glucose levels, and cell counts. Surveillance definitions, however, should allow for the complex nature of this condition and the difficulties in being certain of the diagnosis. Not all cases are clear cut, and a positive CSF culture does not always indicate VDRV, especially if the case involves an organism that may reside on the skin, hence, the higher rate of VDRV with NHSN definitions.[1] Consequently, there is a need for international agreement on surveillance definitions that are practicable and as rigorous as possible. Establishing such definitions will facilitate comparisons between centers that can inform improvements in the care related to these invasive devices and, ultimately, in patient outcomes.

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REFERENCES

1. Reyes MM, Munigala S, Church EL, et al. Comparing external ventricular drains-related ventriculitis surveillance definitions. *Infect Control Hosp Epidemiol* 2017;38:574–579.
2. Humphreys H, Jenks P, Wilson J, et al. Surveillance of infection associated with external ventricular drains; proposed methodology and results from a pilot study. *J Hosp Infect* 2017;95:154–160.
3. van de Beek D, Drake JM, D, Tunkel AR. Nosocomial bacterial meningitis. *N Eng J Med* 2010;362:146–154.