



Diverse Sources of *C-difficile* Infection Identified on Whole-Genome Sequencing

(David Eyre et al. The New England Journal of Medicine: Vol 369, No 13, pg 1195-1205)

Abstract

Clostridium difficile infection has historically been thought to have been transmitted predominantly within the healthcare setting. Therefore, prevention methods were primarily focused on symptomatic patients, their immediate environments, and cautious use of antimicrobial drugs. However, recent research has suggested there are multiple other potential sources of transmission, including but not limited to, patients with asymptomatic colonization, water, farm animals, pets and food.

Background

Whole genome sequencing is a laboratory process that reveals the complete DNA make-up of an organism, enabling us to better understand variations both within and between species. This in turn allows us to differentiate between organisms with a precision that other technologies do not allow.

Study

This study aimed to reveal the substantial genetic diversity among *C. difficile* isolates. A total of 1223 *C. difficile* isolates were acquired from ill patients with symptoms from both the community and healthcare settings. In order to determine possible genetic relatedness, whole genome sequencing of the isolates was compared.

Results

A total of 333 isolates (35%) of the 957 sequenced isolates showed genetic relatedness to previously collected isolates, findings which support transmission. Additionally, 428 isolates (45%) showed no genetic relatedness to previous cases.

Of the 333 patients who showed genetic relatedness:

- 126 patients (38%) had close hospital contact with another CDI patient
- 5 patients (2%) were linked only by possible ward-based contamination after the discharge or recovery of an infectious patient
- 29 patients (6%) had both ward contamination and hospital-wide contact
- 120 patients had no hospital or community contact with another patient

Distinct subtypes of infection continued to be identified throughout the study, which suggests a considerable reservoir of *C. difficile*. For those cases that could not be epidemiologically explained, it was estimated that transmission mediated by health care workers possibly

accounted for 27% of cases which would have resulted from chance rather than transmission.

Conclusions

It was observed that diverse subtypes in patients with *C. difficile* represented a separate transmission event from a reservoir or asymptomatic carrier. Only 35% of the cases studied were genetically related to a previous case. Thus, cases that are clearly linked by hospital or community contact can be targeted to prevent further spread. Such sequencing permits more sensitive monitoring of institutional infection control performance through the counting of genetically related cases, rather than all cases. Furthermore, controlling the use of antibiotics is a proven method in lowering incidence rates of *C. difficile* that should be utilized as a prevention method.

Implications for AHP

AHP Disinfectants are One-Step Disinfectant Cleaners

- AHP has proven cleaning efficiency resulting in lower costs and faster results as well as added confidence that disinfection can occur
- The Oxivir TB formulation has also been proven to kill *C. diff* spores by > 2 Log after 1 minute exposureⁱ

AHP Disinfectants provide the perfect balance between safety and efficacy

- AHP is designed to be easier on employees and occupants resulting in protocol compliance
- The ingredients found in AHP are all listed on the EPA and Health Canada Inerts lists and the FDA Generally Regarded as Safe List

AHP Disinfectants are environmentally sustainable

- AHP's active ingredient, hydrogen peroxide, breaks down into water and oxygen leaving no active residues
- AHP does not contain Volatile Organic Compounds (VOCs) or other chemicals that will negatively impact indoor air quality

AHP Disinfectants have realistic contact times

- Short contact times ensure surfaces remain wet for the required contact time, providing comfort and confidence that disinfection has occurred
- AHP's shelf life both as a ready to use and concentrate once diluted ensures less product is used making it more economical

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DISINFECTION DIGEST

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AHP Disinfectants are compatible

- AHP formulations are tested to ensure compatibility that preserve your investments in equipment, furniture, and building surfaces

ⁱ The Oxivir TB Formulation of Accelerated Hydrogen Peroxide (AHP) is Effective for Killing Clostridium Difficile Spores on Toilet Seat Surfaces. CJIC Vol 22, No. 1, Spring 2007, pg 49

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