



THE MISSING LINK

EpiXact links *Burkholderia cepacia* to contaminated ECMO water heaters

BACKGROUND

In December 2020, three cardiothoracic intensive care unit (CTICU) patients at a large academic hospital were identified with hospital-onset *Burkholderia cepacia* infections. Although preventative interventions were implemented, two additional *B.cepacia* patients were identified a month later. All CTICU patients were immediately put on contact precautions and switched to sterile, bottled water for hydration instead of tap water. Unfortunately, within the next month, two more patients were diagnosed with *B.cepacia* infections.

This case study is described in "Cluster of Burkholderia cepacia Complex Infections Associated with Extracorporeal Membrane Oxygenation Water Heater Devices," published in Clinical Infectious Diseases.

The High Stakes Decision

All inpatient cultures positive for *B.cepacia* between October 2019 - February 2021 were reviewed and 13 were identified as originating from the CTICU. Since *B.cepacia* is known to contaminate hospital water reservoirs and environmental surfaces, specimens were taken from sinks in the CTICU and cultured, but all came back negative. While these investigations were being conducted, three *B.cepacia*-infected patients died and another three developed chronic, recurrent *B.cepacia* infections. Infection Control needed to urgently identify the cause of this ongoing transmission.

Nosocomial B.cepacia clusters in hospitals have been linked to contaminated water reservoirs, sinks, environmental surfaces, and care items such as medications, respiratory equipment, and procedural supplies.

Solution

Infection Control sent seven *B.cepacia* complex isolates, grown from CTICU patients, to Day Zero Diagnostics to perform an epiXact HAI investigation. Four of the seven were identified genomically as *B.contaminans* (a species within the *B.cepacia* complex) and were found to be clonally related (pairwise SNP distances between 0 and 6). The other three specimens were genomically different species and not related to the outbreak cluster. By narrowing the investigation to the infections epiXact found to be cluster-related, Infection Control found that they had all occurred in patients who received extracorporeal membrane oxygenation (ECMO) support.

Infection Control then collected environmental samples from the 9 ECMO devices in circulation at the hospital. These along with additional patient specimens were sent to Day Zero Diagnostics to determine if these cases were part of a persistent outbreak linked to an ECMO-related reservoir. Ultimately, using whole genome sequencing (WGS), epiXact showed that seven of the 13 patients were infected with the same *B.contaminans* strain and, most importantly, all of these strains were genomically identical to the ones cultured from the ECMO devices.

Outcome

EpiXact, linked an ongoing *B.cepacia* outbreak that cost the lives of three patients and endangered many others to the use of ECMO devices. The Infection Control team then cultured all ECMO water heaters, corroborating the epiXact analysis, and identifying them as the proximal source of the outbreak. As a result of the investigation, the hospital removed the ECMO water heaters from clinical service. No further hospital-onset *B.cepacia* infections have been identified in the CTICU in the twelve months since action was taken.

Rhee C et al. Cluster of *Burkholderia cepacia* Complex Infections Associated with Extracorporeal Membrane Oxygenation Water Heater Devices. CID. 2022 March.

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