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Faucet Aerators as a Reservoir for Carbapenem-resistant Acinetobacter baumannii: a Healthcare-associated Infections Outbreak in a Neurosurgical Intensive Care Unit

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Background

On January 7, 2019, we noticed an outbreak of healthcare-associated infection (HAI) caused by Carbapenem-resistant Acinetobacter baumannii (CRAB) in the neurosurgical intensive care unit (NSICU). A follow-up epidemiological investigation was conducted and the emergency response was started. We aimed to study the clonal transmission of CRAB and its possible source.

Keywords

Healthcare-associated infection outbreak, Acinetobacter baumannii, Emergency response,
Neurosurgical intensive care unit, Faucet aerator.

Results

Environmental sampling showed the faucet aerator to be contaminated with A. baumannii. Molecular typing revealed the only outbreak strain, which isolated from tracheal aspirate cultures of the first community infection case and 3 HAI cases. In environmental samples, the outbreak strain was only found in the faucet aerator of dining room. This CRAB outbreak was discovered in time and prevented from further progress through a pre-set emergency response procedure.

Figure 1 Photograph of the faucet aerator. The faucet aerators are made of several wire mesh to filter impurities in water and prevent splashing.

Methods

A matched case–control (1:2) study was performed to identify possible predisposing factors. A multifaceted intervention was implemented to control the outbreak. We collected environmental samples from patients' rooms and living area of the staffs. CRAB isolates were studied for genetic relatedness by Pulsed-Field Gel Electrophoresis (PFGE).

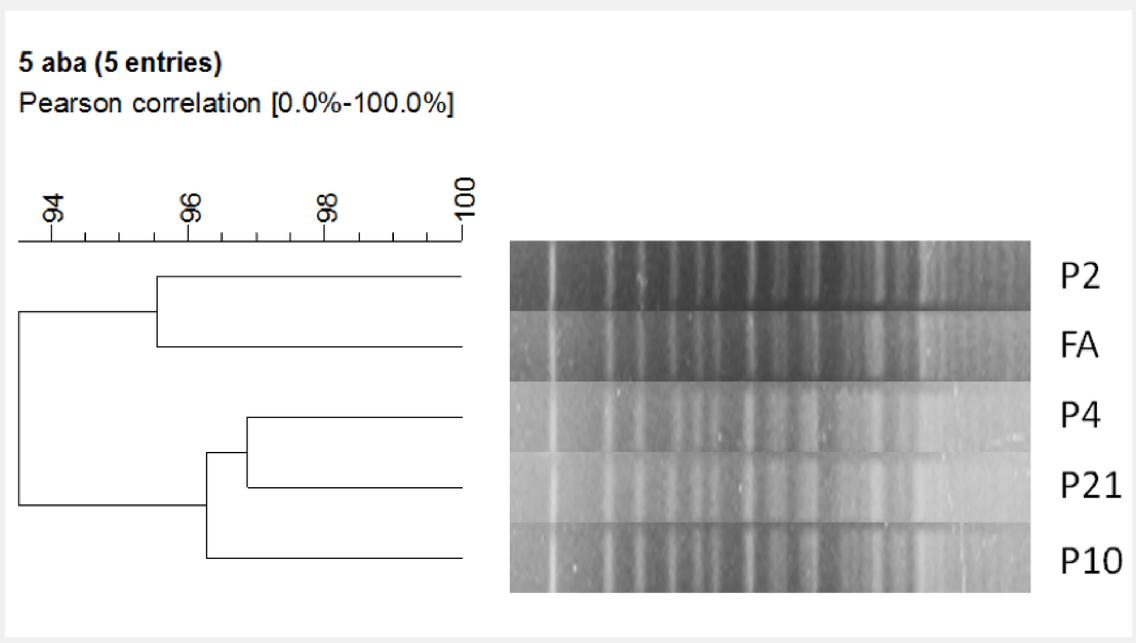

Figure 2 Gel map by CHEF-Mapper PFGE analysis of 5 CRAB isolates from clinical and environmental samples.
P2,P4,P10,P21: bed number of inpatients; FA: faucet aerator.

Conclusions

The faucet aerator acted as a reservoir for bacteria in the outbreak, and the pollution of the faucet aerator might come from splashes originating from healthcare workers (HCWs) washing their hands. The bacterial reservoir (faucet aerator), the route of transmission (hands of the HCWs), and the susceptible population (NSICU inpatients) constitute the CRAB transmission chain in the outbreak.

The aerators are made of several wire meshes to filter impurities in water and to prevent splashing. However, these wires provide space for the propagation of pathogenic microorganisms. In view of the use of the aerator and the structure of the aerator, which might cause aggravated pollution, we believed that the management of faucet aerators in high-risk areas, such as the NSICU, should be given greater attention.
The start-up criteria for emergency response played a key role in controlling CRAB outbreak and its settings should be discussed more widely as other infection control measures.

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