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Contamination of sink drains with carbapenemase-producing Enterobacteriaceae in intensive care units: a concern but don't worry so much!

Sir,

Recent reports have implicated hand-washing sinks as a primary reservoir of resistant pathogens, including carbapenemase-producing *Pseudomonas aeruginosa* [1] and carbapenemase-producing Enterobacteriaceae (CPE) [2], within patient care environments. Although CPE outbreaks are mostly attributed to patient-to-patient transmission via healthcare workers, recent studies identified the sink drains (SDs) as a possible source of transmission in intensive care units (ICUs) [3–5]. Isolation of closely related strains in SDs and in patients, discontinuation of outbreaks, or decrease in acquisition of CPE after the implementation of SD disinfection measures supported this hypothesis. As these studies have been conducted during outbreaks, data concerning the risk of patient contamination within long periods of exposure to contaminated SD outside an epidemic context are lacking.

In 2015, environmental sampling was performed in the 12-bed surgical ICU (SICU) in our 1500-bed French university hospital, as part of the investigation into a carbapenemase-producing *Klebsiella pneumoniae* (KPC) outbreak. Outbreak discontinuation was achieved by implementing a bundle of preventive measures. All SDs were sampled on the same day in 2015; they were re-sampled on a single day in April 2019, outside any epidemic context. Sampling was performed by rotating sterile swabs inserted to a depth of around 5 cm through the sink drain. Specimens were stored in a transport medium (eSwab, Copan, Brescia, Italy) and were then plated on to selective agar plates (chromID CARBA SMART, bioMérieux, Marcy l'Etoile, France). Identification of suspicious colonies was performed by matrix-assisted laser desorption ionization – time of flight mass spectrometry (MALDI-TOF MS) using a Vitek MS mass spectrometer (bioMérieux). For suspicious colonies, carbapenemases were detected by immunochromatography (RESIST-4 O.K.N.V., Coris Bioconcept, Gembloux, Belgium) and confirmed by the method of combined tests (Rosco Diagnostica, Taastrup, Denmark). Isolates were compared using pulsed-field gel electrophoresis (PFGE) as previously described [6] and strains were categorized according to the criteria of Tenover *et al.* [7]. Data concerning CPE isolated in patients hospitalized in the SICU within the 42 months separating the two sets of sink sampling were obtained retrospectively from the laboratory database (GLIMS 8, MIPS Diagnostics Intelligence, Gent, Belgium).

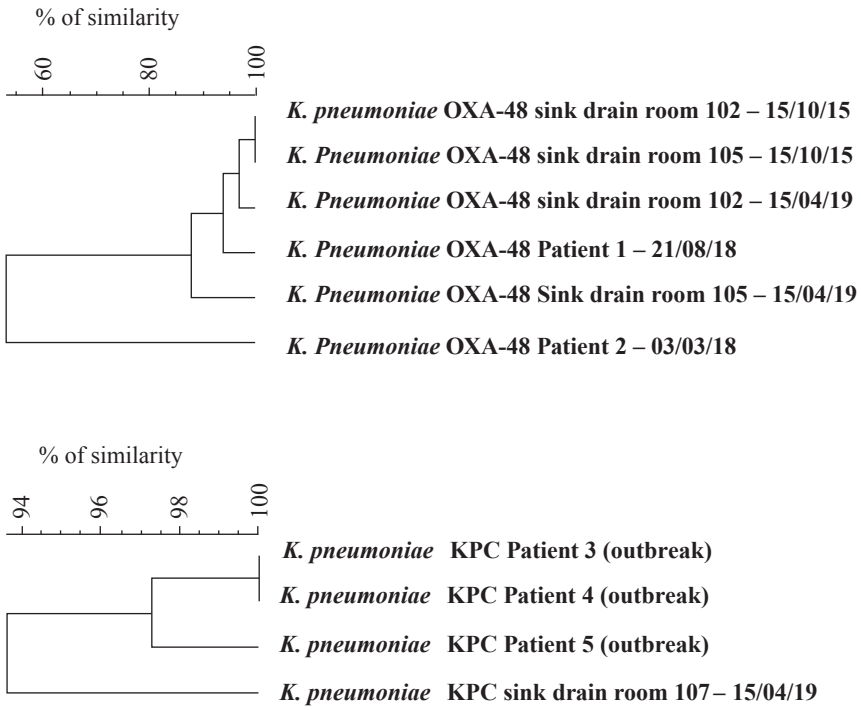

Figure 1. Patterns of the carbapenemase-producing *Klebsiella pneumoniae* isolated from patients and sink drains obtained by pulsed-field gel electrophoresis.

Following the outbreak of KPC occurring in the SICU in 2015, systematic screening of patients for CPE carriage was conducted by rectal swabbing at the time of hospital admission and once weekly.

In 2015, SD contamination by OXA-48-producing *K. pneumoniae* (O48KP) was identified in two rooms (R102 and R105). In 2019, those SDs were still contaminated. In addition, a SD was contaminated with KPC in 2019. During the period separating these two sampling campaigns, 2091 rectal screening samples were performed in the SICU to detect CPE carriers. An O48KP was isolated in two patients (P1 in 2016 and P2 in 2018). PFGE patterns of CPE isolated in three patients contaminated during the initial outbreak (P3—P5), in patients during the study period, and in SDs are presented in Figure 1. O48KP isolated from SD in 2015 and 2019 were closely related. The O48KP isolated from P1 was closely related to sink isolates but was acquired before the patient admission into the SICU. The O48KP isolated from P2 was not related to the other isolates. KPC isolated from patients (2015) and from the SD (2019) were closely related, indicating a probable contamination of the sink in 2015, which persisted until 2019.

No O48KP or KPC closely related to the CPE isolated in SD were detected in patients within the 42-month study period. Even though we cannot provide any data about contamination of SD between 2015 and 2019, the absence of carriage detection among patients hospitalized in the SICU does not support SD re-contamination during this period and therefore suggests a long-term persistence of their initial contamination. Overall, our findings suggest that whereas SD can obviously be contaminated from colonized patients, the risk of dissemination from SD to patients is probably much lower. The results of a recent study [8] aiming to characterize the dispersal of microorganisms from contaminated sinks suggested that droplet rather than aerosol-mediated dispersion is the primary mechanism of bacterial transmission, indicating that bacteria are not suspended in the air for long periods. These findings suggest that the risk of contamination of healthcare workers' hands or gowns is limited to the time immediately following the potential splash-back due to sink use and to further contacts with sink surroundings. The absence of CPE dissemination to patients despite apparent long-term contamination of SDs suggests that contact with contaminated sinks may not be a significant infection-control risk as a risk of contamination. Nevertheless, systematic hand-rubbing with an alcohol product after contact with a sink or its surroundings could further mitigate against this risk. Additional studies are necessary to better evaluate the cost-effectiveness of this strategy and other possible control measures (self-disinfecting systems, routine disinfection), while more thoroughly assessing the actual risk of dissemination.

Conflict of interest statement
None.

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A laboratory Brucella exposure in a UK hospital: a Swiss cheese model?

Sir,

Brucellosis is one the most common zoonotic infections worldwide [1]. It is endemic in the Mediterranean basin, Eastern Europe, South and Central America, Middle East, Asia and Africa. Dramatic changes in socioeconomic development and political conditions in these areas, combined with a transformation of domestic and international travel, has led to new emerging and remerging foci of brucellosis [2]. Thus, clinicians and laboratory technicians in non-endemic areas may be caught unaware by a patient presenting with brucellosis.

Brucella species are regarded as the most common organisms responsible for laboratory-acquired infections, owing in part to the low infectious dose and high attack rate following a laboratory exposure, which ranges from 30—100% [3].

In Northwick Park hospital, North-West London, a 44-year-old Romanian man presented with a 6-day history of back pain and fevers following a trip to Romania. He worked 'transporting bricks' and maintained a vegan diet; whilst in Romania he stayed in a village amongst cows and goats. Routine blood tests showed mildly raised inflammatory markers (c-reactive protein (CRP): 29 mg/L; white cell count (WCC) 8×10^9/L). A chest and thoracic spine X-ray showed no acute abnormalities. A magnetic resonance image (MRI) of the spine showed an abnormally high signal within T5—T6 vertebral bodies, including the intervertebral disc. These changes were reported to represent spondylodiscitis with evidence of a pre-vertebral soft tissue collection. Blood cultures (BCs) three days later returned positive for *B. melitensis*; the patient was started on rifampicin and doxycycline to be completed over three months.

A total of seven sets of BCs were sent to the laboratory over six days. Minimal clinical information was provided with each BC request.

BCs signaled positive after 72 h on the laboratory's automated BC system. The BCs were subcultured on to blood agar in a level 1 biosafety cabinet (an enclosed, ventilated laboratory workspace suitable for working with moderate potential hazards). The agar plates were subsequently manipulated on an open bench. An attempt at identification of the isolates using API20E (Biomerieux) was unsuccessful. Identification was then attempted using matrix-assisted laser desorption/ionization-time of flight mass spectrometry (MALDI-TOF); the isolate could not be identified using the in-vitro diagnostics (IVD) library. A MALDI-TOF database not validated for routine use ('RUO' research use only database) was then used, which identified the organism as *B. melitensis*. Twenty laboratory staff members were exposed to *B. melitensis*; eight were identified as 'high risk' and received three weeks of prophylactic antibiotic.

Symptoms of brucellosis are vague, typically including fever, fatigue, headache and musculoskeletal pain. Transmission occurs through ingesting contaminated unpasteurized dairy products, direct contact with infected animals or inhalation of aerosols. Brucellosis is rare in the UK with the