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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

infection almost always being acquired overseas. Public Health England reported that around 20 cases of brucellosis have been reported annually in England and Wales over the last 10 years, 34 laboratory exposures to *Brucella* sp. have occurred in laboratories in across England and Wales.

Providing relevant clinical history with BC requests alerts the laboratory to take appropriate measures to prevent potential laboratory exposure. Our laboratory initially processed the specimens in a class 1 biosafety cabinet. However, when the organism failed to be identified by API 20E and MALDI-TOF, there was an error of judgment by performing manipulations outside containment, contrary to the laboratory procedure that requires all manipulation be performed in a biosafety cabinet, until the organism is identified.

In this report, the organism was identified as *B. melitensis* by MALDI-TOF only after the non-validated 'security' database was used. Many laboratory biomedical scientists may not be aware that the standard validated database available with the instrument, cannot identify *Brucella* sp. Our report serves as a reminder of the importance of using the security database to identify potentially hazardous bacteria such as *Brucella* spp., *Burkholderia pseudomallei* and *Franciscella* sp. [4]. Only then can the early identification of these bacteria offered by MALDI-TOF be used, and its role in prevention potential exposure of laboratory staff was highlighted in a recent report [5].

In summary, ideally clinicians need to be aware of the importance of providing relevant clinical information including travel history with laboratory requests. However, it is equally important that laboratory staff follow procedures that exist to protect them. The main message from this report is that the conventional MALDI-TOF database does not identify some organisms such as *Brucella* spp. that are potentially hazardous to the laboratory worker. These organisms can be identified by using the 'RUO' database, speeding up clinical diagnosis, and also potentially protecting laboratory staff from exposure.

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Bacterial cross-infection related to the use of bladeless fans in a clinical setting

Sir,

Clinical use of portable fans has been linked to cross-infection [1], thus a recent Estates and Facilities Alert [2] has recommended that the use and reuse of fans should be assessed. In recent years, many hospitals have purchased bladeless fans on the premise that they appeared easier to clean. However, it has become clear that their internal components are not readily cleanable. Alsaffar et al. [3] found that the internal mechanisms of a three-year-old bladeless fan were contaminated with various micro-organisms, some of which were of potential clinical significance. Our hospital has purchased a large number of bladeless fans in recent years. As part of our risk assessment of these fans, we conducted analysis on their impact on microbial air quality.

A test facility was established in a patient cubicle on an unused hospital ward. The exterior window and the interior door both remained closed during testing. The room was not mechanically ventilated. A cross-over design was used to compare 10 bladeless fans to two conventional fans and against the control (no fan). Prior to testing, the fans were in regular clinical use. Their ages could not be determined; they were externally clean, but had never undergone cleaning of the internal mechanism.

A grid was mapped out with an area of 3 m × 2.9 m; with settle plates distributed at 12 locations on the grid and fan location were marked. A control air sample (1000 L) was obtained using an air sampler (Thermo Fisher Scientific, UK) before each fan was tested, to maintain the validity of control settle plates collected on day one. Settle plates were laid out and left for 4 h, with the fan running. After collection, the settle plates were incubated for 48 h at 37°C and colony-forming units (cfu) were counted. The data were analysed,