GLOBAL OUTBREAK OF MYCOBACTERIUM CHIMAERA DISEASE AFTER CARDIOPULMONARY BYPASS: A HEATER COOLER INDUCED SEVERE

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Introduction. Open heart surgery is associated with considerable risk of bacterial contamination. In my presentation I will focus on 2 aspects: sterility of primed cardiopulmonary bypass circuits, and the use of heater coolers.

Background. Since 2013, over 100 cases of Mycobacterium chimaera prosthetic valve endocarditis and disseminated disease were notified in Europe and the USA, linked to contaminated heater-cooler units (HCUs) used during cardiac surgery. We did a molecular epidemiological investigation to establish the source of these patients' disease.

Methods. We included 24 M chimaera isolates from 21 cardiac surgery- related patients in Switzerland, Germany, the Netherlands, and the UK, 218 M chimaera isolates from various types of HCUs in hospitals, from LivaNova (formerly Sorin; London, UK) and Maquet (Rastatt, Germany) brand HCU production sites, and unrelated environmental sources and patients, as well as eight Mycobacterium intracellulare isolates. Isolates were analysed by next- generation whole-genome sequencing using Illumina and Pacific Biosciences technologies, and compared with published M chimaera genomes.

Findings. Phylogenetic analysis based on whole-genome sequencing of 250 isolates revealed two major M chimaera groups. Cardiac surgery-related patient isolates were all classified into group 1, in which all, except one, formed a distinct subgroup. This subgroup also comprised isolates from 11 cardiac surgery-related patients reported from the USA, most isolates from LivaNova HCUs, and one from their production site. Isolates from other HCUs and unrelated patients were more widely distributed in the phylogenetic tree.

Interpretation. HCU contamination with M chimaera at the LivaNova factory seems a likely source for cardiothoracic surgery-related severe M chimaera infections diagnosed in Switzerland, Germany, the Netherlands, the UK, the USA, and Australia. Protective measures and heightened clinician awareness are essential to guarantee patient safety.