

PHLN survey regarding *Mycobacterium chimaera* & heater-cooler units

Summary

Eleven laboratories, including all five Mycobacterium Reference Laboratories (MRLs), responded to a survey. Cumulatively, the respondents had been involved in the testing of >65 Sorin-3T heater-cooler units (HCUs). This laboratory-based survey could not elucidate details on specimen collection techniques, which is an area that CDNA or the Australian Commission on Quality & Safety in Health Care (ACQSHC) may address. Standard heterotrophic plate counts (HPCs), mycobacterial culture and identification methodologies were employed. Two and four sites respectively had performed unrewarding legionella & air testing. Only one jurisdiction reported no positive Sorin-3T machines. Of those sites giving full details, 17 (73%, 95% CI 55%-91%) of 23 machines were culture positive for *M. chimaera*. Importantly, three sites noted no relationship between HPCs & *M. chimaera* isolation. Six sites in four jurisdictions had conducted a formal records review. Four sites had a protocol for future prosthetic valve/aortic graft investigations.

Methodology

A questionnaire was distributed by e-mail to all members of the Public Health Laboratory Network (PHLN) and to 45 members of the Australian Society for Microbiology Mycobacterium Special Interest Group (MSIG). Recipients were given nine days to reply. The survey contained 49 questions covering topics such as: specimen collection, mycobacterial culture methodology, other bacterial cultures performed, *M. chimaera* culture results, and associated clinical information. A copy of the questionnaire is available.

Results

Respondents

The respondents comprised six PHLN laboratories including all five MRLs, a NZ tertiary laboratory, two private laboratories, a perfusionist & an environmental laboratory. Cumulatively, the respondents had been involved in the testing of >65 Sorin-3T heater-cooler units (HCUs). Eight respondents had also tested Macquet-Jostra &/or Sorin Flextherm machines.

Specimen collection

Being reference or tertiary laboratories, five respondents had little or no direct communication with specimen collectors. Information about specimen collection methodologies were therefore incomplete. Sites were generally following the PHE collection guidelines. For inactivation of disinfectants, four sites were adding thiosulphate to the collection containers; one was adding EDTA to neutralise copper silver ions; Minncare was being inactivated by dilution. A few laboratories queried the correct methodology for handling specimens following H₂O₂ treatment.

Mycobacterial testing methodology

The nine respondents performing mycobacterial cultures were using standard acceptable methodologies. Eight used the MGIT system incubated for 6-8 weeks (four supplemented these broth-based cultures with solid media cultured for 8-12 weeks), one used only solid media. All

laboratories incubated cultures at 35-37 C; two undertook additional cultures at 30 C. The reference laboratories employed recognised techniques for identifying *M. chimaera* including initial molecular methods or HPLC followed by 16S &/or ITS sequencing.

Other water testing

Seven respondents reported doing heterotrophic plate counts (HPC) either in-house or by referral. Five respondents tested for *E coli* or *P. aeruginosa* to the Australian Drinking Water Guidelines (ADWG). Only three respondents commented on the frequency of this testing, which was monthly. Three sites provided detailed results on this additional water testing. One described initial mixed environmental growth until water handling improved.

Two laboratories had performed monthly legionella cultures. No positive cultures had been obtained over two years.

Air testing

Four sites had performed air sampling on at least one occasion; three using an air collection device (ACD) & one using both an ACD & settle plates. Three respondents provided results: the cultures were confounded by fungal overgrowth in two laboratories; the third reported culturing mixed environmental organisms. Importantly, no site isolated mycobacteria from their air sampling.

Mycobacterial culture results

Only one jurisdiction reported no positive Sorin-3T machines. Of those sites giving full details, 17 (73%, 95% CI 55%-91%) of 23 machines were culture positive for *M. chimaera*. Cultures became positive within 1-6 weeks (slower on solid media). Importantly, three sites noted no relationship between HPC & *M. chimaera* isolation.

Four respondents reported successful decontamination of a total of 11 machines; four machines at two sites remain clear for > 6 months. Only one instance of “reversion” (ie. a “successfully decontaminated” machine becoming culture positive again on later testing) was reported. Eight respondents answered the question about culturing other mycobacteria from Sorin-3T machines: six had not, two had grown various non-tuberculous mycobacteria (NTM).

Three laboratories reported obtaining positive HPCs from non-Sorin-3T machines. Importantly, none reported growing mycobacteria from these other machines.

Associated clinical cases

Queensland Health has reported a *M. chimaera* infection associated with a HCU. Another jurisdiction has cultured an NTM from a lung transplant patient; preliminary molecular investigations have not linked this isolate with a HCU.

Six sites in four jurisdictions had conducted a formal records review. Four sites (each in a different jurisdiction) reported a total of 1930 operations per year, though the number of at-risk prosthetic valve or graft operations was not stipulated. The single Queensland case comes from 35,000 open heart operations performed in public or private in the state in the last five years (Courier Mail, 23 August 2016). Of the nine laboratory respondents, four had a protocol for future valve/graft testing, including two who would perform routine mycobacteriology culture if bacterial cultures were ordered on a resected prosthetic valve.