

Microbiological Air Sampling in Conventional Operating Theatres

Standard Operating Procedure

This Standard Operating Procedure (SOP) applies only to conventionally-ventilated empty operating theatres.

This SOP applies to all staff, service users and contractors associated with NHS Lothian.

When to carry out air sampling:

- after any work that may result in bacterial or fungal contamination of the air supply, e.g. alterations or damage to the fabric of the theatre
- after any changes that may affect airflow supply rates or distribution patterns, e.g. changes to the ductwork distribution
- to commission a new conventional operating theatre prior to its first use
- as part of a wider investigation into possible theatre-acquired infections with a suspected airborne element – this may involve sampling within an active theatre environment after discussion with the duty Consultant Microbiologist (ext: 26028 9am-5pm or via switchboard)

Who should carry out air sampling:

- theatre or infection prevention and control personnel who are trained and considered competent by their clinical lead to adhere to the manufacturer's instructions for using the air sampling machine

Maintenance of the air sampling machine:

- the theatre clinical lead is responsible to ensure that annual calibration and maintenance of the air sampling machine is carried out by the manufacturer, and has documented records to demonstrate that the machine is working optimally

Prior to using an air sampling machine:

The user must:

- ensure the theatre clinical lead (or on-call theatre co-ordinator if out-of-hours) is aware that air sampling will be carried out
- contact the duty Consultant Microbiologist (ext 26028 9am-5pm) to discuss the rationale for the air sampling – the Microbiologist can then advise whether testing should be in an empty or active theatre
- contact the local microbiology laboratory staff (RIE ext 26021; SJH ext 53075) to request an air sampling request form and at least two agar plates with non selective

media (5% Horse Blood agar), unless a different agar is advised by the Microbiology Consultant as part of an incident investigation, prior to collection of these

- for mycobacterial air sampling contact Mike Smith, Pauline Claxton or Christine Doig (ext 26069); note it may take over a week to obtain the particular agar required
- check the agar plates to ensure the packaging is intact, they have not reached their expiry date, and they are free from any contaminant growth – the dishes must be discarded as clinical waste and not used if non-compliant with any of these

Prepare the theatre before each use

- ensure the theatre is terminally cleaned and check the theatre to ensure it is visibly clean and free of dust
- leave the theatre empty with the doors closed
- run the ventilation system at normal flow rates of 25 air changes per hour (not in setback mode) for at least 15 minutes

Air sampling in an empty/fallow theatre:

- carry out hand hygiene and clean the air sampling machine as per the manufacturer's instructions
- place the air sampling machine on a hard surface of the operating table (approximately 1m above floor level), or on a clean dressing trolley, in the centre of the theatre or at other locations, e.g. near sites of air entry/extract if there are concerns that air pressures or flow in the theatre may not be optimal

Air sampling in an active theatre:

- air sampling in an active theatre should only be carried out if bacterial and/or fungal colony forming units per cubic metre (CFU/m³), on non selective media (5% Horse Blood agar), were within acceptable limits when empty/fallow, i.e. did not exceed 10 CFU/m³
- if the CFU exceeded limits, the theatre should not be used until this is corrected
- the operating surgeon and theatre clinical lead (or on-call theatre co-ordinator if out-of-hours) should be contacted prior to air sampling during an operation, but this should not affect or delay the operation
- the air sampling machine should be positioned as close to the operative field as is practical or at other locations in the theatre, e.g. near sites of air entry/extract if there are concerns that air pressure/flow in the theatre may not be optimal

How to use the Cantium MicroBio MB2 air sampling machine:

- remove the sampling head cover holding only the external edge – do not touch the perforated surfaces or inside surfaces
- remove the lid of the agar plate and insert the plate inside the springs firmly between the three contact plate support posts with the exposed agar facing up

- refit the sampling head cover, holding only the external edge
- press the 'on/off' button
- press the 'menu' button three times until 'delayed sample' appears on the screen
- ensure the machine is programmed for a volume of 1000 litres
- exit the theatre; the ten minute air sampling cycle will begin once the delayed start countdown has passed
- after the ten minute cycle, re-enter the room to remove the agar plate and seal with its protective lid
- label the agar plate with an indelible marker, on the outer casing of the bottom of the plate, with the number in order taken and the time, date, and theatre site
- repeat the stages in this section for duplicate plates – at least two samples per theatre is recommended
- after the required samples have been obtained, complete the air sampling request form

- to cancel sampling at any time press and hold the 'menu' button

Where to send the samples:

- the agar plates and appropriately completed request form must be transported together in a sealed specimen bag to the RIE microbiology laboratory

How to access and action the results:

- air sampling is not considered an emergency microbiological test – discussions regarding results should usually be restricted to 9am-5pm
- the results must be authorised by a Consultant Microbiologist prior to any actions regarding use of theatres for surgery
- authorised results will be available through ICNet to the Duty Infection Prevention and Control Nurse (IPCN)
 - to access the results on Apex: log on, type RNQ, and use the specimen number available on ICNet

- in an empty/fallow theatre, aerobic cultures on non selective media (5% Horse Blood agar) should not exceed 10 CFU/m³
- in an active operating theatre, aerobic cultures over a five minute period should not exceed 180 CFU/m³
 - if air sampling is performed as part of an investigation of increased post-operative infection, the local IPCN (Mon-Fri) or Duty IPCN (out-of-hours) must discuss the results with the duty Consultant Microbiologist regarding the nature of the organisms composing the CFU, as further investigations may be required if the organisms detected correspond with those that are deemed to cause post operative infections, even if the overall count is within limits

- the local IPCN (Mon-Fri) or Duty IPCN (out-of-hours) must then inform the theatre clinical lead (or on-call theatre co-ordinator if out-of-hours) of the results (via

switchboard or RIE page 2118; SJH page 3541; WGH ext 31761) to advise whether further actions are required

- for most circumstances the 48 hour sampling result must be received prior to the theatre being used
 - if the CFU/m³ exceeds limits, the theatre should be terminally cleaned again and have a visual inspection by a local IPCN (Mon-Fri) to assess for factors that might account for the high CFU/m³ counts
 - the room must be left empty with doors closed, and the ventilation system run at normal flow rates (not in setback mode) for at least 15 minutes before repeat air sampling is carried out
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- if the results were actioned out-of-hours, the Duty IPCN should inform the local IPCT of the results, the advice given by the Consultant Microbiologist, and the advice given to the theatre clinical lead (or on-call theatre co-ordinator)
 - the local IPCT (Mon-Fri) is responsible to follow-up if further investigations are required, e.g. if the CFU/m³ continue to exceed limits

References

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