JOINTCASE National Ultra Clean Air audit

How to participate

All elective orthopaedic units in the United Kingdom are encouraged to participate in this study. This includes district general hospitals, major elective centres and tertiary units. The audit will initially focus on ultra clean air (UCA) theatres used for joint replacement surgery in the UK.

The audit is supported by the President of the British Orthopaedic Association and the Chief Medical Advisor at the UK Health Security Agency (UKHSA). It is designed to review the microbiological quality of the air in UCA theatres, with the long term objective of reducing deep infection rates.

The audit has been peer reviewed by microbiologists from the National Infection Teams Collaborative for Audit and Research (NITCAR), which is a trainee led system supported by the British Infection Association.

The NITCAR system is designed to be trainee run, so there will be one or two trainee leads (Trauma and orthopaedic or microbiology/infectious diseases trainee) at each hospital site. The trainees will undertake setup, local approvals and work with supervising consultants in orthopaedics and microbiology/Infectious diseases.

The project will require site approval as an audit at each hospital. It does not require ethics approval. Site approval should be routine as this is a national audit, which has been peer reviewed by NITCAR.

In the future the audit may be repeated elsewhere, to study the outcomes using different types of UCA systems. The techniques are also applicable to neurosurgery, spinal surgery, cardiac surgery and vascular surgery facilities in due course.

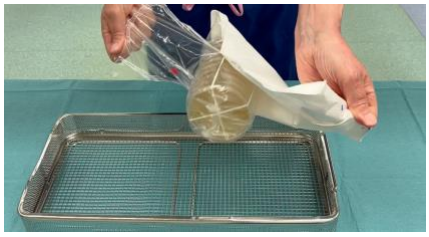
Audit technique

The audit will be conducted jointly by the local orthopaedic department and the local microbiology/infectious diseases department. Multidisciplinary involvement of Infection Prevention and Control (IPC) teams is welcome and encouraged, but not essential.

The audit uses a settle plate based technique. The necessary packs of microbiology plates will need to be ordered by the orthopaedic department using local clinical audit funding. Packs of 10 plates, which can be peeled apart for easy dispensing onto surgical instrument trolleys have been developed by Cherwell labs.

The packs are Redipor peel apart packs of 10 settle plates, product code 5.0724 from Cherwell Labs. https://www.cherwell-labs.co.uk/

The packs of 10 plates can be opened aseptically, using the Cherwell peel apart packs, and dispensed onto the instrument trolleys for the scrub person to manage during the procedure. It is best to dispense the pack into an instrument basket, because of the risk that it may roll off the trolley, and onto the floor!



Microbiology settle plates (pack of 10) will be distributed around the surgical field during each joint arthroplasty procedures. The audit is of the air quality in the ultra clean zone, not in the periphery of the operating theatre, so the plates are only placed on the instrument trolleys, and next to the wound.

The packs of 10 plates are filled with tryptone soya agar, which is a standard medium for this type of environmental study. Similar packs of plates are available from other suppliers, however, they may be more difficult to dispense in a sterile manner, if they do not come with a peel apart wrapping. Note: The study group, do not have any financial or consultancy relationship with Cherwell Labs.

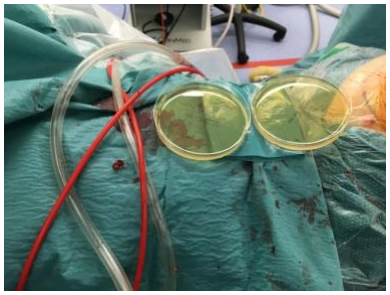
The pack of 10 settle plates should be distributed on the instrument trolleys and near to the wound during the setup procedures, but not opened at this stage. Experience has shown that the instrument trolleys are commonly so crowded during joint replacement operations that it may be difficult to find space for all 10 settle plates. As far as is possible the plates should be evenly distributed in all areas of the clean zone.

It is clearly of interest to monitor airborne contamination close to the wound, so some plates can be placed near the wound.

A good compromise is to have two plates next to the wound and, for example, 2-4 plates on each of two or three instrument trolleys, depending on the trolly set-up. The plates should be placed as evenly as possible, typically between instrument containers. The plates must all be inside the clean zone, which should happen naturally as all the trolleys should be inside the clean zone as a matter of routine.

For the plates near the wound it is easy to fix them using a rolled up sticky strip, which is freely available in orthopaedic theatres. For the plates next to the wound it is

important that they are as horizontal as possible. This is generally not too difficult in a total hip replacement. In a total knee replacement, it is more practical to have the plates in the region of the contralateral hip, which will not move during the procedure, and should be out of the way of the assistant.



In order to standardise the technique, the plates should be placed in position during the preparation for surgery. They should be opened by the scrub person at or soon after the time the incision is being made. This is partly for consistency with other studies. Also, it is known that the prepping and draping stage of the procedure results in temporary high levels of airborne contamination which will be short lived and highly variable, and therefore not well measured using settle plates.

The plates should be closed after one hour. This is partly for consistency with other studies. It would be possible to leave the plates exposed until the wound is closed and record the time, but this risks interfering with tasks such as the swab count, so one hour seems to work well, unless the procedure is done in less than one hour, in which case the time should be noted.

A member of the circulating staff is encouraged to set an alarm on a mobile phone. When the alarm goes off, the plates should be closed and handed over to the circulating staff by the scrub person.

The plates should be marked with the date and time and whether they are from the wound or from the instrument trolleys (although the plates from the wound will usually have residual sticky strip on them).

The 10 plates from each procedure should be stacked and secured with Micropore or similar type, which is freely available. The plates on the trolleys should be marked with a “T” using a black magic marker, and any plates from the wound should be marked with a “W”. The pack of 10 plates should then be placed in a plastic bag, together with a theatre paper form with basic details for the microbiology department.

The theatre paper form is designed for speedy filling during a busy list. The nature of the microbiology request documentation will need to be agreed locally. If a clinical lab is used, they may require a standard microbiology form in addition to the paper form. It is helpful to mark this for the attention of a named individual in the lab, usually the microbiology trainee collaborator, particularly if a large laboratory is used.

In the microbiology department, the plates will be incubated for 48 hours using standard incubators, at a standard temperature, and the colonies counted.

The microbiological data should be expressed as microbial colonies per 90 mm plate per hour. If all 10 settle plates are exposed on the instrument trolleys, then the data can be logged as number of colonies per 10 plates per hour. If the plates are split, then the data can be expressed as number of colonies per eight plates per hour on the instrument trolleys and number of colonies per two plates per hour on the wound margins. The data collection tool will allow investigators to submit the number of microbial colonies individually per plate, or collectively.

The data on the paper form from the theatre and the colony counts will be entered electronically by the microbiology department on an NHS form. The data entry from microbiology can be batched and done at the convenience of the infection trainee.

The following variables from each arthroplasty case will be recorded on the paper data collection form in theatre:

• *Date and time of surgery (for the information of the microbiology department, to be retained locally only).*

• *The exact type of theatre, manufacturer and model number.*
• *Number of circulating and anaesthetic persons in the theatre*
• *Number of scrubbed persons in the clean zone*
• *Type of clothing used by the scrub team, i.e. standard disposables, reusable's, battery hood or battery hood with full toga.*
• *Type of procedure, i.e. THR or TKR*
• *Use of either image intensifiers or robots*
• *Use of warming blanket, forced air or resistive*
• *Significant event, such as plate dropped, free text*

The following information will be recorded by the microbiology department:

• *Microbiological data:* expressed as colonies per 90 mm plate per hour, on the trolly plates, and the wound plates, if any.

• Identification of the organisms by the microbiology department is very welcome and encouraged, but not essential. The fact that there should not be more than one colony per plate should help with managing the identification workload.

The data set on each patient will then be uploaded to the data collection system by the microbiology department, at their convenience.

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