# Aim

To describe the processing of ear swabs.

# Principle

The range of organisms causing external and middle ear infections is wide.

Otitis externa is infection of the external auditory (ear) canal. In general, infections organisms are similar to those causing skin/soft tissue infection. Acute otitis externa can be localised (*Staphylococcus aureus* or Group A streptococcus) or diffuse (*S. aureus* or *Pseudomonas aeruginosa*). Anaerobes may be found in polymicrobial infections. Chronic otitis externa is usually due to colonisation with coliforms and fungi (e.g. *Aspergillus niger*). Malignant otitis externa is due to an invasive *P. aeruginosa* infection and occurs in diabetics and immunocompromised patients.

Acute otitis media is infection of the middle ear, usually caused by migration of upper respiratory tract flora (*Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis, S. aureus,* Group A streptococcus). Chronic suppurative otitis media is usually associated with *P. aeruginosa*, *S. aureus,* and anaerobes.

# Method

## Specimen collection

Specimens should be collected using sterile swabs and placed into Amies transport medium (+/-charcoal).

## Specimen transport and storage

Specimens should ideally be stored and transported in sealed plastic bags. Laboratory processing should occur as soon as possible after specimen collection. Specimens should be refrigerated if delays in processing over two hours are unavoidable.

## Specimen processing

### Reception

Log the specimen in the appropriate specimen book and assign a specimen number.

### Microscopic examination

After inoculating the appropriate agar plates prepare a smear of the specimen and Gram stain.

### Culture

Inoculate and incubate culture media as indicated in Table 1.

**Table 1.** Culture media, conditions, and target organisms

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Standard media** | **Incubation** | | | **Cultures read** | **Target organism(s)** |
| **Temp (°C)** | **Atmosphere** | **Time** |
| Chocolate agar | 35 – 37 | 5 – 10% CO2 | 40 - 48h | Daily | *H. influenzae*  *M catarrhalis*  *S. pneumoniae*  Other organisms may be significant if pure growth |
| CNA-blood agar | 35 – 37 | Air | 40 - 48h | Daily | β-haemolytic streptococci  *S. aureus*  *S. pneumoniae* |
| MacConkey agar | 35 – 37 | Air | 40 - 48h | Daily | Enterobacteriaceae  Pseudomonads |
| Sabouraud agar | 35 – 37 | Air | 40 - 48h | Daily | Fungi |

# Interpretation

Record the semi-quantitative growth of each colony type (i.e. +/- to ++++).

## Minimum level of identification in the laboratory

In general significant isolates should be identified as fully as possible (i.e. to species level): potentially significant organisms are summarised in SOP MID-004.

Yeasts should be reported to the “yeasts” level.

Coliforms should be reported to the “coliforms” level: antimicrobial susceptibility testing is not normally required.

Non-*P. aeruginosa* pseudomonads should be reported to the “pseudomonads” level: antimicrobial susceptibility testing is not normally required.

## Antimicrobial susceptibility testing

All significant isolates should have antimicrobial susceptibilities determined according to SOP MIC-001.

## Reporting

Gram stain results: WBC and organisms detected.

Culture: Presence of significant isolates (e.g. *S. aureus*); no significant growth / mixed growth of doubtful significance may be used; absence of growth.

# Quality assurance

Media and identification tests should be quality controlled according to the relevant SOP.

# Limitations

Prior antimicrobial use may result in negative cultures.

# References

1. Health Protection Agency, UK SOP B24: Investigation of Ear swabs and associated specimens (Issue 8.4; March 2012).

# Synopsis / Bench aids



# Risk assessment

|  |  |
| --- | --- |
| **COSHH risk assessment - University of Oxford COSHH Assessment Form** | |
| **Description of procedure**  Culture of ear swabs | **Substances used**  Variable, depending on organism cultured (may include Gram stain reagents; 3% hydrogen peroxide (catalase test); N,N,N',N'-tetramethyl-1,4-phenylenediamine (oxidase test); sodium deoxycholate (bile solubility test); bioMerieux API reagents) |
| **Quantities of chemicals used**  Small | **Frequency of SOP use**  Daily |
| **Hazards identified**  1. Autoclaved liquid  2. Potentially infectious material in sample  3. Potentially pathogenic bacteria  4. Chemical exposure form bacterial identification tests | **Could a less hazardous substance be used instead?**  No |
| **What measures have you taken to control risk?**  1. Training in good laboratory practices (GLP)  2. Appropriate PPE (lab coat, gloves, eye protection)  3. Use of biosafety cabinet for reading of plates / follow-up of BSL-3 organisms (e.g. *B. pseudomallei*) | |
| **Checks on control measures**  Observation and supervision by senior staff | |
| **Is health surveillance required?**  No | **Training requirements:**  GLP |
| **Emergency procedures**:  1. Report all incidents to Safety Adviser  2. Use eyewash for splashes  3. Clean up spills using 1% Virkon or chemical spill kit | **Waste disposal procedures**:  1. Sharps discarded into appropriate rigid containers for incineration  2. Infectious waste discarded into autoclave bags or 1% Virkon solution prior to autoclaving and subsequent incineration  3. Chemical waste disposed of according to manufacturer’s instructions |