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**Document control information** (Published as separate document)

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<td>January 2021</td>
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Current Version is held on the Intranet
Check with Intranet that this printed copy is the latest issue
Who should read this document?

This policy applies to all clinical staff involved the prescribing of antimicrobials.

Key Practice Points

This policy recommends surgical prophylaxis options for adult patients undergoing specified neurosurgical procedures.

Background/ Scope/ Definitions

Antimicrobial agents are among the most commonly prescribed drugs and account for 20% of the hospital pharmacy budget. Unfortunately, the benefits of antibiotics to individual patients are compromised by the development of bacterial drug resistance. Resistance is a natural and inevitable result of exposing bacteria to antimicrobials.

Good antimicrobial prescribing will help to reduce the rate at which antibiotic resistance emerges and spreads. It will also minimise the many side effects associated with antibiotic prescribing, such as Clostridium difficile infection. It should be borne in mind that antibiotics are not needed for simple coughs and colds. In some clinical situations, where infection is one of several possibilities and the patient is not showing signs of systemic sepsis, a wait and see approach to antibiotic prescribing is often justified while relevant cultures are performed.

This document provides treatment guidelines for the most common situations in which antibiotic treatment is required. The products and regimens listed here have been selected by the Trust's Medicines Management Group on the basis of published evidence. Doses assume a weight of 60-80kg with normal renal and hepatic function. Adjustments may be needed for the treatment of some patients.

This document provides treatment guidelines for the appropriate use of antibiotics. The recommendations that follow are for empirical therapy and do not cover all clinical circumstances. Alternative antimicrobial therapy may be needed in up to 20% of cases. Alternative recommendations will be made by the microbiologist in consultation with the clinical team.

This document refers to the treatment of adult patients (unless otherwise stated).

Please refer to up to date BNF/SPC for a full list of cautions, contraindications, interactions and adverse effects of individual drugs.
What is new in this version?

Penetrating craniocerebral injuries separated out from depressed skull fractures as latest PHE advice is to treat with CNS dose ceftriaxone and oral metronidazole.

Short paragraph on prophylaxis for facial fractures added recommending a maximum of 5 days prophylactic antibiotics.

Policy/ Guideline/ Protocol

Surgical Prophylaxis Principles

Antimicrobial prophylaxis is indicated during selected clean surgical procedures and during procedures which involve incision of non-sterile mucosal surfaces (oral mucosa, respiratory tract, gastrointestinal tract and female genito-urinary tract). Local departmental protocols should be followed where available. Prophylactic antibiotics should be prescribed on the EPMAR (using the relevant prescribing order set where available).

Where a patient is at high risk of post-operative MRSA infection, teicoplanin should be included in the prophylaxis regimen.

Patients at high risk of MRSA infection include:

- Patient has a history of MRSA colonisation or infection
- Prolonged pre-operative hospital inpatient stay

General Principles

1. The final decision regarding the benefits and risks of antibiotic prophylaxis for an individual patient will depend on:
   - the patient’s risk of surgical site infection
   - the potential severity of the consequences of surgical site infection
   - the effectiveness of prophylaxis in that operation
   - the consequences of prophylaxis for that patient (e.g. increased risk of C. difficile colitis)

2. Prophylaxis should be administered ≤ 60 minutes prior to surgical incision (administration must be complete before the surgical incision, and before inflation of the tourniquet when used).

During induction of anaesthesia great care must be taken to prevent drug substitution errors between anaesthetic drugs and antibiotics (which has the potential to lead to unintentional awareness).
3. **Penicillin Allergy:**

Patients with a history of angiodema, anaphylaxis, or severe skin reaction to any beta-lactam antibiotics, are likely to have a true penicillin allergy and are therefore at an increased risk of immediate hypersensitivity to penicillins. They should **not** receive prophylaxis with a beta–lactam antibiotic (these include penicillins, cephalosporins, monobactams and carbapenems).

Patients with a minor or delayed rash, may not have a true penicillin allergy and can therefore receive prophylaxis with a cephalosporin, monobactam or carbapenem but **not** a penicillin.

4. Teicoplanin, gentamicin and ciprofloxacin have long half lives and additional doses during surgery are **not** required. Where other antibiotics are used, an additional dose of prophylactic antibiotic during the operation is indicated if:

- there is major intra-operative blood loss blood loss of > 1500 ml during surgery. In this case, additional dose of the prophylactic antibiotic should be given **after** fluid replacement.
- haemodilution up to 15ml/kg
- surgery has lasted for more than 4 hours
<table>
<thead>
<tr>
<th>Neurosurgical procedure / operation</th>
<th>Prophylaxis</th>
<th>Prophylaxis if allergic to penicillin or known to be colonised or infected with MRSA at any site</th>
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</thead>
<tbody>
<tr>
<td><strong>Clean non – implant and Cranioplasty</strong> (Procedure that does not breach air sinuses, mastoid air cells or nasal or oral cavity)</td>
<td>Cefuroxime 1.5 g IV at induction and every 4 hours during surgery</td>
<td>Teicoplanin 400 mg IV at induction</td>
</tr>
<tr>
<td><strong>Clean contaminated</strong> (Procedures that breach air sinuses, mastoid air cells or nasal or oral cavity)</td>
<td>Cefuroxime 1.5 g IV AND metronidazole 500 mg IV at induction and every 4 hours during surgery</td>
<td>Teicoplanin 400 mg IV, Gentamicin 160 mg IV and metronidazole 500 mg IV at induction and ONLY IV metronidazole 500 mg every 4 hours during surgery</td>
</tr>
<tr>
<td><strong>Extended transsphenoidal Surgery</strong> Transfers from other trusts for urgent transsphenoidal surgery should have MRSA cover unless negative MRSA screen from episode at referring trust or current SRFT admission</td>
<td>Cefuroxime 1.5 g IV AND Metronidazole 500 mg IV at induction and every 4 hours during surgery</td>
<td>Teicoplanin 400 mg IV, Gentamicin 160 mg IV and metronidazole 500 mg IV at induction and ONLY IV metronidazole 500 mg every 4 hours during surgery</td>
</tr>
<tr>
<td><strong>CSF shunt surgery – Primary shunt device insertion or revision due to malfunction WITHOUT evidence of infection</strong></td>
<td>Cefuroxime 1.5 g IV at induction and vancomycin 10 mg intraventricular instillation</td>
<td>Teicoplanin 400 mg IV at induction and vancomycin 10 mg intraventricular instillation</td>
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<tr>
<td><strong>CSF shunt surgery – For revision shunt procedures FOLLOWING infection</strong></td>
<td>Cefuroxime 1.5 g IV at induction and vancomycin 10 mg intraventricular and gentamicin 5 mg intraventricular instillation</td>
<td>Teicoplanin 400 mg IV at induction and vancomycin 10 mg intraventricular and gentamicin 5 mg intraventricular instillation</td>
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<td><strong>External ventricular drain (EVD) insertion</strong></td>
<td>Cefuroxime 1.5 g IV at induction</td>
<td>Teicoplanin 400 mg IV at induction</td>
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<tr>
<td><strong>Deep brain stimulator insertion</strong></td>
<td>Flucloxacillin 1g IV AND gentamicin 160mg IV at induction, and ONLY IV flucloxacillin 1g every 4 hours during surgery</td>
<td>Teicoplanin 400 mg IV and Gentamicin 160 mg IV at induction</td>
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<tr>
<td><strong>Spinal cord stimulator insertion</strong></td>
<td></td>
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<tr>
<td>Neurosurgical procedure / operation</td>
<td>Prophylaxis if allergic to penicillin or known to be colonised or infected with MRSA at any site</td>
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<tr>
<td><strong>Depressed skull fractures</strong></td>
<td>Cefuroxime 1.5 g IV 8 hourly and metronidazole 500 mg IV 8 hourly for 5 days</td>
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<tr>
<td></td>
<td>Discuss with Duty Microbiologist</td>
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<td></td>
<td>NB: Review tetanus status of patient &amp; consider vaccination</td>
<td></td>
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<tr>
<td><strong>Penetrating craniocerebral injuries</strong></td>
<td>Ceftriaxone 2g IV 12 hourly and metronidazole 400mg Orally for 2 weeks initially and then review with microbiology.</td>
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<tr>
<td></td>
<td>NB: Review tetanus status of patient and consider vaccination</td>
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**Antibiotic prophylaxis NOT RECOMMENDED for:**
- Basal skull fractures
- Traumatic CSF fistula
- Post surgical CSF leak

**Antibiotic Prophylaxis in Skull base surgery**

<table>
<thead>
<tr>
<th>Neurosurgical procedure / operation</th>
<th>Prophylaxis</th>
<th>Prophylaxis if allergic to penicillin or known to be colonised or infected with MRSA at any site</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All lateral skull / transmastoid skull base surgery</strong></td>
<td>Cefuroxime 1.5 g IV AND metronidazole 500 mg IV at induction and every 4 hours during surgery</td>
<td>Teicoplanin 400 mg IV, Gentamicin 160 mg IV and metronidazole 500 mg IV at induction and ONLY IV metronidazole 500 mg every 4 hours during surgery</td>
</tr>
<tr>
<td><strong>Cochlear or brainstem implant insertion</strong></td>
<td>Cefuroxime 1.5 g IV and metronidazole 500 mg IV at induction. Postoperatively give 2 more doses of both the antibiotics 8 hourly</td>
<td>Teicoplanin 400 mg IV, Gentamicin 160 mg IV and metronidazole 500 mg IV at induction. Postoperatively give 2 more doses of IV metronidazole 8 hourly and one dose of teicoplanin 400 mg IV after 12 hours</td>
</tr>
<tr>
<td><strong>Extensive anterior fossa cranio-facial resections</strong></td>
<td>Discuss with Duty Microbiologist – Depends on extent of resection and reconstruction</td>
<td>Discuss with Duty Microbiologist – Depends on extent of resection and reconstruction</td>
</tr>
</tbody>
</table>
Protocol for CSF shunt surgery (internalisation) in patients with an EVD

Follow the following protocol:

- Collect CSF sample for culture 2-3 days before the procedure from a port or the Ommaya reservoir if fitted to ensure CSF is sterile.

- Instil vancomycin 10 mg into the ventricles immediately after the above sample is taken.

- If the CSF is free flowing (> 100 ml/day) the dose should be repeated daily until surgery. If the CSF flow is minimal only the first dose may be necessary.

- If surgery is delayed for 1-2 days, continue vancomycin until surgery, however if the surgery is delayed or postponed indefinitely, discontinue vancomycin.

- If CSF sample is confirmed to be sterile, no further vancomycin will be required.

- If CSF sample is culture positive, then surgery must be delayed until an appropriate course of treatment has eradicated the infection.

Antibiotic Prophylaxis in Spinal Surgery

Please see separate policy on trust intranet:


Antibiotic Prophylaxis for Facial fractures

Prophylactic antibiotic choice should be guided by the maxillofacial team.

Duration should not exceed 5 days as per Central Manchester Foundation Trust guidelines.
Standards

- Document the Indication/rationale for antimicrobial therapy.
- Review and document the patient’s allergy status.
- Ensure the choice of antibiotic complies with the antibiotic guidelines.
- Prescribe single dose antibiotics for surgical prophylaxis, unless policy states otherwise.
- Administer antibiotic prophylaxis within 60 minutes prior to surgical incision (administration must be complete before the incision, and before inflation of the tourniquet when used)

Explanation of terms & Definitions

NA

References and Supporting Documents


Roles and responsibilities

All clinical staff involved in the prescribing of antimicrobials to adhere to this policy including full documentation on EPMAR as detailed.