Blind Treatment of Bacterial Infection

If a bacterial infection is suspected, it is often impracticable to wait for test results before starting treatment. Selecting the most appropriate antibiotic should be guided by the following principles:[1]

- Use antibiotics responsibly, considering issues such as safety, resistance and cost.
- Check that an antibiotic is really needed - history and examination may yield clues as to whether a condition is bacterial or viral; however, this is not always easy. Consider delayed antibiotics. Some viral conditions may need prophylaxis to prevent secondary bacterial overgrowth - eg, acute necrotising ulcerative gingivitis secondary to herpes simplex infection.
- **C-reactive protein (CRP) blood test:**
  - The use of point of care rapid CRP testing may reduce the precription of antibiotics. There is evidence of an overall reduction in the use of antibiotics when using CRP tests to guide whether antibiotic treatment is required.[2]
  - However, the CRP result is nonspecific and should be considered in the context of the clinical presentation. The usefulness of the CRP level can be affected by various factors, including the age of the patient, site of infection and the timing of the test. CRP values are often slightly raised in the indeterminate range and therefore may be of limited value.

Blind prescribing does not obviate the need to take samples for culture and sensitivity, before starting treatment, whenever appropriate.[3] Depending on the clinical picture, this may include skin or wound swabs, high vaginal swabs, endocervical swabs, urine, faeces, sputum, blood, aspirate. In the hospital environment, consider cerebrospinal fluid.

Where clinically appropriate, consider FBC, ESR, CRP, U&Es, LFTs, clotting, atypical serology, malaria film, serum for virology, CXR and arterial blood gas analysis. Perform urinalysis.

Blind antibiotic prescribing for pyrexia of unknown origin (PUO) in a relatively well and stable patient is rarely helpful.

Calculating dosage is not an exact science but consider factors affecting absorption or bioavailability, such as age, weight, hepatic function, renal function, severity of infection and other medication:

- Underdosing may result in significant failure of treatment and bacterial resistance in serious infection.
- An excessive dose may result in toxicity, particularly for antibiotics with a narrow margin between the toxic and therapeutic dose (eg, an aminoglycoside).
- Consider drug plasma monitoring, although this is difficult in primary care and may be more appropriate in an intermediate care setting.

- Route of administration - most patients in primary care will cope with oral antibiotics, although some patients have difficulty swallowing tablets and may need liquid or dispersible preparations. Serious infections may require intravenous (IV) administration. Avoid intramuscular (IM) antibiotics in children, as these are likely to be painful.
- Duration depends on condition and severity. Chronic infections such as tuberculosis may require prolonged treatment.
- Follow local policy and national guidelines.[4]
- Consider any other factors relating to the patient which are likely to be relevant - eg, ethnicity, history of allergy, whether immunocompromised, severity of condition and whether taking other medication.
- If female:
  - Check whether pregnant, breast-feeding or taking an oral contraceptive.
  - In pregnancy avoid tetracyclines, aminoglycosides, quinolones, high-dose metronidazole.
  - Short-term use of trimethoprim (there is a theoretical risk in the first trimester in patients with a poor diet, as it is a folate antagonist) or of nitrofurantoin (at term, there is a theoretical risk of neonatal haemolysis) is unlikely to cause problems.

- Prescribing antibiotics after a telephone consultation should be the exception rather than the rule.
- Choose simple generics first-line unless there is a very good case for using newer more expensive antibiotics.
- Avoid widespread use of topical antibiotics, especially those readily used in oral forms, as this may spread resistance.
- Clarithromycin is an acceptable alternative in patients who have gastrointestinal side-effects with erythromycin.
- If blind treatment fails and test results are not available, check with a microbiologist.

Which anti-infective?[4]

Choosing the right drug in the absence of sensitivity results is an inexact science at the best of times but should be guided by the following principles:

**History**

- A detailed history may reveal the source of infection.
- Ask about respiratory, gastrointestinal or genitourinary symptoms.
- Ask about recent travel or treatment or conditions which could compromise the immune system.

**Examination**

Check vital signs: temperature, pulse, blood pressure, respiratory rate and capillary return, to assess the severity of illness and signs of septicaemia.
Treatment
- After 'best guessing' the source of infection, follow local guidelines.
- Be ready to change treatment once drug sensitivities are known.
- Treatment of most infections should not exceed seven days.
- In a hospital or intermediate care setting, IV antibiotic therapy is usually reviewed after 48 hours and changed to oral preparations when possible.
- If in doubt, ask a microbiologist.


Unless otherwise specified, the antibiotic doses in the following table are for adults. Always check a drug formulary such as the British National Formulary for Children when prescribing for children.[^5]

<table>
<thead>
<tr>
<th>Infection</th>
<th>Treatment</th>
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<tbody>
<tr>
<td>Blind Treatment of Infection</td>
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<tr>
<td>Tonsillitis</td>
<td>Most sore throats are viral, but if bacterial tonsillitis is suspected:</td>
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<td>- Phenoxymethylpenicillin 500 mg QDS or 1 g BD for 10 days.</td>
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<tr>
<td></td>
<td>- If allergic to penicillin, clarithromycin 250 mg-500 mg BD for 10 days.</td>
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<tr>
<td>Otitis media in childhood</td>
<td>Many are viral - 80% resolve without antibiotics. If clinically appropriate:</td>
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<td>- Amoxicillin first-line - 40 mg/kg/day in three divided doses.</td>
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<td>- Maximum 1 g TDS for 5 days.</td>
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<td>- If allergic to penicillin:</td>
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<td>- Erythromycin first-line - under 2 years 125 mg QDS; 2-8 years 250 mg QDS; other 250-500 mg QDS.</td>
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<tr>
<td>Rhinosinusitis</td>
<td>Acid antibiotics unless severe, or where symptoms are lasting more than 10 days. 80% resolve within 14 days without antibiotics.</td>
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<td>- First-line - amoxicillin 500 mg TDS for 7 days or doxycycline or 200 mg stat/100 mg OD for 7 days or clarithromycin 250 mg-500 mg BD for 7 days or phenoxymethylpenicillin 250 mg QDS-500 mg BD for 7 days.</td>
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<td>- For persistent symptoms - co-amoxiclav 625 mg TDS for 7 days.</td>
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<tr>
<td>Acute bronchitis/ lower respiratory tract infection</td>
<td>Only marginal benefits in otherwise healthy adults. Patient leaflets can reduce antibiotic use:</td>
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<tr>
<td></td>
<td>- Amoxicillin 500 mg TDS or doxycycline 200 mg stat then 100 mg OD for 5 days.</td>
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<td></td>
<td>- If there is penicillin allergy and tetracycline is contra-indicated, use erythromycin.</td>
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<tr>
<td>Acute exacerbation of chronic obstructive pulmonary disease</td>
<td>Use antibiotics if there is increased dyspnoea and purulent sputum and/or increased sputum volume:</td>
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<td>- First-line - amoxicillin 500 mg TDS or doxycycline 200 mg stat then 100 mg OD or clarithromycin 500mg BD, for 5 days.</td>
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<td></td>
<td>- If resistance - co-amoxiclav 625 mg TDS for 5 days.</td>
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<td>Community-acquired pneumonia</td>
<td>Use CRB-65 score to guide appropriate management. See separate Pneumonia article:</td>
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<td></td>
<td>- First-line: amoxicillin 500 mg BD or clarithromycin 500 mg BD or doxycycline 200 mg stat the 100 mg OD for up to 10 days.</td>
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<td>- Consider risk factors for Staphylococcus aureus and Legionella spp.</td>
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<td>- Assess need for dual therapy for atypical organisms: amoxicillin and clarithromycin, or doxycycline alone.</td>
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<td>Meningitis</td>
<td>Admit to hospital immediately:</td>
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<td>- Benzylpenicillin or cefotaxime prior to admission, unless there is history of anaphylaxis, (NOT allergy). Ideally, IV but IM if a vein cannot be found.</td>
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<td>- Benzylpenicillin: adults and children 10 years and over: 1200 mg. Children 1-9 years: 600 mg. Children under 1 year: 300 mg.</td>
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<td>- Cefotaxime: age 12+ years: 1 gram. Age &lt; 12 years: 50 mg/kg.</td>
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<td>Uncomplicated urinary tract infection (UTI) - is no fever or flank pain</td>
<td>Amoxicillin resistance is common: therefore, ONLY use it if culture confirms susceptibility.</td>
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<td>- In the elderly (&gt;65 years), do not treat asymptomatic bacteriuria; it occurs in 25% of women and 10% of men and is not associated with increased morbidity.</td>
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<td>- In the presence of a catheter, antibiotics will not eradicate bacteriuria; only treat if systemically unwell or if pyelonephritis is likely.</td>
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• Do MSU on all treatment failures - extended-spectrum beta-lactamase enzyme-producing organisms increasing multiple resistance but still sensitive to nitrofurantoin.

Uncomplicated UTI (no fever or flank pain):
• Use urine dipstick to assess for UTI: nitrite plus blood or leukocytes 92% positive predictive value; negative for nitrite, blood and leukocyte 76% negative predictive value.
• Use nitrofurantoin first-line as general resistance and community multi-resistant.
• Trimethoprim 200 mg BD, nitrofurantoin 50-100 mg QDS or pivmecillinam 200 mg TDS (400 mg TDS if resistance risk).
• Treat for 3 days in women and for 7 days in men.

UTI in pregnancy:
• Send MSU for culture and start antibiotics.
• Avoid trimethoprim if low folate status or on folate antagonist (eg, antiepileptic or proguanil).
• Short-term use of nitrofurantoin in pregnancy is unlikely to cause problems to the fetus.
• First-line - nitrofurantoin 100 mg MR BD; or amoxicillin 500 mg TDS (if organism susceptible); treat for 7 days.
• Second line - trimethoprim 200 mg BD for 7 days (also give folate if in first trimester).
• Third-line - cefalexin 500 mg BD for 7 days.

Children (see also separate Urinary Tract Infection in Children article):
• Lower UTI: trimethoprim or nitrofurantoin (or amoxicillin if susceptible); second-line - cefalexin.
• Upper UTI: co-amoxiclav; second-line - cefotaxime.

Recurrent UTI in non-pregnant women (3 or more UTIs/year):
• See also separate Recurrent Urinary Tract Infection article.
• Postcoital prophylaxis is as effective as prophylaxis taken nightly.
• For prophylaxis use nitrofurantoin 50-100 mg or trimethoprim 100 mg; stat postcoital or OD at night (review at 6 months).

Skin/soft tissue infections

Impétigo:
• Reserve topical antibiotics for very localised lesions to reduce risk resistance.
• Reserve mupirocin for meticillin-resistant S. aureus (MRSA).
• First-line oral medication - flucloxacillin 500 mg or, if penicillin allergy, clarithromycin 250-500 mg BD; treat for 7 days.
• Topical - use fusidic acid TDS for 5 days.

Eczema:
• Using antibiotics, or adding them to steroids, in eczema does not improve healing unless there are visible signs of infection.

Cellulitis:
• Fluclaxillin 500 mg QDS for 7 days. Use clarithromycin if there is allergy to penicillin.
• If febrile and ill, admit for IV treatment.
• If on statins use doxycycline 200 mg stat then 100 mg OD for 7 days.
• If unresolved - clindamycin 300-450 mg QDS 7 days.
• In facial cellulitis, use co-amoxiclav 625 mg TDS for 7 days.
• Initially treat for 7 days but continue for a further 7 days if there is slow response.

Leg ulcers:
• Bacteria will always be present. Antibiotics do not improve healing unless there is active infection. Culture swabs and review antibiotics after culture results.
• Active infection indicated if there is cellulitis, increased pain, pyrexia, purulent exudate or odour.
• If there is active infection, use fluclaxillin or clarithromycin as for cellulitis.

Human and animal bites:
• Thorough irrigation is important.
• Assess tetanus, rabies, HIV and hepatitis B/C risk.
• Antibiotic prophylaxis if:
  • Cat bite.
  • Human bite.
  • Puncture wound.
  • Bite involving a hand, foot, face, joint, tendon or ligament.
  • Immunocompromised, diabetes, asplenic, cirrhotic or presence of prosthetic valve or prosthetic joint.
  • First-line is co-amoxiclav 375-625 mg TDS for 7 days.
  • If there is allergy to penicillin, use:
    • Metronidazole 400 mg TDS PLUS doxycycline 100 mg BD (for cat, dog or human bite); or
    • Metronidazole PLUS clarithromycin (for human bite).
  • Review at 24 hours and 48 hours.

NB: doses are for adults unless otherwise stated - for further details see the British National Formulary.

The table is a brief summary. Guidance changes from time to time depending on prevailing antibiotic sensitivities.
Further reading & references

- Management of infection guidance for primary care for consultation and local adaptation; Public Health England, 2017
- Bacterial Sepsis following Pregnancy; Royal College of Obstetricians and Gynaecologists (April 2012)

3. British National Formulary (BNF); NICE Evidence Services (UK access only)

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<th>Author: Dr Colin Tidy</th>
<th>Peer Reviewer: Dr Adrian Bonsall</th>
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<td>Next Review: 26/07/2021</td>
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