

ANTIBIOTIC GUIDANCE FOR SHROPSHIRE & POWYS PRIMARY CARE

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Comments/suggested changes for consideration welcome. Send to stephanie.damoa-siakwan@sath.nhs.uk

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Using antibiotics is a not a subject where every answer can be pre-defined. These guidelines describe first steps in common situations and are not comprehensive or applicable to patients with two infections. Section 1 are empirical guidelines based on 'Management and Treatment of Common Infections' from PHE (references and grading of guidance recommendations are available at [Guidance for primary care - Publications - GOV.UK](#)).

Empirical management will not deal with unexpected resistance, which means failure and changing antibiotics. If the situation you meet is not covered, microbiologists will be pleased to help. Note the guidance deliberately does NOT generally cover any other aspects of diagnosis (see laboratory handbook), vaccination or immunisation (See DH guidelines) or non-antibiotic treatment of infection.

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1. EMPIRICAL USE GUIDELINES.

1.1.Aims

- to provide a simple, effective, economical empirical approach to the treatment of common infections
- to promote the safe, effective and economic use of antibiotics
- to minimise the emergence of bacterial resistance in the community

1.2. Advice

Can be obtained, if infection is severe, from the following by e-mail or telephone:

Clinical Bacteriology Results	(Phone) 01743 261000 ext 1161/1167
Serology, Molecular & Virology Results	(Phone) 01743 261000 ext 3205/1161
Clinical Enquiries	Dr G Harvey - graham.harvey@sath.nhs.uk Dr P O'Neill patricia.oneill@sath.nhs.uk Dr S Damoa-Siakwan - stephanie.damoa-siakwan@sath.nhs.uk Dr M Brian – michael.brian@sath.nhs.uk

Unless otherwise stated, these guidelines are intended for adults only. Different antibiotics doses are, and different choices may be, needed for children. However, bacterial infection is commoner as a cause of sore throat, otitis media and sinusitis in children so antibiotic guidance in these sections considers children. Not all conditions are covered. HIV therapy and Tuberculosis therapy are dealt with by specialist physicians.

1.3. Principles of Treatment

- This guidance is based on the best available evidence but its application must be modified by professional judgement.
- It is important to initiate antibiotics as soon as possible in severe infection
- Prescribe an antibiotic only when there is likely to be a clear clinical benefit.
- Do not use antibiotics for acute sore throat, colds, acute cough or sinusitis. Delayed antibiotic prescription is an option.
- Do not treat organisms in leg ulcers unless there is a 2cm erythematous zone suggesting cellulitis (unless attempting [MRSA](#) clearance).
- Avoid prescribing over the telephone except in exceptional cases.
- Use simple generic antibiotics first whenever possible.
- Avoid broad-spectrum antibiotics when narrow spectrum antibiotics remain effective, as broad-spectrum antibiotics increase the risk of *Clostridium difficile*, MRSA and resistant UTIs. All antibiotics have the potential to induce *Clostridium difficile* associated diarrhoea. Carbapenems, cephalosporins, quinolones and clindamycin are considered to be high-risk while metronidazole, flucloxacillin, doxycycline, trimethoprim and amoxicillin are lower risk agents.
- A dose and duration of treatment is suggested for adults. Give short courses of antibiotics where possible. Five days is normally adequate unless otherwise stated and 3-day courses are satisfactory for cystitis. Always review by 7 days if you plan to continue antibiotics.
- Try to avoid giving a series of antibiotics for one infection. Another organism or pharmacological factors such as dose, absorption, and penetration to the site of infection, may be responsible for treatment failure.
- Always enquire about the nature of any reported allergy and previous reaction; symptoms such as nausea and diarrhoea are not features of true allergy. Less than 10% of individuals who are penicillin allergic are allergic to cephalosporins or carbapenems. These agents should not be given to those with a history of facial/oral swelling, difficulty breathing or urticarial rash with penicillins.
- Use higher doses in patients weighing >70Kg and certainly if the patient weighs >100Kg, penicillins are particularly safe to use at high dose. When using flucloxacillin use 1G qds for severe Staph aureus infection up to 70Kg, 1.5 g qds from 70-100Kg and 2G qds >100Kg.
- Avoid widespread use of topical antibiotics (especially gentamicin, fucidin and mupirocin)
- In pregnancy AVOID tetracyclines, aminoglycosides, ciprofloxacin, *high dose* metronidazole (2g). Take specimens to inform treatment. Short-term use of trimethoprim (theoretical risk in first trimester in patients with poor diet, or taking another folate antagonist) or nitrofurantoin (at term, theoretical risk of neonatal haemolysis) is unlikely to cause problems to the foetus.
- Where a 'best guess' therapy has failed or special circumstances exist, microbiological samples are essential.
- This guidance should not be used in isolation; it should be supported with patient information about back-up/delayed antibiotics, infection severity, usual duration and clinical staff education. Materials are available on the RCGP [TARGET](#) website.

ILLNESS	COMMENTS	TREATMENT	ADULT DOSE (unless stated)	DURATION
1.4. UPPER RESPIRATORY TRACT INFECTIONS: Consider delayed antibiotic prescriptions.				
Influenza Treatment: PHE Seasonal influenza Prophylaxis: NICE influenza	Annual vaccination is essential for all those at risk of influenza. For otherwise healthy adults, antivirals are not recommended. Treat 'at risk' patients with antivirals: - when influenza is circulating in the community, within 48 hours of onset of symptoms - during localised outbreaks in long term and residential nursing homes, if there is a high level of certainty that the causative agent is influenza (see CCG guideline on prescribing antivirals in this situation). At risk: pregnant (including up to 2 weeks post-partum), 65 years or over, chronic respiratory disease (including COPD and asthma) significant cardiovascular disease (not hypertension), immunocompromised, diabetes mellitus, chronic renal, liver or neurological disease, morbid obesity (BMI≥40). Use oseltamivir 75 mg oral capsule BD for 5 days. If pregnant or there is resistance to oseltamivir, use zanamivir 10 mg (2 inhalations by diskhaler) BD for 5 days. Patients under 13 years see PHE (HPA) guidance.			
Otitis media CKS Otitis media - acute	Optimise NSAID and Paracetamol Avoid antibiotics as 60% are better in 24 hours without: they only reduce pain at 2 days (NNT15) and do not prevent deafness Consider 2 or 3-day-delayed or immediate antibiotics for pain relief if: <ul style="list-style-type: none"> • < 2yrs with bilateral Acute OM (NNT4) or bulging membrane and ≥ 4 symptoms • All ages with otorrhoea (NNT3) Antibiotics to prevent Mastoiditis NNT >4000 Macrolides concentrate intracellularly and are less active against the extracellular H influenzae	<i>First line</i> amoxicillin <i>Second line</i> co-amoxiclav <i>ONLY if penicillin allergic & not ideal for Haemophilus.</i> Clarithromycin <i>Erythromycin can be used but has more unwanted effects</i>	40 mg/kg/day in 3 divided doses Maximum 1g TDS in those aged >10 years 1-6 yrs 125/31 mg TDS 6-12 yrs 250/62 mg TDS Adults 250/125 mg TDS 250mg-500mg BD (adults) <2 yrs 125 mg QDS 2-8 yrs 250 mg QDS Adults: 250-500 mgQDS	5 days

<p>Acute Otitis Externa Otitis externa - NICE CKS</p>	<p>First line: analgesia and apply localised heat (eg a warm flannel). Second line: topical acetic acid or topical antibiotic +/- steroid: similar cure at 7 days. If cellulitis or disease extends outside ear canal, or systemic signs of infection, start oral flucloxacillin and refer to exclude malignant otitis externa.</p>	<p><i>Second line</i> Acetic acid 2% Neomycin sulphate with corticosteroid</p> <p><i>Cellulitis</i> Flucloxacillin</p>	<p>1 spray TDS 3 drops TDS</p> <p>500mg qds 1g QDS (severe or >70kg)</p>	<p>7 days 7-14 days</p> <p>7 days</p>
<p>Acute sinusitis Sinusitis - NICE CKS RTI - NICE</p>	<p>Symptoms <10 days: do not offer antibiotics as most resolve in 14 days without, and antibiotics only offer marginal benefit after 7 days (NNT15). Symptoms >10 days: no antibiotic, or back-up antibiotic if several of: purulent nasal discharge; severe localised unilateral pain; fever; marked deterioration after initial milder phase. Systemically very unwell, or more serious signs and symptoms: immediate antibiotic. Suspected complications: eg sepsis, intraorbital or intracranial, refer to secondary care. Self-care: paracetamol/ibuprofen for pain/fever. Consider high-dose nasal steroid if >12 years. Nasal decongestants or saline may help some.</p> <p>Phenoxymethylpenicillin is only active against pneumococci and haemolytic streptococci and macrolides are less active against H.influenzae. If no response, switch between first line antibiotics then try second. Anaerobes more common in persistent rhinosinusitis</p>	<p><i>No antibiotics:</i> self-care</p> <p><i>First line for delayed:</i> phenoxymethylpenicillin <i>Penicillin allergy or intolerance:</i> doxycycline OR clarithromycin</p> <p><i>Very unwell or worsening:</i> co-amoxiclav</p> <p>Mometasone</p>	<p>500mg QDS</p> <p>200mg stat/ 100mg OD 500mg BD</p> <p>500/125 mg TDS</p> <p>200mcg BD</p>	<p>5 days</p> <p>5 days 5 days</p> <p>5 days</p> <p>14 days</p>

<p>Pharyngitis/ sore throat/ tonsillitis</p> <p>CKS Sore throat-acute</p> <p>NICE RTIs</p> <p>FeverPain</p>	<p>Avoid antibiotics as 82% resolve in 7 days without, and pain only reduced by 16 hours</p> <p>Use FeverPAIN Score: Fever in last 24 hours; Purulence; Attend rapidly under three days; severely Inflamed tonsils; No cough or coryza.</p> <p>Score 0-1: 13-18% streptococci - no antibiotic. 2-3: 34-40% streptococci - 3-day delayed antibiotic. 4-5: 62-65% streptococci - if severe, immediate antibiotic or 48-hour delayed antibiotic.</p> <p>Advise paracetamol, self-care, and safety net. 6D</p> <p>Complications are rare: antibiotics to prevent quinsy NNT>4000; otitis media NNT200. 10 days' penicillin has lower relapse than 5 days in patients under 18y.</p>	<p><i>Fever pain 0-1:</i> self-care</p> <p><i>Fever pain 2-3:</i> delayed prescription of phenoxymethylpenicillin</p> <p><i>Penicillin allergy:</i> Clarithromycin</p> <p><i>Penicillin allergy in pregnancy:</i> erythromycin</p>	<p>500mg QDS 1g BD (if mild) <i>If severe:</i> 500mg QDS</p> <p>250mg BD <i>If severe:</i> 500mg BD</p> <p>250-500mg QDS</p>	<p>} 5-10 days</p> <p>5 days</p> <p>5 days</p>
<p>Scarlet Fever</p> <p>PHE Scarlet fever</p>	<p>Prompt treatment with appropriate antibiotics significantly reduces the risk of complications. Observe immunocompromised individuals (diabetes, women in the puerperal period, chickenpox) as they are at increased risk of invasive infection</p>	<p><i>First line (mild):</i> analgesia</p> <p>Phenoxymethylpenicillin</p> <p><i>Penicillin allergy:</i> clarithromycin</p>	<p>500mg QDS</p> <p>250-500mg BD</p>	<p>10 days</p> <p>5 days</p>

ILLNESS	COMMENTS	TREATMENT	ADULT DOSE	DURATION
1.5. LOWER RESPIRATORY TRACT INFECTIONS				
Note: Avoid tetracyclines in pregnancy. Low doses of penicillins are more likely to select out resistance. Do not use quinolones (ciprofloxacin and ofloxacin) first line as they have poor activity against pneumococci. However, they do have use in PROVEN pseudomonal infections which are common in bronchiectasis.				
Acute cough, bronchitis Cough - NICE CKS NICE 69 NICE RTI	Antibiotics have little benefit in otherwise healthy adults so avoid. Consider 7d delayed antibiotic with advice. Symptom resolution can take up to 3 weeks Consider immediate antibiotics if >80y and 1 of below or >65y with 2 of: hospitalization in the past year, oral steroids, diabetic, congestive cardiac failure. Consider CRP if antibiotic is being considered. No antibiotics if CRP<20mg/L and symptoms for >24 hours; delayed antibiotics if 20-100mg/L. Immediate antibiotics if >100mg/L	<i>First line:</i> self-care and safety netting advice <i>Second line:</i> amoxicillin <i>Penicillin allergy:</i> doxycycline	500mg TDS 200mg stat/100mg OD	5 days 5 days
Exacerbation of COPD NICE ng115 NICE ng114	30% viral, 30-50% bacterial (usually Haemophilus influenzae). Use antibiotics only if purulent sputum and increased dyspnoea and/or increased sputum volume <i>If clinical failure switch between first line antibiotics before using 2nd line</i> Risk factors for antibiotic resistant organisms include co-morbid disease, severe COPD, frequent exacerbations and antibiotics in last 3 m Avoid clarithromycin because unreliable against Haemophilus. Coliforms often isolated from sputum samples, usually reflect colonisation only.	<i>First line</i> Amoxicillin OR doxycycline <i>Second line</i> co-amoxiclav	500 mg TDS 200 mg/100mg OD 625 mg TDS	5 days

<p>Exacerbation of Bronchiectasis BTS Bronchiectasis</p>	<p><i>Haemophilus influenzae</i> common. Often associated with mucoid <i>Pseudomonas aeruginosa</i>. May require amendment according to previous culture results. Intravenous or inhaled combinations may be required.</p>	<p>Amoxicillin OR Doxycycline Ciprofloxacin If susceptible</p>	<p>1g TDS 100mg BD 500 - 750mg BD</p>	<p>14 days 14 days</p>
<p>Community-acquired pneumonia BTS Pneumonia NICE Pneumonia</p>	<p>Manage using clinical judgement & CRB-65 score with review: each scores 1: Confusion (AMT<8); Respiratory rate >30/min; BP systolic<90 or diastolic≤60; age ≥65y Score 0 suitable for home treatment 1-2 consider hospital referral 3-4 urgent hospital admission. If delayed admission or life threatening give immediate benzylpenicillin or amoxicillin 1G po Give safety-net advice and likely duration of different symptoms, eg cough 6 week Mycoplasma infection is rare in over 65s¹ Request legionella urinary antigen if travel history with overnight stay abroad or in UK in last 18 days</p>	<p><i>CRB65=0</i> Amoxicillin OR Doxycycline <i>CRB65=1 and at home</i> (clinically assess need for dual therapy for atypicals): amoxicillin <i>AND</i> clarithromycin <i>OR doxycycline alone</i></p>	<p>500 mg - 1g TDS 100mg BD 500 mg - 1g TDS 500mg BD 100mg BD</p>	<p>5 days, consider 7-10 days if poor response 7-10 days</p>
<p>1.6. MENINGITIS</p>				
<p>Suspected meningococcal disease PHE -Meningococcal Meningitis in under 16s NICE</p>	<p>Transfer all patients to hospital immediately. If time, administer benzylpenicillin or ceftriaxone prior to admission, unless history of difficulty breathing, collapse, loss of consciousness or urticarial rash with these agents. Ideally IV but IM if a vein cannot be found.</p>	<p>iv or im Benzylpenicillin Iv or im Ceftriaxone or Cefotaxime</p>	<p>Adults and children 10 yr and over: 1200 mg Children 1 - 9 yr: 600 mg Children <1 yr: 300 mg Adults, >12y 1G, Children <12y: 50mg/Kg,</p>	
<p>Prevention of secondary case of meningitis: Only prescribe following advice from Public Health Doctor: 9 am – 5 pm: 0344 225 3560 opt2 then opt2 Out of hours: Contact on-call Public Health Doctor via RSH switchboard 01743 261000</p>				

ILLNESS	COMMENTS	TREATMENT	ADULT DOSE	DURATION
1.7. URINARY TRACT INFECTIONS				
<p>Note: As antibiotic resistance and Escherichia coli bacteraemia in the community is increasing, use nitrofurantoin first line, always give safety net and self-care advice, and consider risks for resistance. See PHE UTI guidance for diagnostic information PHE quick reference</p>				
<p>Do not treat asymptomatic bacteriuria in the elderly (>65 years); it occurs in 25% of women and 10% of men and is not associated with increased morbidity. In the presence of a catheter, antibiotics will not eradicate bacteriuria; only send sample and treat if systemically unwell (pyrexial) or pyelonephritis likely. Treatment may occasionally be advised for clearance/suppression of MRSA carriage. Do not routinely use prophylactic antibiotics for catheter changes unless history of catheter change associated UTI or trauma Amoxicillin resistance is common, therefore ONLY use if culture confirms susceptibility</p>				
<p>Uncomplicated UTI i.e. no fever, rigors or flank pain in adults</p> <p>PHE UTI women - NICE CKS UTI men - NICE CKS SIGN RCGP clinical module</p>	<p>Women<65y, mild/or ≤2 symptoms: pain relief and consider delayed antibiotic. If urine not cloudy, 97% NPV of no UTI If urine cloudy, use dipstick to guide treatment: nitrite, leukocytes, blood all negative 76% NPV nitrite plus blood or leukocytes 92% PPV of UTI Women severe/or ≥ 3 symptoms: treat Men<65y: Consider prostatitis & send pre-treatment MSU OR if symptoms mild/non-specific, use –ve dipstick to exclude UTI. >65y: treat if fever >38°C, or 1.5°C above base twice in 12 hours, and >1 other symptom. If treatment failure: always perform culture.</p> <p>Low risk of resistance: younger women with acute UTI and no risk. Risk factors for increased resistance include: care-home resident; recurrent UTI; hospitalisation for >7 days in the last 6 months; unresolving urinary symptoms; recent travel to a country with increased resistance; previous UTI resistant to trimethoprim, cephalosporins, or quinolones. If risk of resistance: send urine for culture and susceptibilities; safety net</p>	<p>nitrofurantoin OR trimethoprim OR pivmecillinam <i>If high resistance risk</i> Fosfomycin</p> <p>Nitrofurantoin is 1st line for lower UTIs. Use if GFR >45ml/min. GFR 30-45 use only if resistance and no alternative Send cultures if treatment failure. Community Extended-spectrum beta-lactamases (ESBLs) are not uncommon (see below 3.3)</p>	<p>50 mg QDS or 100mg m/r BD 200 mg BD 400mg stat then 200mg tds Women 3g stat Men 3g stat and rpt 3 days later (unlicensed)</p>	<p>3 days women 7days men</p>

<p>Acute pyelonephritis i.e fever/rigors and loin pain NICE CKS</p>	<p>Send MSU for culture. If no response within 24 hours admit.</p>	<p>ciprofloxacin OR cefalexin If susceptible, trimethoprim</p>	<p>500 mg BD 500mg QDS 200 mg BD</p>	<p>7 days 10 days 10-14 days</p>
<p>UTI in pregnancy UTI - women - NICE CKS</p>	<p>Send MSU for culture. DO NOT use urine dipstick to exclude UTI in pregnancy. There is a low sensitivity to such tests due to urine dilution. Asymptomatic bacteriuria should be treated only if the same organism is grown on 2 samples at $>10^5$. NB Short-term use of or nitrofurantoin in pregnancy is unlikely to cause problems to the foetus. Avoid trimethoprim in the 1st trimester or if low folate status or taking folate antagonist.</p>	<p>nitrofurantoin Cefalexin OR amoxicillin (if known to be sensitive)</p>	<p>50mg QDS 100mg m/r BD 500 mg qds 500mg tds</p>	<p>7 days</p>
<p>Children NICE CKS</p>	<p>Refer children <3 months urgently for assessment If > 3 months, use positive nitrite test as criterion to start antibiotics. Send MSU in all for culture & susceptibility. Upper UTI: refer to paediatrics to: obtain a urine sample for culture; assess for signs of systemic infection Imaging: refer if child <6 months, recurrent or atypical UTI</p>	<p><i>For therapy</i> Trimethoprim OR nitrofurantoin OR cefalexin OR, post testing, amoxicillin <i>For prophylaxis</i> trimethoprim OR nitrofurantoin</p>	<p>See BNF for dosage</p>	<p>Lower UTI 3 days Upper UTI 7-10 days</p>
<p>Recurrent UTI women ≥ 3/yr, 2 in 6 mo (non-pregnant)</p>	<p>To reduce recurrence first advise simple measures including hydration, cranberry products. Then standby or post-coital antibiotics. Third line: antibiotic prophylaxis. Consider methenamine if no renal/hepatic impairment.</p>	<p>Prophylactic nitrofurantoin OR trimethoprim Methenamine hippurate</p>	<p>50 mg 100 mg 1g BD</p>	<p>Stat post coital, OR OD at night Review at 3-6 months 6 months</p>
<p>Acute Prostatitis BASHH NICE CKS</p>	<p>Send MSU for culture and start antibiotics. 4-week course may prevent chronic prostatitis. Quinolones achieve high prostate levels.</p>	<p>Ciprofloxacin <i>2nd line</i> Trimethoprim</p>	<p>500mg bd 200mg bd</p>	<p>28 days</p>

1.8. GASTRO-INTESTINAL TRACT INFECTIONS				
Infectious diarrhoea	Antibiotic therapy not indicated for bacterial infection unless patient systemically ill or has had recent antibiotic therapy suggesting <i>Clostridium difficile</i> . Treatment after susceptibility testing may be considered still for Salmonella in the frail elderly. Send samples from previously healthy children with acute painful or bloody diarrhoea to exclude <i>E.coli</i> 0157 infection			
Gastroenteritis - NICE CKS Infectious diarrhoea-PHE	Giardia	Metronidazole	2G daily or 400mg tds	3 days 5 days
	Entamoeba histolytica	Metronidazole followed by Diloxanide furoate	800mg tds 500mg tds	5 days 10 days
	Shigella dysenteriae or flexneri	Ciprofloxacin	500mg bd	5 days
Traveller's diarrhoea CKS	Only consider standby antibiotics for remote areas or people at high-risk of severe illness with travellers' diarrhoea If standby antibiotics appropriate: azithromycin 500mg OD for 1-3 days. Quinolone resistance is high in many areas. Prophylaxis is rarely, if ever, indicated. Bismuth subsalicylate (Pepto Bismol) may be used as prophylaxis/treatment at 2 tablets QDS for 2 days (advise patient to purchase from a pharmacy)			
Threadworms Threadworm - NICE CKS	Treat all household contacts at the same time PLUS advise hygiene measures for 2 weeks (hand hygiene, pants at night, morning shower) PLUS wash sleepwear, bed linen, dust and vacuum on day one. Child <6 months, add perianal wet wiping or washes three hourly	>6months: mebendazole (off label if <2y) <6months: 6 weeks hygiene	100mg	Stat Rpt in 2 weeks if persistent
Oral Candidiasis Candida - oral - NICE CKS	Topical azoles are more effective than topical nystatin. Oral candidiasis is rare in immunocompetent adults; consider undiagnosed risk factors, including HIV. Use 50mg fluconazole if extensive/severe candidiasis. If HIV or immunocompromised, use 100mg fluconazole.	Miconazole oral gel <i>If not tolerated:</i> Nystatin suspension Fluconazole	20mg/ml QDS (hold in mouth after food) 4ml; 100,000 units/mL QDS (half in each side of mouth) 50mg/100mg OD	7 days, further 2 days after symptoms resolve 7-14 days

<p>Clostridium difficile</p> <p>Clostridium difficile - GOV.UK</p>	<p>Stop unnecessary antibiotics and review any use of PPIs and antiperistaltic agents.</p> <p>Assess severity: Severe if T >38.5; WCC >15, rising creatinine or signs/symptoms of severe colitis</p> <p>If severe treat with vancomycin, review progress closely and consider admission</p> <p>Relapse within 1 month – Treat according to worst severity of last episode or current episode. If second relapse, or severe seek microbiology or gastroenterologist advice.</p> <p>See also section 3.1</p>	<p><i>1st/2nd episode</i></p> <p>Metronidazole.</p> <p><i>2nd relapse or severe</i></p> <p>Vancomycin</p>	<p>400 mg oral TDS</p> <p>125mg oral QDS</p>	<p>10-14 days</p> <p>10-14 days</p>
<p>Diverticulitis</p> <p>Diverticular disease - NICE CKS</p>	<p>Oral antibiotics together with dietary modification can be used to treat uncomplicated episodes.</p> <p>Metronidazole alone may be sufficient to treat many episodes</p>	<p>Metronidazole +/- ciprofloxacin</p> <p>Co-amoxiclav</p>	<p>400mg TDS</p> <p>500mg BD</p> <p>375mg TDS</p>	<p>7 days</p>
<p>Eradication of Helicobacter pylori</p> <p>Dyspepsia - NICE</p> <p>Helicobacter pylori - GOV.UK</p> <p>Dyspepsia - NICE CKS</p>	<p>Treat all positives in known DU, GU or low grade MALToma. In Non-Ulcer NNT is 14</p> <p>Do not offer eradication for GORD</p> <p>Do not use clarithromycin, metronidazole or quinolone if used in past year for any infection</p> <p>Penicillin allergy: use PPI plus clarithromycin & MZ; If previous clarithromycin use PPI + bismuth salt + metronidazole + tetracycline.</p> <p>Relapse and previous MZ & clari: use PPI PLUS amoxicillin, PLUS either tetracycline or levofloxacin</p> <p>Retest for H. pylori post DU/GU or relapse after second line therapy: using breath or stool test OR consider endoscopy for culture and susceptibility</p>	<p>Always use PPI</p> <p>PPI (use cheapest) PLUS amoxicillin AND clarithromycin OR metronidazole (MZ)</p> <p><i>penicillin allergy and previous MZ +Clari</i></p> <p>PPI PLUS Bismuth subsalicylate PLUS Metronidazole PLUS tetracycline</p> <p><i>relapse and previous MZ+clari</i></p> <p>PPI WITH Amoxicillin AND tetracycline OR levofloxacin</p>	<p>1g BD</p> <p>500mg BD</p> <p>400mg BD</p> <p>525 mg BD</p> <p>400 mg BD</p> <p>500 mg QDS</p> <p>1g BD</p> <p>500mg TDS</p> <p>250mg BD</p>	<p>All for 7 days</p> <p>14 days in relapse or MALToma</p>

ILLNESS	COMMENTS	TREATMENT	ADULT DOSE	DURATION
1.9. GENITAL TRACT INFECTIONS				
Contact UKTIS for information on foetal risks if patient is pregnant				
STI screening	People with risk factors should be screened for chlamydia, gonorrhoea, HIV, syphilis. Refer to GUM clinic or GP with level 2 or 3 expertise in GUM. Risk factors: < 25y, no condom use, recent (<12mth)/frequent change of partner, symptomatic partner			
Chlamydia trachomatis/ urethritis SIGN BASHH PHE Chlamydia trachomatis - GOV.UK Chlamydia - NICE CKS	Opportunistically screen all aged 15-25y Treat contacts by contacting Chlamydia coordinator / refer to general practices with level 2 or 3 expertise in GUM or GUM clinic. In pregnancy or breastfeeding: use azithromycin or erythromycin. Note this is less reliable than doxycycline and 'test of cure' should be performed no sooner than 6 weeks after Rx. Suspected epididymitis in men. Consider GUM referral if high risk	doxycycline OR azithromycin <i>Pregnant or breastfeeding:</i> Azithromycin Or erythromycin Or amoxicillin Doxycycline Ofloxacin	100 mg BD 1g 1g (off-label use) 500 mg QDS or 500mg BD 500mg TDS 100mg BD 400mg BD	7 days Stat 1 hr before or 2 hrs after food stat 7 days 14 days 7 days 14 days 14 days
Trichomonas BASHH PHE Trichomoniasis - NICE CKS	Treat partners simultaneously and refer to GUM. In pregnancy or breastfeeding, avoid 2g single dose metronidazole. Topical clotrimazole gives symptomatic relief (but NOT cure).	metronidazole <i>pregnancy for symptoms:</i> clotrimazole	400 mg BD or 2 g 100 mg pessary	5-7 days single dose 6 nights
Pelvic Inflammatory Disease BASHH Pelvic inflammatory disease - NICE CKS	Refer woman and contacts to GUM service Always culture for gonorrhoea and chlamydia. If gonorrhoea likely (partner has it, severe symptoms, sex abroad) use ceftriaxone regimen as resistance to quinolones is high	metronidazole + ofloxacin <i>If high risk of gonorrhoea:</i> metronidazole + doxycycline + ceftriaxone	400 mg BD 400 mg BD 400mg BD 100mg BD 500mg IM	14 days 14 days 14 days 14 days stat
Gonorrhoea	Antibiotic resistance is now very high. Use IM ceftriaxone and oral azithromycin refer to GUM. Test of cure is essential.	Ceftriaxone PLUS Azithromycin	500mg im 1g	Stat Stat

<p>Genital Herpes BASHH</p>	<p>Advise: saline bathing, analgesia, or topical lidocaine for pain and discuss transmission. First episode: treat within five days if new lesions or systemic symptoms and refer to GUM. Recurrent: self-care if mild or immediate short course antiviral treatment or suppressive therapy if more than six episodes per year.</p>	<p>Oral acyclovir OR Valaciclovir OR famciclovir</p>	<p>400mg TDS 800mg TDS (if recurrent) 500mg BD 250mg TDS 1g BD (if recurrent)</p>	<p>5 days 2 days 5 days 5 days 1 day</p>
<p>Vaginal candida BASHH PHE Candida - female genital - NICE CKS</p>	<p>All topical and oral azoles give 75% cure <i>Candida albicans</i> is the usual cause of thrush. The second most common cause of thrush is <i>C. glabrata</i>, which occurs in about 5% of infections. <i>C. glabrata</i> tends to be more resistant to antifungal treatment than <i>C. albicans</i> and is harder to treat. May be normal flora so try to assess if causal. In pregnancy avoid oral azole and use intravaginal agents Recurrent (4 episodes/yr)</p>	<p>clotrimazole OR Miconazole OR fluconazole clotrimazole miconazole 2% cream <i>Recurrent:</i> Fluconazole</p>	<p>5g 10%vaginal cream or 500 mg pessary 100mg pessary 150 mg orally 100mg pessary 5g intravaginally BD 150mg every 72h THEN 150mg 1/week</p>	<p>14 nights stat stat stat 6 nights 7 days 3 doses 6 months</p>
<p>Bacterial vaginosis BASHH PHE Bacterial vaginosis - NICE CKS</p>	<p>Oral metronidazole is as effective as topical treatment but is cheaper Less relapse with 7 days of oral metronidazole than 2 g stat.^{A+} at 4 weeks. Avoid 2g stat dose in pregnancy/breastfeeding. Treating partners does not reduce relapse</p>	<p>metronidazole OR MTZ 0.75% vag gel OR clindamycin 2% cream</p>	<p>400 mg BD Or 2g 5 g applicator nocte 5 g applicator nocte</p>	<p>7 days stat 5 nights 7 nights</p>
<p>Epididymitis</p>	<p>Usually due to Gram-negative enteric bacteria in men over 35 years with low risk of STI. If under 35 years or STI risk, refer to GUM.</p>	<p>Doxycycline OR Ofloxacin OR Ciprofloxacin</p>	<p>100mg BD 200mg BD 500mg BD</p>	<p>10-14 days 14 days 10 days</p>

1.10. SKIN & SOFT TISSUE INFECTIONS				
PVL PHE	Panton-Valentine Leukocidin (PVL) is a toxin produced by 2% of <i>Staph aureus</i> . It can occur in both MRSA and MSSA and is associated with persistent recurrent pustules and carbuncles or cellulitis. PVL strains are rare in healthy people but can be severe. Risk factors for PVL: recurrent skin infections, invasive infections, MSM, more than one case in a home or close community (school, military personnel, nursing home, household contact)			
Eczema Eczema - CKS	Using antibiotics, or adding them to steroids, in eczema encourages resistance and does not improve healing unless there are visible signs of infection. In infected eczema, use treatment as in impetigo (see below).			
Impetigo Impetigo - NICE CKS	Localised lesions only: topical antibiotics to reduce risk of resistance. Only use mupirocin if caused by MRSA. Extensive, severe, or bullous: oral antibiotics.	Topical fusidic acid flucloxacillin or clarithromycin or erythromycin	Thinly TDS Oral 500 mg QDS Oral 500mg BD Oral 500 mg QDS	5 days 7 days 7 days 7 days
Cellulitis Cellulitis - acute - NICE CKS CREST BLS	Class I: patient afebrile and no comorbidity, flucloxacillin or doxycycline may be used as single drug treatment. If not responding to oral regime, consider out-patient iv therapy (OPAT) (e.g. via DAART or in Telford and Wrekin contact single point of referral (01952 607788) to arrange for home intravenous treatment) If river/sea water exposure, discuss with microbiologist Class II febrile and ill, refer for admission or use OPAT In facial cellulitis in children <6 years use co-amoxiclav	Flucloxacillin <i>If penicillin allergic:</i> doxycycline alone <i>Unresolving:</i> clindamycin co-amoxiclav	500 mg QDS 1g QDS if weighs >70Kg up to 2G QDS if > 100Kg 100mg BD 300mg QDS (See BNF for dosage)	7 – 14 days
Foot and Leg Ulcers CKS PHE	Bacteria will always be present. Antibiotics do not improve healing. Culture swabs and antibiotics are ONLY indicated if there is evidence of clinical infection i.e. cellulitis with >2cm surrounding erythema; increased pain; enlarging ulcer or pyrexia. Review after culture results. Anaerobes may be significant. Diabetics should be referred to diabetic clinics for specialist guidance. In these patients coliform /pseudomonas infections may be significant.	As for cellulitis above. Consider metronidazole if unresponsive to first line therapy in absence of resistance to flucloxacillin or doxycycline Non-healing: antimicrobial reactive gel may reduce bacterial load.		7 –14 days

<p>Animal Bite CKS</p>	<p>Surgical toilet important. Assess tetanus and rabies risk (NB bats in UK). Seek microbiology advice if not human, dog or cat bite. Antibiotic prophylaxis advised for puncture wound, bite involving hand, foot, face, joint, tendon, ligament; immunocompromised, diabetics, elderly, asplenic, cirrhotic.</p>	<p><i>Prophylaxis and treatment (animal or human)</i> co-amoxiclav^{B-} <i>If penicillin allergic:</i> metronidazole PLUS doxycycline or clarithromycin (human) and review at 24 & 48 hrs</p>	<p>375-625 mg TDS 400 mg TDS 100 mg BD 250-500 mg QDS</p>	<p>7 days</p>
<p>Human Bite</p>	<p>Also assess HIV, hepatitis B & C risk</p>			
<p>Acne Acne vulgaris - NICE CKS</p>	<p>Mild (open and closed comedones) or moderate (inflammatory lesions): First-line: self-care (wash with mild soap; do not scrub; avoid make-up). Second-line: topical retinoid or benzoyl peroxide. Third-line: add topical antibiotic, or consider addition of oral antibiotic. Severe (nodules and cysts): add oral antibiotic (for 3 months max) and refer</p>	<p><i>1st line:</i> self-care <i>2nd line;</i> Topical retinoid OR Benzoyl peroxide <i>3rd line:</i> Topical clindamycin <i>Treatment failure/severe:</i> Tetracycline OR doxycycline</p>	<p>Thinly OD 5% cream OD-BD 1% cream thinly BD 500mg BD 100mg OD</p>	<p>6-8 weeks 6-8 weeks 12 weeks 6-12 weeks 6-12 weeks</p>
<p>Mastitis Mastitis and breast abscess - NICE CKS</p>	<p><i>S. aureus</i> is the most common infecting pathogen. Suspect if woman has: a painful breast; fever and/or general malaise; a tender, red breast. Breastfeeding: oral antibiotics are appropriate, where indicated. Women should continue feeding including from the affected breast. Non-lactating patients >35y with no obvious cause should be investigated once infection resolved</p>	<p>Flucloxacillin <i>Penicillin allergy :</i> Erythromycin OR Clarithromycin</p>	<p>500 mg QDS 1g QDS if weighs >70Kg 500mg QDS 500mg BD</p>	<p>10-14 days</p>
<p>Scabies and Head Lice Scabies - NICE CKS</p>	<p>Treat whole body from ear/chin downwards and under nails. Under 2y/elderly: also treat face/scalp Home/sexual contacts: treat within 24h See local PHE guidelines (Specific need for discussion with CCG IPC team if scabies in nursing home resident).</p>	<p>Permethrin <i>If allergy</i> Malathion</p>	<p>5% cream 0.5% aqueous cream</p>	<p>2 applications 1 week apart</p>

<p>Dermatophyte infection of the fingernail or toenail For children seek advice</p> <p>CKS PHE</p>	<p>Take nail clippings: Start therapy only if infection is confirmed by laboratory. Liver reactions rare with oral antifungals (<1%). Terbinafine is more effective than the azoles. Itraconazole is active against yeasts, dermatophytes and some non-dermatophyte mould (excluding Scopulariopsis) . Topical nail lacquer is not as effective. To prevent recurrence: apply 1% topical antifungal cream to entire toe area weekly Specialist advice may be required in children</p>	<p>terbinafine</p> <p>itraconazole</p> <p>5% amorolfine nail lacquer^{B-} (for superficial)</p>	<p>250 mg OD fingers toes</p> <p>200 mg BD fingers toes</p> <p>1-2x/week fingers toes</p>	<p>6 weeks 12 weeks</p> <p>7 days monthly 2 courses 3 courses</p> <p>6 months 12 months</p> <p>Stop treatment when continual, new, healthy, proximal nail growth</p>
<p>Dermatophyte infection of the skin</p> <p>CKS - body and groin CKS - foot CKS - scalp</p>	<p>Terbinafine is fungicidal so treatment time is shorter than with fungistatic azoles. Use azoles for candida. Take skin scrapings for culture. If intractable consider oral itraconazole. Discuss scalp infections with dermatologist.</p>	<p>Topical 1% terbinafine⁺ Topical imidazole 1% <i>For athletes foot only</i> Topical undecenoic acid (Mycota®)</p>	<p>OD-BD OD-BD</p> <p>OD-BD</p>	<p>1-4 weeks</p> <p>4 - 6 weeks (i.e. 1-2 weeks after healing)</p>
<p>Varicella zoster/ Chicken pox Chickenpox - NICE CKS</p> <p>Herpes zoster/ shingles Shingles - NICE CKS</p> <p>Pregnancy RCOG</p>	<p>Chicken pox: Consider aciclovir if onset of rash <24h and >14y or severe pain or dense/oral rash or 2°household case or steroids or smoke. Shingles: Treat if >50y (PHN rare in <50y) and within 72h of rash or if one of: active ophthalmic, Ramsey Hunt, eczema, non-truncal involvement, moderate/severe pain, moderate/severe rash. If >72h: consider antiviral up to 7 days after onset of rash if high risk of severe shingles or complications (continued vesicle formation, older age, immunocompromised, severe pain) Contact in pregnant or immunocompromised send samples for immunity testing stating date and time of contact. Consult virologist/microbiologist urgently</p>	<p>Aciclovir</p> <p><i>2nd line for shingles if compliance a problem</i> valaciclovir or famciclovir (Latter two products are better absorbed but cost >10x as much)</p>	<p>800 mg 5x/day Child doses – see BNF</p> <p>1 g TDS</p> <p>500mg TDS or 750mg BD</p>	<p>7 days</p> <p>7 days</p> <p>7 days</p>
<p>Cold sores Herpes simplex - oral - NICE CKS</p>	<p>Cold sores resolve after 5-10d without treatment. Topical antivirals applied prodromally reduce duration by 12-24h If frequent, severe, and predictable triggers: consider oral prophylaxis:4D,5A+ aciclovir 400mg, twice daily, for 5-7 days</p>			

1.11 EYE INFECTIONS				
<p>Conjunctivitis CKS AAO</p>	<p>Most are viral or are self-limiting. First line: bath/clean eyelids with cotton wool dipped in sterile saline or boiled cooled water to remove crusting. Treat only if severe. Bacterial are usually unilateral and also self-limiting. Characterised by red eye with mucopurulent discharge. 65% and 74% resolve on placebo by days 5 and 7.</p> <p>Differential diagnosis of red eyes, viral infection and infections associated with contact lenses is not included in these guidelines. Fusidic acid has less Gram-negative activity.</p>	<p><i>1st line:</i> self-care</p> <p><i>2nd line:</i> Chloramphenicol 0.5% drops OR 1% ointment</p> <p><i>3rd line</i> fusidic acid</p>	<p>2 hrly for 2 days then 4 hrly whilst awake</p> <p>at night</p> <p>1% gel BD</p>	<p>All for 48 hours after resolution</p>
<p>Blepharitis Blepharitis - NICE CKS</p>	<p>First line: lid hygiene for symptom control including: warm compresses; lid massage and scrubs; gentle washing; avoiding cosmetics. Second line: topical antibiotics if hygiene measures are ineffective after 2 weeks. Signs of Meibomian gland dysfunction or acne rosacea: consider oral antibiotics.</p>	<p><i>1st line:</i> self-care</p> <p><i>2nd line:</i> Chloramphenicol</p> <p><i>3rd line:</i> Oral oxytetracycline or Oral doxycycline</p>	<p>1% ointment BD</p> <p>500mg BD 250mg BD 100mg OD 50mg OD</p>	<p>6 week trial</p> <p>4 wks (initial) 8 wks (maint) 4 wks (initial) 8 wks (maint)</p>

1.12 MRSA INFECTIONS AND COLONISATION				
<p>Failing to clear any nasal MRSA colonisation is much more likely if there is a skin break also growing the MRSA and in such cases both an oral antibiotic AND topical nasal decolonisation are essential. All MRSA are resistant to flucloxacillin, cephalosporins & coamoxiclav. 70% are resistant to erythromycin/clarithromycin and 98% to ciprofloxacin. Tetracycline resistance is less frequent (c 15%) but becoming commoner. See also section 3.2</p>				
<p>MRSA PHE</p>	<p>Nasal carriage alone with mupirocin-susceptible MRSA</p>	<p>Apply mupirocin with a dry swab to both sides of nasal septum. Rub from outside of nose until tasted at back of throat.^A</p>	<p>intranasally 2-3x/day</p>	<p>5 days</p>
	<p>Mupirocin & tetracycline sensitive MRSA in nose and soft tissue.</p>	<p>As above plus doxycycline</p>	<p>100mg bd po</p>	<p>Both for 10 days</p>
	<p>Mupirocin resistant MRSA carriage (nose +/- soft tissue)</p>	<p>Neomycin-chlorhexidine nasal ointment (Naseptin) AND doxycycline</p>	<p>intranasally qds 100mg bd</p>	<p>Both for 10 days</p>
	<p>Tetracycline and erythromycin resistant MRSA in infected soft tissue lesion & Tetracycline treatment failures of mupirocin-resistant MRSA</p>	<p>Discuss with microbiologist</p>	<p>Outpatient teicoplanin therapy may be required in some cases</p>	

ILLNESS	COMMENTS	TREATMENT	ADULT DOSE (unless stated)	DURATION
1.13 DENTAL INFECTIONS				
This guidance is not designed to be a definitive guide to oral conditions. It is for GPs for the management of acute oral conditions pending being seen by a dentist or dental specialist. GPs should not routinely be involved in dental treatment and, if possible, advice should be sought from the patient's dentist, who should have an answer-phone message with details of how to access treatment out-of-hours, or NHS 111 on 111				
Toothache	Antibiotics do not cure toothache. First line treatment is with paracetamol and/or ibuprofen. Codeine is not effective for toothache.			
Mucosal ulceration and inflammation (simple gingivitis) SDCEP	Temporary pain and swelling relief can be attained with saline mouthwash Use antiseptic mouthwash: If more severe & pain limits oral hygiene to treat or prevent secondary infection. The primary cause for mucosal ulceration or inflammation (aphthous ulcers, oral lichen planus, herpes simplex infection, oral cancer) needs to be evaluated and treated.	Simple saline mouthwash Chlorhexidine 0.12-0.2% <i>(Do not use within 30 mins of toothpaste)</i> Hydrogen peroxide 6% <i>(spit out after use)</i>	½ tsp salt dissolved in glass warm water Rinse mouth for 1 minute BD with 5 ml diluted with 5-10 ml water. Rinse mouth for 2 mins TDS with 15ml diluted in ½ glass warm water	Always spit out after use. Use until lesions resolve or less pain allows oral hygiene
Acute necrotising ulcerative gingivitis	Refer to dentist for scaling and oral hygiene advice Antiseptic mouthwash if pain limits oral hygiene Commence metronidazole in the presence of systemic symptoms	Metronidazole Chlorhexidine or hydrogen peroxide	400 mg TDS see above dosing in mucosal ulceration	3 days Until oral hygiene possible
Pericoronitis SDCEP	Refer to dentist for irrigation & debridement. If persistent swelling or systemic symptoms use metronidazole or amoxicillin. Use antiseptic mouthwash if pain and trismus limit oral hygiene	Amoxicillin Metronidazole Chlorhexidine or hydrogen peroxide	500 mg TDS 400 mg TDS see above dosing in mucosal ulceration	3 days 3 days Until oral hygiene possible

<p>Dental abscess SDCEP</p>	<p>Regular analgesia should be first option until a dentist can be seen for urgent drainage, as repeated courses of antibiotics for abscess are not appropriate. Repeated antibiotics alone, without drainage are ineffective in preventing spread of infection. Antibiotics are only recommended if there are signs of severe infection, systemic symptoms or high risk of complications. Severe odontogenic infections; defined as cellulitis plus signs of sepsis, difficulty in swallowing, impending airway obstruction, Ludwigs angina. Refer urgently for admission to protect airway, achieve surgical drainage and IV antibiotics The empirical use of cephalosporins, co-amoxiclav, clarithromycin, and clindamycin do not offer any advantage for most dental patients and should only be used if no response to first line drugs when referral is the preferred option.</p>			
	<p><i>If pus</i> refer for drainage, tooth extraction or root canal. Send pus for microbiology. <i>True penicillin allergy:</i> use clarithromycin or clindamycin if severe and consider referral. <i>If spreading infection</i> (lymph node involvement, or systemic signs ie fever or malaise) ADD metronidazole</p>	<p>Amoxicillin or Phenoxymethylpenicillin <i>True penicillin allergy:</i> Clarithromycin <i>Severe infection add</i> Metronidazole <i>or if allergy</i> Clindamycin alone</p>	<p>500 mg TDS 500 mg – 1g QDS 500 mg BD 400 mg TDS 300mg QDS</p>	<p>Up to 5 days review at 3d 5 days 5 days</p>

2. SPECIFIC ANTIMICROBIAL AGENTS

- **Oral cephalosporins** should be AVOIDED in respiratory tract infections. Oral cefuroxime axetil produces a higher incidence of C.difficile diarrhoea. Cephalexin has a narrower spectrum than cefuroxime and does not have activity against Haemophilus in COPD. Amoxicillin or doxycycline are the recommended agents in RTIs that need antibiotics. For suspected Mycoplasma infection use doxycycline. Cephalexin has a place in UTI.
- **Doxycycline** is appropriate therapy for wound infections/cellulitis in patients allergic to penicillins but it is not recommended alone for infections in bone. Avoid tetracyclines (including doxycycline) during breast-feeding, or under the age of 12 years. Remember to avoid giving milk, calcium or magnesium antacids, or iron. Doxycycline is deliberately advised at 100mg bd dose in wound infection because this regimen has proved effective in MRSA clearance and treatment, loading doses are often accidentally omitted and because it is a non-toxic dose in chlamydia infection and patients without established renal impairment.
- Oral **co-amoxiclav** has a similar spectrum to i.v. cefuroxime and metronidazole used after abdominal surgery or in soft tissue infection but should not be used indiscriminately – outbreaks of C difficile associated with over-use are recorded. Metronidazole is not required if this agent is being used. It occasionally is useful as a single antibiotic where mixed faecal flora or mixtures of Staph. aureus (not MRSA) or streptococci, and anaerobes are causing infection. It also may be useful as an alternative to doxycycline in respiratory Haemophilus infections confirmed as resistant to amoxicillin.
- **Flucloxacillin** is useful for wound infections/cellulitis infections. It is not necessary to give penicillin with flucloxacillin, as flucloxacillin will cover streptococci.
- **Macrolide** (erythromycin / clarithromycin / azithromycin) resistance is now commoner than tetracycline resistance in S aureus. Clarithromycin 500mg bd can be used instead of Erythromycin to reduce nausea, which causes discontinuation of therapy in 20% of erythromycin patients, but clarithromycin is modestly more expensive in primary care.
- **Ciprofloxacin**: Remember to avoid giving milk/ calcium or magnesium antacids/iron. Moxifloxacin, and levofloxacin have been implicated in C difficile ribotype O27 infections and are not needed for all but exceptional respiratory tract infections. Ofloxacin has inferior activity against Pseudomonas and offers no compensatory advantage. Nalidixic acid has an inferior spectrum and systemic activity to ciprofloxacin.
- Due to increasing levels of resistance, coliforms are now being tested against **Pivmecillinam**. Pivmecillinam is a pro-drug that is metabolised to the active form mecillinam. It is active against many gram-negative bacteria, such as E.coli, Klebsiella and Enterobacter, but it is not active against Pseudomonas or Proteus. It is a penicillin so should be avoided in patients with penicillin allergy and it is also contra-indicated in

patients with oesophageal stricture, gastro-intestinal obstruction and carnitine deficiency. Patients should be informed that tablets should be swallowed whole with plenty of fluid during meals while sitting or standing.

- **Cotrimoxazole's** use is restricted in primary care to prophylaxis against Pneumocystis.

3. SPECIFIC ORGANISMS

3.1 Clostridium difficile

A significant proportion of cases of Clostridium difficile Infection (CDI) are diagnosed in the community. Many patients have a history of recent hospital admission but some do not. Any antibiotic can be associated with CDI but it is most often associated with carbapenem, cephalosporin and quinolone use. CDI has a wide spectrum of manifestation from mild diarrhoea to severe, potentially fatal colitis. Patients should be reviewed regularly and admission arranged if there are signs of severe disease (>5 type 5-7 stools/day, temperature >38.5°C, hypotension, tachycardia, ileus, abdominal tenderness)

In mild cases, simply stopping aggravating antibiotics is all that is required and if symptoms have settled by the time the result is known then treatment is not required.

- First line treatment is oral metronidazole 400mg tds for 10-14 days
- C. difficile can be detectable in faeces for several weeks and repeat samples are unnecessary. Treat according to symptoms.
- Antibiotic use should be avoided for a minimum of 6 weeks after an episode of CDI or in C.difficile carriers. If there is evidence of another infection that requires treatment during this period then microbiological advice should be sought.
- Up to 20% of cases relapse after resolution of symptoms. Recurrences should be treated promptly with metronidazole or, if the initial illness was severe, oral vancomycin. After a first relapse, the risk of another is increased. Second and subsequent relapses should be treated with vancomycin. Difficult cases should be referred to gastroenterology.

3.2 MRSA

MRSA is increasingly being treated in the community, particularly as it now a requirement that all elective surgical admissions should have an MRSA screen. Clearance should also be considered if MRSA is detected in the community and the patient is not due for admission. All MRSA are resistant to flucloxacillin, co-amoxiclav and cephalosporins. There are also high rates of resistance to erythromycin/clarithromycin and ciprofloxacin. If a patient has been started on a decolonisation regime in hospital, it should be completed after discharge.

- Mupirocin sensitive MRSA decolonisation

Nose only positive and no lesions: mupirocin 2% nasal ointment (bactroban nasal) 2-3x/day for 5 days

Lesion positive +/- nose positive: doxycycline 100mg bd AND nasal mupirocin 2-3x/day for 10 days.

If the strain is resistant to doxycycline or it is contraindicated, seek advice.

- Mupirocin resistant MRSA decolonisation

The alternatives to mupirocin are less effective and consequently, mupirocin resistant strains are more difficult to clear. A systemic agent is required as nasal agents alone are seldom successful.

Neomycin-chlorhexidine nasal ointment (Naseptin) qds AND doxycycline 100mg bd for 10 days

If resistant to one or both agents seek advice about alternatives.

If 2 attempts have been made to clear the patient then further attempts are unlikely to be successful and may lead to the development of more resistant strains. However it might be worth a further attempt if, for example, a wound or pressure sore has healed or skin conditions such as psoriasis are much improved.

For details on management of patients with urinary catheters please see the CCG urinary catheter policy

3.3 ESBL (Extended Spectrum B lactamase) producing coliforms

These Gram-negative organisms are resistant to all cephalosporins and penicillins and usually also to ciprofloxacin, trimethoprim and sometimes gentamicin. We have extensive local experience in treatment. Recurrent infection is frequent and often involves the upper urinary tract. Faecal carriage is prolonged for a number of years as the source of these recurrences and cannot be cleared. Severe infection or if no oral regime available requires treatment with ertapenem 1g od iv which can be given as an outpatient e.g. via DAART.

Oral regimes available if strain resistant to trimethoprim and ciprofloxacin:

- Nitrofurantoin 50mg qds for 10 days (only suitable for lower UTIs)
- 400mg tds pivmecillinam **plus** 375mg tds co-amoxiclav for 5-7 days
- Fosfomycin 3g stat dose in women, in men 2nd 3g dose 3 days later
- Fosfomycin is an orally active, bactericidal antibiotic that inhibits bacterial cell wall production. It is well absorbed after oral administration (but absorption can be reduced if taken with food) and excreted unchanged in the urine. After a 3g dose, very high urine levels are achieved. A licensed oral preparation is available (Monuril[®]) as granules for oral solution (as per BNF) though may not be routinely stocked by community pharmacies.

4. ANTIBIOTIC ASSAYS FOR PRIMARY CARE

4.1 Teicoplanin assays

The pharmacokinetics of teicoplanin is less predictable than vancomycin.

Contrary to the manufacturers view professional microbiology guidelines in the UK recommend that antibiotic assays for treatment of severe infection should always be performed.

A loading period is essential in the first 24 hours of therapy to ensure adequate levels. The manufacturers recommend that three doses of 400mg are given 12 hours apart and thereafter 400mg is given every 24hrs. An alternative is to give an initial dose of 800mg followed by 400mg every 24 hours.

No local assay service is available and samples are sent away which normally implies a 48 –72 hour turnaround. Assays on Friday and Saturday should be avoided.

Trough levels of teicoplanin should be measured once the patient has had at least 2 teicoplanin doses 24 hours apart. Use a plain red-topped tube.

Levels are not always required with short courses in patients with normal renal function. However they are advised in renal impairment, obesity and those not responding to treatment to ensure appropriate levels. Use in severe renal failure is not recommended as no local assay service is available and the delay in sending samples away compromises correct dosing.

Pre-dose blood levels should be >15mg/l (>20mg/l in endocarditis and bone and joint infection) and <60mg/l.

4.2 Tobramycin levels

Tobramycin is twice as active as Gentamicin against *Pseudomonas aeruginosa* but in general half as active against other organisms.

Specific susceptibility tests are necessary because antibiotic resistance mechanisms affect both drugs in different and unpredictable ways.

Usually we only recommend tobramycin use in treatment of *pseudomonas* in bronchiectasis and cystic fibrosis. In general tobramycin is less nephrotoxic than gentamicin but comparable information for ototoxicity is poorly reported.

By analogy with gentamicin, it is likely that high once daily doses are more effective and less toxic than multiple smaller daily doses. The Hartford nomogram based on samples taken 6-14 hours post dosage could be used to ensure dosage is not excessive.

Trough levels are used in paediatrics in cystic fibrosis on once daily dosing, usually for maintenance. These results cannot be relied on to guide therapy in other situations as trough levels are outside the linear part of the calibrated assay and may not reliably detect slight drug accumulation. Levels >1mg/l certainly indicate accumulation although with the reduced toxicity of the parent compound this only certainly indicates some impaired renal clearance.

4.3 Itraconazole and voriconazole levels

When these drugs are used orally for prophylaxis or treatment of life threatening invasive mycoses, particularly aspergillosis, antibiotic levels should be routinely monitored to ensure absorption is adequate. No local service is available and these assays are sent away and batched so a 48-hour to 7-day delay in reporting assays is usual.

Itraconazole

- Should not be given with cyclophosphamide regimens as the drug induces production of toxic cyclophosphamide metabolites. Discuss alternatives with microbiology.
- Grapefruit juice may increase serum levels of Itraconazole in some species but this is not clearly known in man.
- Itraconazole has potent effects on P450 cytochrome enzymes and levels are affected by other p450 cytochrome enzyme inducers. Take care re drug interactions.
- Trough therapeutic levels of Itraconazole should be maintained above 0.5mg/l.

Voriconazole

- Induces falls in cyclosporin A levels and other interactions associated with drug metabolising enzymes are to be expected.
- Voriconazole levels are affected by genetic heterogeneity in drug metabolising enzymes leading to high degree of interpatient variability
- Voriconazole levels should be drawn 12 hours after the last dose after the patient has received at least 5-7 days of consistent therapy.
- Recommended trough level for both efficacy and safety is between 2 and 6 mg/L.

5. PROPHYLAXIS

5.1 Bacterial endocarditis

Preventive dentistry to treat existing dental sepsis should always be undertaken when a new diagnosis of cardiac congenital or valvular disease is made and before insertion of orthopaedic or other prostheses and is the single most important action in prevention of endocarditis. Indeed, **the importance of maintaining good oral health** should be emphasised for all patients.

Current NICE guidelines ([NICE 2015 update](#)) state that antibiotic prophylaxis against infective endocarditis is **not routinely** recommended:

- for people undergoing dental procedures
- for people undergoing non-dental procedures at the following sites:
 - upper and lower gastrointestinal tract
 - genitourinary tract; this includes urological, gynaecological and obstetric procedures, and childbirth
 - upper and lower respiratory tract; this includes ear, nose and throat procedures and bronchoscopy.

The evidence is poor for prophylaxis in many conditions where prophylaxis has been the standard of care for 50 years and if the incidence of bacteraemia is low, the risks of prophylaxis in superinfection and allergy may outweigh theoretical and observed risks of endocarditis. However, the risk of endocarditis is increased if there is suspected infection at the site of the procedure at the time of operation. If elective urological procedures are to be undertaken, a urine culture should be sent preoperatively. If any culture is positive, seek microbiologist advice on treatment and operative prophylaxis as cephalosporins, quinolones, trimethoprim and nitrofurantoin are unreliable in prophylaxis against enterococci.

The following are regarded as being at risk of infective endocarditis (NICE 2008)

- acquired valvular heart disease with stenosis or regurgitation
- valve replacement
- structural congenital heart disease, including surgically corrected or palliated structural conditions, but excluding isolated atrial septal defect, fully repaired ventricular septal defect or fully repaired patent ductus arteriosus, and closure devices that are judged to be endothelialised
- previous infective endocarditis
- hypertrophic cardiomyopathy.

Any episodes of infection in people at risk of infective endocarditis should be investigated and treated promptly to reduce the risk of endocarditis developing.

Patients should be made aware of the symptoms that may indicate infective endocarditis and when to seek expert advice as well as the risks of undergoing invasive procedures, including non-medical procedures such as body piercing or tattooing.

5.2 Prosthetic Joints

Comparable to the changes in guidance concerning dental procedures and risk of infective endocarditis, there is no evidence of benefit and antibiotic prophylaxis is not routinely recommended for patients with joint prostheses. However, it is important to maintain good oral hygiene and to avoid dental sepsis.

5.3 Prophylaxis post-splenectomy

Antibiotic prophylaxis

- Not penicillin allergic – advise penicillin V continuously from hospital discharge until at least 16 years old or at least 2 years post splenectomy for patients >16y. Adult dose is 500mg bd. If unwell change to amoxicillin full dose and seek medical advice.
- Penicillin allergic – the evidence of benefit is less good. Adults – advise no prophylaxis; children – consider erythromycin. If unwell seek immediate medical advice.

Life long prophylactic antibiotics should be offered to patients considered at continued high risk of pneumococcal infection
aged <16 years or > 50 years,
inadequate serological response to pneumococcal vaccination,
a history of previous invasive pneumococcal disease,
splenectomy for underlying haematological malignancy particularly in the context of on-going immunosuppression)

Patients not at high risk should be counselled regarding the risks and benefits of lifelong antibiotics and may choose to continue or discontinue prophylaxis.

All patients should carry a supply of appropriate antibiotics for emergency use and advised to seek urgent medical advice if develop symptoms and/or signs of infection

Immunisation

Ideally patients should be vaccinated four to six weeks before elective splenectomy. Where this is not possible, they can be given up to two weeks before surgery. If it is not possible to vaccinate at least two weeks before surgery, or a patient has an emergency splenectomy, vaccination should be delayed until at least two weeks after the operation to obtain a better response.

The immunisations required are listed below. See [Immunisation against infectious disease - GOV.UK \(green Book\)](#) for details on timings and preparations.

Pneumococcal Vaccine

Influenza

Hib/MenC

Quadrivalent Meningococcal (ACWY) polysaccharide vaccine - If hyposplenic or asplenic individuals are travelling to countries with an increased risk of ACW or Y strains of meningococcus eg the Haj, they should receive the ACWY vaccine **in addition** to the MenC vaccine

Other advice

- Avoid malaria
- Note risk of multiresistant pneumococci abroad eg Spain
- Advise antibiotic prophylaxis for animal bites
- Avoid tick bites - in areas where babesiosis endemic e.g. North America
- Carry a medic-alert disc

6. ANTIBIOTIC RESISTANCE RATES

Antibiotic resistance rates for common organisms in Shropshire 2016/17

	Pneumococcus	Haemophilus influenzae	Group A Streptococcus	S.aureus (exclude screens)
Amoxicillin	-	28.2	-	-
Co-amoxiclav	-	7.9	-	-
Penicillin	1.8	-	0.0	-
Doxycycline	15.3	1.2	7.6	6.8
Erythromycin	11.9	-	3.8	13.3
Flucloxacillin	-	-	0.0	5.1

7. REFERENCES

References and grading of guidance recommendations are available on the [PHE website](#)