

Management of Common Infections in General Practice

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Contents

1. Upper Respiratory tract infections

- Acute bronchitis.....1
- Acute sinusitis1
- Acute purulent rhinitis1
- Common cold 1
- Laryngitis and Croup.....2
- Otitis media 2
- Pharyngitis3
- Pus coming from ear canal 3
- Whooping cough 4

2. Lower respiratory tract infections

- Acute exacerbations of chronic bronchitis (COPD)4
- Community acquired pneumonia5

3. Skin infections

- Boils (furunculosis)5
- Cellulitis 5
- Impetigo6

4. Eye infections

- Blepharitis (inflamed purulent eyelids)6
- Conjunctivitis6
- Herpes keratitis7

5. Dental and gingival infections.....7

6. Gastrointestinal infections

- Cholecystitis7
- Diarrhoea8
- Gastritis and peptic ulceration8

7. Urological infections

- Urinary tract infections9
- Pyelonephritis9

8. Genital infections

- Cervix/vaginal infections10
- Epididymitis11
- Pelvic inflammatory disease11
- Urethritis12

9. Bacterial Meningitis12

10. Antibiotic dosages.....13

Disease: What does it look like?	Patient	Organisms	Antibiotics: In order of preference	Comment
Acute bronchitis Typically cough, sputum and lower respiratory signs, but in practice often just cough and sputum	Any age, if < 1 year, consider bronchiolitis	Usually viral. If >55 yrs or very unwell, think of pneumonia. Sputum cultures usually not needed.	If obvious bronchospasm treat as that. If concerned about pneumonia confirm by CXR.	CXR in older patients (>55 yrs) or very unwell. If cough longer than 3-4 weeks consider pertussis.
Acute sinusitis Facial pain +/- nasal discharge	Any age	Viruses <i>S. pneumoniae</i> <i>H. influenzae</i> <i>M. catarrhalis</i> Nasal cultures not usually helpful.	No antibiotics unless severe. Try decongestants first, if not successful then amoxicillin, cotrimoxazole, doxycycline or amoxicillin/clavulanate. Duration of antibiotics if given: 7 to 14 days.	It is reasonable to try a decongestant in first instance unless the patient is very unwell. An antibiotic is usually indicated if symptoms persist longer than 7 days. Doxycycline must be taken with food as it is irritating to the GI system.
Acute purulent rhinitis See BMJ 2002;325:1311-2 on antibiotics for acute purulent rhinitis	Usually children	Unknown Nasal cultures not recommended	1st Amoxicillin or 2nd Cotrimoxazole One week probably sufficient	Although effective, don't use antibiotics initially. Use a decongestant first.
Common cold Rhinitis, +/-sore throat +/- fever +/- cough +/-sputum	Any age	Viral especially Rhinoviruses and Coronaviruses – some 200 in all. Secondary bacterial infection is not reduced by antibiotics.	Consider over the counter medication such as decongestants and paracetamol.	Antibiotics are contraindicated.

Disease: What does it look like?	Patient	Organisms	Antibiotics: In order of preference	Comment
Laryngitis and Croup		Laryngitis is primarily viral, occasionally <i>S. pyogenes</i> , <i>Mycoplasma</i> or <i>Chlamydophila</i> may be contributory, but the role of antibacterial treatment is uncertain. Croup is viral and there is no place for antibiotics		
Otitis media Bulging red drum with fluid in the middle ear together with acute symptoms of pain and fever	Children; uncommon in adults	<i>S. pneumoniae</i> <i>H. influenzae</i> <i>M. catarrhalis</i> (less common)	Delayed prescription if temp < 37.5, not vomiting and not seriously ill 1st Amoxicillin 80-90mg/kg/day (need high dose for penicillin "resistant" pneumococcus) 2nd Cotrimoxazole 5 days usually ok. If Rx fails, give amox/clav + amoxicillin 1:4 to achieve adequate amoxicillin without excessive clavulanate	Monitor for hearing loss especially if bilateral. Cefaclor does not get high levels in middle ear. Amox/clav has an advantage over amoxicillin for beta-lactamase producers, i.e. <i>H. influenzae</i> and <i>M. catarrhalis</i> . Duration of treatment is controversial; about 5 to 10 days.

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<p>Pharyngitis From vague redness to large, pus-containing tonsils. Pus on tonsils + fever + tender anterior cervical neck glands + absence of cough + age <15 yrs favours <i>S. pyogenes</i>. Associated laryngitis suggests viral etiology. Look for signs of infectious mononucleosis (generalized lymphadenopathy, splenomegaly)</p>	<p>All ages <i>S. pyogenes</i> relatively common in those age 2-25 years</p>	<p>10% of cases <i>S. pyogenes</i> (Lancefield group A), 90% viral in adults, 50% in children. Rarely <i>Mycoplasma</i> or <i>C. diphtheriae</i> or <i>Arcanobacterium haemolyticum</i></p>	<p>1st Penicillin VK orally for 10 days or stat IM benzathine 0.6 mu <27kg and 1.2 MU if > 27 kg</p> <p>2nd Erythromycin 10 days or Cephalosporin 10 days.</p> <p>Cephalosporins have higher bacteriological and clinical cure rates but are more expensive and have more adverse effects. Pediatrics 2004;113:866-82</p>	<p>Amoxicillin (can be taken with food) but has more frequent side-effects than penicillin. High index of suspicion of <i>S. pyogenes</i> in high risk populations - Maori, Pacific and children.</p> <p>No need to culture for <i>S. pyogenes</i> after treatment as a +ve result likely to represent prior carriage which is not harmful and not eradicated by penicillin.</p>
<p>Pus coming from ear canal It is not always possible to see the drum. Otitis externa (drum intact) or chronic suppurative otitis media (drum perforated)</p>	<p>CSOM is almost always seen in children. There has been acute otitis media in the past, but superinfection may have occurred. OE can occur at any age, commonly called "swimmer's ear"</p>	<p>Swabs are rarely helpful. <i>P. aeruginosa</i> is the most common cause of otitis externa and a common super-infecting organism in CSOM</p>	<p>Topical antiseptic (Vosol) or antibiotic, ideally Ciprofloxacin HC (not funded) Framycetin/gramicidin +/- dexamethasone, or maxitrol eye drops (specialist recommendation for funding) can all be used for otitis externa but may be harmful when the drum is perforated. Steroid reduces inflammation particularly if there is an eczematous component.</p>	<p>Oral antibiotics rarely indicated. Watch for rare complications of CSOM: mastoiditis and cholesteatoma</p>

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Whooping cough (Pertussis)	Young children at risk of complications; infection may occur at any age	<i>B. pertussis</i> . May be detected by culture if collect nasopharyngeal swab with charcoal transport medium. If patient has had cough longer than 3 weeks or already received an antibiotic request Bordetella PCR on a nasopharyngeal swab (don't use charcoal transport medium).	Erythromycin 50 mg/kg/day given qid, maximum 2 G, for 14 days may shorten duration of symptoms and prevents transmission to contacts.	Prophylactic erythromycin, as for treatment, is given to all household contacts. This is especially important if there is an infant in the household who is not the index case, since the infant is at greatest risk. A notifiable illness.
Acute exacerbations of chronic bronchitis (COPD) 2 symptoms out of 3: - increasing dyspnoea - increase in sputum volume - decrease in lung function	Usually older (>50 yrs) and smoker or ex-smoker	<i>S. pneumoniae</i> <i>H. influenzae</i> <i>M. catarrhalis</i> less often: <i>K. pneumoniae</i> or <i>P. aeruginosa</i> <i>Pseudomonas</i> important in bronchiectasis and cystic fibrosis	1st Amoxicillin +/- clavulanic acid 500 tds 2nd Cefaclor 500 mg tds or cotrimoxazole 2 bd or doxycycline 200 mg stat then 100 bd for 10 days or erythromycin 500 mg qid or roxithromycin 300 mg daily for 10 days	Most exacerbations are probably viral and antibiotics are of very limited benefit. Antibiotics are of no benefit in acute tracheobronchitis in those without underlying lung disease.

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Community acquired pneumonia Febrile/afebrile, vague to specific chest pain +/- sputum, tachypnoeic, can be mildly ill to very sick. Need clinical or radiological confirmation of pulmonary consolidation	Any age	<i>S. pneumoniae</i> + others incl. <i>M. pneumoniae</i> and <i>C. pneumoniae</i> Consider sputum and blood cultures	1st Amoxycillin or amox/clav: 500 tds 2nd Cefaclor 500 mg tds or cotrimoxazole 2 bd or doxycycline 200 mg stat then 100 bd for 10 days or erythromycin 500 mg qid or roxithromycin 300 mg daily for 10 days	Doxycycline, erythromycin, and roxithromycin have useful activity against <i>L. pneumophila</i> and atypical pathogens. The need for a combination of beta-lactam and macrolide routinely is debateable. The macrolide is indicated if <i>L. pneumophila</i> is a strong possibility. BMJ 2005;330:456. In this case request <i>Legionella</i> urinary antigen.
Boils (furunculosis)	Any age, especially teenagers	<i>S. aureus</i>	Consider drainage alone unless on face (risk of intracranial spread) 1st Flucloxacillin for one week 2nd Erythromycin or cefaclor May need cotrimoxazole, erythromycin or doxycycline if methicillin resistant <i>S. aureus</i> .	If recurrent, attempt eradication of nasal carriage with a topical regimen e.g. mupirocin or fusidic acid or povidone iodine in anterior nares for 5 days plus antiseptic bodywash for same 5 days. Approximately 20% of <i>S. aureus</i> resistant to mupirocin or fusidic acid. Last resort: rifampicin 300mg orally 12 hrly always together with another effective antibiotic, both for 5 days.
Cellulitis Redness +/- streaking +/- pain +/- regional lymphadenopathy	Any age. Get advice if on diabetic foot	<i>S. pyogenes</i> usually, but sometimes <i>S. aureus</i>	1st Penicillin if sure it is strep, otherwise flucloxacillin for 10 days. Both on an empty stomach 1hr ac 2hrs pc 2nd Erythromycin or cefaclor	May need hospitalisation or IV drugs. In GP, consider cephazolin 2 g once daily IV plus 500 mg of probenecid po bd. If cellulitis is associated with diabetic foot ulcer get advice and/or use amox/clav

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Impetigo	Usually children	<i>S. pyogenes</i> alone 66% of cases and rest mixed with <i>S. aureus</i> or <i>S. aureus</i> alone	1st Flucloxacillin for one week 2nd Erythromycin or topical mupirocin if minor or unable to take oral medication as for cellulitis	Approximately 20% of <i>S. aureus</i> resistant to mupirocin or fusidic acid.
Blepharitis (inflamed purulent eyelids)	Older patients, often secondary to seborrhoeic dermatitis	<i>S. aureus</i> acutely. Sometimes <i>S. pyogenes</i> or <i>M. catarrhalis</i>	1st Topical chloramphenicol +/- oral doxycycline or erythromycin 2nd Topical fusidic acid +/- oral doxycycline or erythromycin	Can be difficult to treat.
Conjunctivitis	Any age, if newborn give special consideration	Viral or allergic especially if starts bilaterally. Bacterial if eyelids very sticky or unilateral to start with. In newborn think of <i>C. trachomatis</i> (specific swab needed) or <i>N. gonorrhoeae</i>	Consider chloramphenicol, or fusidic acid Outbreaks of viral conjunctivitis can occur → collect green viral swab for viral culture. If <i>Chlamydia</i> or <i>N. gonorrhoeae</i> : get advice on treatment. Need systemic treatment. Mother and partner(s) also need treating. <i>N. meningitidis</i> : see comment	Benefit by treating conjunctivitis due to bacteria other than <i>Chlamydia</i> and <i>N. gonorrhoeae</i> and <i>N. meningitidis</i> is uncertain – most resolve spontaneously. Meningococcal conjunctivitis may progress to invasive disease and should be treated with systemic amoxicillin. Notify as meningococcal disease - MOH should consider prophylactic rifampicin for both the patient and for household contacts.

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Herpes keratitis Presents as a dendritic ulcer seen with fluorescein staining	Any age	<i>Herpes simplex</i>	Ophthalmological referral	Rare, but must always be considered in patients with red eyes
Dental and gingival infections	Any age, usually poor dental hygiene	Mixed aerobic and anaerobic	1 st Metronidazole 400 mg bd with food + penicillin VK 500 mg qid for 3-7 days 2 nd Amox/clav 500mg tds	Metronidazole must be taken with food as very irritating to GI tract. Avoid alcohol while on metronidazole. Penicillin must be taken on an empty stomach while amox/clav can be taken with food.
Cholecystitis (difficult to tell from cholelithiasis unless febrile or persisting pain)	Adults	<i>Enterobacteriaceae</i> <i>Enterococcus</i> 10% <i>Bacteroides, Clostridium</i> 10%	Usually hospitalise if concerned Amoxicillin/clavulanate is a reasonable choice	If afebrile then give pain relief. Reassess if not improving, consider antibiotics or refer to hospital

Disease: What does it look like?	Patient	Organisms	Antibiotics: In order of preference	Comment
<p>Diarrhoea Little place for antibiotics in diarrhoea. Two exceptions are <i>Giardia</i> and <i>C. difficile</i>. Sometimes <i>Shigella</i> is treated with antibiotics to reduce secondary cases. <i>Giardia</i> and <i>Campylobacter jejuni</i> are common in general practice.</p>	<p>All ages Note that the following are notifiable: <i>Campylobacter</i> Cholera <i>Cryptosporidium</i> <i>E. coli</i> 0157 <i>Giardia</i> <i>Salmonella</i> <i>Shigella</i> <i>Yersinia</i> Outbreaks of gastroenteritis regardless of cause</p>	<p>Many but usually viral. Culture stool and consider blood cultures if patient has fever or blood in stool.</p> <p>If camping or travel or live rurally consider <i>Giardia</i> and <i>Cryptosporidium</i>.</p> <p>If on antibiotics recently, then <i>C. difficile</i> toxin.</p> <p>If recent poorly cooked chicken, contact with animals then consider <i>C. jejuni</i>.</p>	<p>Replace fluids using oral rehydration solutions if appropriate</p> <p><i>Giardiasis</i> - give metronidazole</p> <p><i>Campylobacter jejuni</i>: Erythromycin shortens carriage, but only shortens symptoms if started in first 24 hours. 250 to 500 mg tds for 5 days.</p> <p><i>C. difficile</i> - stop precipitant antibiotic if possible, give metronidazole 400 mg tds for 7- 10 days. 20% relapse.</p>	<p>Most diarrhoea is not serious. Most do not benefit from antibiotics. Other rarer causes or after recent travel to be guided by stool culture.</p> <p>If an outbreak is suspected, e.g. among resthome residents, or other cluster, contact local Medical Officer of Health.</p>
<p>Gastritis and peptic ulceration. <i>H. pylori</i> infection can be diagnosed by antibody detection, stool antigen test or direct biopsy. For stool test no antibiotics for 4 weeks and no Bismuth or PPI for 2 weeks prior to test.</p>	<p>Patients with ulcers not induced by NSAIDs</p>	<p><i>H. pylori</i></p>	<p>Triple therapy omeprazole 20 mg bd clarithromycin 500 mg bd amoxicillin 1000 mg bd for one week. These come as commercial packs Losec HP7 or Klacid HP7 If allergic to penicillin then doxycycline 100 mg bd or metronidazole and if allergic to clarithromycin then metronidazole 400 mg bd or tds.</p>	<p>Can only test clearance with stool test (breath test not used in Auckland) or repeat biopsy. Ideally wait at least 4 weeks to retest. Serology stays positive even after successful treatment. Wait at least 6 months after treatment for a fall in titre.</p> <p>If eradication is unsuccessful, a resistant strain is possible. Culture of a gastric biopsy would be required to prove this.</p>

<p>Urinary Tract infection - Cystitis Frequency, dysuria +/- hematuria, +/-pyuria. Asymptomatic bacteruria in pregnancy warrants treatment because of risk of subsequent pyelonephritis</p>	<p>Women - usually sexually active or older. Children not toilet trained may need a catheter urine. A negative bag rules out UTI but a +ve is not always helpful because of contamination. If documented UTI in child, or male of any age, further assessment is needed.</p>	<p>Mainly <i>E. coli</i> and <i>S. saprophyticus</i>. Less commonly other bacteria</p>	<p>1st trimethoprim 300 mg nocte 3 nights or 600 mg as single dose or nitrofurantoin 50 mg qid for 7 days</p> <p>2nd norfloxacin 400 mg bd 3 days or 800 mg as single dose</p> <p>Ciprofloxacin is slightly more active than norfloxacin but isolates resistant to norfloxacin are also relatively resistant to ciprofloxacin</p>	<p>Single dose slightly less effective than 3 day course. Don't give trimethoprim in 1st trimester, don't give norfloxacin in pregnancy or in children and don't give nitrofurantoin at term.</p> <p>Due to increases in multi-resistant (ESBL positive) urinary <i>E. coli</i> and <i>Klebsiella</i> in the Auckland region, norfloxacin should be reserved as a second line agent.</p>
<p>Pyelonephritis Can have symptoms of cystitis, but not always</p> <ul style="list-style-type: none"> - fever - low back pain - chills - +/- vomiting 	<p>Woman - especially pregnant- and older men</p>	<p>As for UTI except <i>S. saprophyticus</i> which is uncommon</p>	<p>Usually hospitalised.</p> <p>Ciprofloxacin +/- amoxicillin for 5 -14 days.</p>	<p>Ciprofloxacin is preferred to norfloxacin in treating pyelonephritis because it achieves good levels in tissue as well as in urine.</p> <p>However, ciprofloxacin is avoided during pregnancy.</p>

<p>Cervix/Vaginal infection Cervicitis: <i>Chlamydia trachomatis</i> <i>N. gonorrhoeae</i></p> <p>Vaginitis: <i>Trichomonas</i> <i>Candida</i> bacterial vaginosis</p> <p>Urethritis: <i>C. trachomatis</i> <i>N. gonorrhoeae</i></p>	<p>Usually adults</p> <p>Suspected or confirmed STIs in children should be discussed with Paediatricians at Te Puaruruhau.</p>	<p><i>Candida</i> diagnosed on microscopy/culture</p> <p><i>Trichomonas</i> diagnosed by culture at DML. <i>Chlamydia</i> diagnosed by nucleic acid amplification in under 25 year olds.</p> <p><i>N. gonorrhoeae</i> diagnosed on culture</p> <p>Bacterial vaginosis diagnosed on combination of clinical signs and symptoms and microscopy</p>	<p><i>Candida</i> + symptoms of candidiasis give: e.g. clotrimazole vag cream/tablet 3-7 nights</p> <p><i>Trichomonas</i> or bacterial vaginosis give: Metronidazole 2 gm stat or 400 mg bd 7 days or single or multiple doses of ornidazole</p> <p><i>Chlamydia</i> give: Azithromycin 1 gm stat or doxycycline 100 mg bd 7 days</p> <p>Azithromycin is also the treatment of choice for infection due to <i>M. hominis</i> which accounts for some cases of urethritis but for which there is no routinely available laboratory test.</p> <p><i>N. gonorrhoeae</i> give: Ciprofloxacin 500 mg stat if the isolate is known to be susceptible to ciprofloxacin. During pregnancy or for ciprofloxacin R strains use ceftriaxone 500 mg stat IM</p>	<p>With <i>N. gonorrhoeae</i> and <i>Trichomonas</i> it is wise to treat for <i>Chlamydia</i> at same time, as co-infection is common.</p> <p>If candidiasis check for diabetes and consider oral anti-candidal agents if refractory to topical treatment.</p> <p>High rates of ciprofloxacin-resistant Gonorrhoea in Auckland likely to require IM ceftriaxone.</p> <p>Metronidazole in a single dose is considered safe in pregnancy</p> <p>Chlamydial infection, gonorrhoea and trichomoniasis are sexually transmitted and partners need treatment. Recommend a repeat sexual health screen for case and partner in approx 3 months.</p>
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<p>Epididymitis</p>	<p>Men</p>	<p>Younger men, think of sexually transmitted agents.</p> <p>Older men – <i>Enterobacteriaceae</i></p>	<p>As for urethritis in young men. Ciprofloxacin 500 mg bd for 10 to 14 days in older men</p>	<p>Older men may develop epididymitis after urinary tract instrumentation</p>
<p>Pelvic inflammatory disease</p> <p>Pelvic pain AND Bilateral adnexal tenderness or uterine tenderness or cervical motion tenderness</p>	<p>Adult women</p>	<p><i>N. gonorrhoeae</i> <i>C. trachomatis</i> anaerobes <i>Enterobacteriaceae</i> streptococci</p>	<p>Ceftriaxone 500mg im stat. AND Doxycycline 100mg bd po 14 days +/- Metronidazole 400mg bd for 14 days IF moderately severe PID and extra anaerobic cover required</p> <p>Substitute the stat dose of ceftriaxone for ciprofloxacin 500mg po stat if the patient has a history of penicillin or cephalosporin anaphylaxis.</p>	<p>Treat immediately after taking cultures. Consider referral for assessment and IV treatment if severe symptoms or during pregnancy. Always consider ectopic pregnancy.</p> <p>For partner: Perform a sexual health screen and treat empirically for <i>Chlamydia</i>. If the index case is diagnosed with <i>N. gonorrhoeae</i> and/or <i>Trichomonas vaginalis</i> infection, treat partner empirically for these also.</p> <p>Recommend a repeat sexual health screen for case and partner in approx 3 months.</p>

<p>Urethritis In males painful micturition and small creamy discharge in morning. In women WBC on urine microscopy but no growth (sterile pyuria).</p>	<p>Sexually active</p>	<p><i>C. trachomatis</i>, <i>N. gonorrhoeae</i> <i>Herpes simplex virus</i> <i>Ureaplasma</i> <i>Mycoplasma hominis</i></p>	<p>Ceftriaxone 500mg IM + azithromycin 1 gm stat together effective versus both <i>Chlamydia</i>, <i>N. gonorrhoeae</i>, <i>M. hominis</i> and some <i>Ureaplasma</i>.</p> <p>If gonococcal isolate known to be susceptible: 500mg ciprofloxacin or amoxicillin 3g plus probenecid</p>	<p>Ceftriaxone for gonorrhoea in pregnancy or if resistant to ciprofloxacin.</p> <p>Sexual contacts should be screened and treated.</p> <p>Recommend a repeat sexual health screen for case and partner in approx 3 months.</p>
<p>Bacterial Meningitis - fever -neck stiffness -non-blanching rash (meningococcal)</p>	<p>Any age</p>	<p><i>N. meningitidis</i> <i>S. pneumoniae</i> <i>H. influenzae</i></p>	<p>Penicillin IV or IM stat and immediate referral to hospital.</p> <p>Adults: 1.2 gm stat Children: 25-50 mg/kg stat or 50-100 mg/kg amoxicillin 1-2 gm for adults</p>	<p>For meningococcal contacts give rifampicin 600mg BD for 4 doses or 10mg/kg/dose in children (not to be given in pregnancy). This is usually arranged by Public Health.</p>

Antibiotic Dosages

Name of drug	Typical Adult Dosage	Typical Paediatric Dosage (not to exceed adult dosage)
Amoxicillin	250mg-2gm 6 hrly	15-25mg/kg 6-8 hrly (not to exceed adult dosage)
Amoxicillin/clavulanate (Augmentin)	500mg amoxicillin/100mg clavulanate BD to TID	20-45mg/kg 12 hrly
Azithromycin	1gm stat or 500mg daily	10mg/kg on day 1 then 5mg/kg per 24 hrly
Cefaclor (Ceclor)	250mg TID	10mg/kg 8 hrly
Clarithromycin		7.5-12.5mg/kg 12hrly
Ciprofloxacin	500mg to 750mg 12 hrly	10mg/kg 12hrly
Cotrimoxazole	Trimethoprim 80mg Sulphamethoxazole 400mg =480 mg tablet adult dose is 960mg BD	4/20mg/kg 6-12hrly
Doxycycline	100mg BD with food	not given to children
Erythromycin stearate	250-500mg 6 hrly	10-20mg/kg 6 hrly
Flucloxacillin	250mg -1gm 6 hrly on empty stomach	12.5-50mg/kg 6 hrly on empty stomach
Metronidazole	400mg-800mg 8 hrly with food	7.5mg/kg 8-12 hrly with food
Nitrofurantoin	50-100mg 6-8 hrly	1-2mg/kg 6 hrly
Norfloxacin	400mg BD	No child dose
Ornidazole	1.5 gm stat or 1.0 gm daily	25mg/kg daily
Penicillin	250mg-500mg 6 hrly on an empty stomach	10mg/kg 6 hrly on an empty stomach
Roxithromycin	150mg BD or 300mg once daily	4mg/kg BD
Trimethoprim	100-300mg daily	2-6mg/kg daily

BD = twice daily TID = three times daily