### MONOGRAPH

#### Amoxicillin (Amoxicillin) Monograph - Paediatrics

| Scope (Staff): | Medical, Nursing, Pharmacy |
| Scope (Area):  | PCH                         |

This document should be read in conjunction with this DISCLAIMER

### DESCRIPTION

- Amoxicillin is a bactericidal penicillin antibiotic which interferes with cell wall peptidoglycan synthesis by binding to penicillin-binding proteins resulting in cell lysis.\(^{1-3}\)
- Amoxicillin is a moderate spectrum penicillin, active against some Gram negative organisms (e.g. *E. coli* and *Haemophilus influenzae*) but is inactivated by beta-lactamase producing strains.\(^{1}\)

### INDICATIONS AND RESTRICTIONS

**Oral and IV: Unrestricted (green) antibiotic**

- This is not a restricted agent. Follow standard ChAMP guidelines where appropriate.

### CONTRAINDICATIONS

- Amoxicillin is contraindicated in patients with a history of severe allergy to penicillins, care should also be taken with cephalosporins and carbapenems as cross reactivity may occur between penicillins, cephalosporins and carbapenems.\(^{1}\)

### PRECAUTIONS

- Rapid IV injection may result in seizures.\(^{1,7}\)
- A generalised dull red, maculopapular rash occurs in 5 to 10% of children receiving amoxicillin.
- The rash tends to occur within 3 to 14 days of commencing therapy and is more common in patients with infectious mononucleosis, acute lymphoblastic leukaemia, chronic lymphocytic leukaemia and HIV infection.
- The rash should be evaluated to differentiate an immediate hypersensitivity reaction from a delayed hypersensitivity reaction to amoxicillin.\(^{3,7}\)

### FORMULATIONS

**Available at PCH:**

- 500mg and 1g powder for injection vial (Amoxil® and Fisamox®)
- 250mg/5mL powder for oral suspension (Sandoz)
- 250mg capsules (APO brand)
### Other formulations:
- 500mg and 1g powder for injection vial (multiple generic brands available)
- 250mg/5mL, 125mg/5mL and 100mg/mL powder for oral suspension (multiple generic brands available)
- 250mg and 500mg capsules (multiple generic brands available)
- 1000mg tablets (Maxamox®)

### DOSAGE

- The doses listed below fall within the standard range. Higher doses may be prescribed for certain situations.
- This should be in consultation with an infectious diseases or clinical microbiology consultant.

**Neonates (<1 month of age):**
- Please refer to neonatal clinical care drug protocols

**IV:**
- Usual dose: 25mg/kg/dose (to a maximum of 1gram) 8 hourly.
- Severe infections: 50mg/kg/dose (to a maximum of 2grams) 4 to 6 hourly.\(^{(1, 4)}\)
  - **Note:** 4 hourly dosing is usually reserved for treatment of endocarditis or meningitis.\(^{(2)}\)

**Oral:**
- **Usual dose:** 15mg/kg/dose (to a maximum of 500mg) 8 hourly.\(^{(1)}\)
- For patients with otitis media, 30mg/kg/dose (to a maximum of 1gram) 12 hourly may be given if there are concerns of non-compliance.\(^{(4)}\)
- **Severe infections or suspected partial non-susceptibility:** 30mg/kg/dose (to a maximum of 1gram) 8 hourly.\(^{(1)}\)

**Endocarditis Prophylaxis:**
- **Oral:** 50mg/kg (to a maximum of 2grams) as a single dose given 1 hour prior to the procedure.\(^{(1, 4)}\)
- **IV:** 50mg/kg (to a maximum of 2grams) as a single dose given 15 to 60 minutes prior to the procedure, if oral prophylaxis is not possible.\(^{(1, 4)}\)

**Pneumococcal prophylaxis in aspenic or hyposplenic patients:**
- All ages: 20mg/kg/dose (to a maximum of 250mg) given once daily.\(^{(4)}\)
**DOSAGE ADJUSTMENT**

**Dosage adjustment required in renal impairment:**
- Dosage adjustment may be required in cases of impaired renal function (with creatinine clearance of less than 30mL/min).\(^1\)
- To calculate the estimated glomerular filtration rate (eGFR) use the following formula:

\[
\text{eGFR (mL/min/1.73m}^2) = \frac{36.5 \times \text{height (in cm)}}{\text{Serum creatinine (micromol/L)}}
\]
- The use of high parenteral doses and/or prolonged treatment in renal impairment may result in electrolyte disturbance (due to the high sodium content), neurotoxicity (due to accumulation of the penicillin) and crystalluria.
- The risk of neutropenia and rash may also be increased.\(^2\)
- CrCl ≥ 50mL/minute = normal dose
- CrCl 10-50mL/minute = 100% dose 8 to 12 hourly.
- CrCl <10mL/minute = 100% dose 12 hourly.\(^4\)

**Dosage adjustment required in hepatic impairment:**
- No dose adjustment is required in hepatic impairment.\(^3, 5\)

**RECONSTITUTION**

**IV:**
- Reconstitute each vial with the volume of water for injection in the table below. Further dilution with a compatible fluid to a concentration of 50mg/mL is required prior to administration.\(^6, 7\)

<table>
<thead>
<tr>
<th>Vial strength</th>
<th>Volume of water required</th>
<th>Resulting concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>500mg</td>
<td>4.6mL</td>
<td>100mg/mL</td>
</tr>
<tr>
<td>1 gram</td>
<td>9.2mL</td>
<td>100mg/mL</td>
</tr>
</tbody>
</table>

- A transient pink or slight opalescence may appear during reconstitution.\(^6\)
- Oral suspension (250mg/5mL Sandoz brand):
- Reconstitute the Sandoz brand amoxicillin with 92mL of water as follows: Tap bottle until all the powder flows freely, add the total volume of water for reconstitution and shake vigorously to suspend the powder. Store the reconstituted suspension at room temperature (below 25°C) and discard any remaining suspension after 14 days.
- Refer to product packaging for the reconstitution instructions for alternative brands and strengths.
### Administration

**IV injection:**
- For doses < 30mg/kg, dilute reconstituted solution to a concentration of 50mg/mL or less and inject over 3 to 4 minutes. Avoid rapid administration of large doses, as it may result in seizures.\(^{(1, 7, 8)}\)

**IV infusion:**
- For doses ≥30mg/kg, dilute reconstituted solution to a concentration of 50mg/mL or weaker and infuse over 30 minutes.\(^{(7, 8)}\)

**IM injection:**
- If IV access is not available this medication may be given by IM injection into a large muscle. Doses >500mg should be split between multiple injection sites.\(^{(7)}\)

**Oral:**
- Shake well prior to measuring out a dose of the suspension. Oral amoxicillin may be administered without regard to the timing of food intake.\(^{(3, 6)}\)

### Monitoring

- Renal, hepatic and haematological function should be monitored weekly with prolonged therapy (i.e. longer than 7 days).\(^{(1, 3, 6)}\)
- Patients should be monitored for signs of allergy or anaphylaxis with the first dose of amoxicillin.\(^{(1, 3, 6)}\)

### Adverse Effects

**Common:** widespread erythematous maculopapular rash (generally self-resolving after treatment is ceased), diarrhoea, nausea, pain and inflammation at the injection site, candidiasis, allergy, hypersensitivity reaction, joint pain.\(^{(1, 2)}\)

**Rare:** pustular drug eruption, crystalluria (with high IV doses), vomiting, *Clostridium difficile*-associated disease, black tongue, electrolyte disturbance (hypernatraemia or hypokalaemia), CNS irritation, neurotoxicity or encephalopathy (usually with high doses), bleeding, blood dyscrasias (neutropenia or thrombocytopenia)\(^{(1, 2)}\)

**Immunologic reactions:** include rash, erythema, urticaria, contact dermatitis, fever, anaphylactic shock, angioedema, bronchospasm, interstitial nephritis, haemolytic anaemia, eosinophilia, serum sickness-like syndrome, exfoliative dermatitis, Stevens-Johnson syndrome and toxic epidermal necrolysis.\(^{(1)}\)

### Compatible Fluids

- Glucose 5%
- Glucose 5% with sodium chloride 0.45%
- Sodium Chloride 0.9%
- Hartmann’s solution\(^{(7)}\)
**STORAGE**

**IV powder for injection:**
- Store vials below 25˚C, use immediately after reconstitution and discard any excess solution.

**Oral powder for suspension:**
- Store dry powder for suspension below 25˚C, once reconstituted, the suspension should be stored between 2 - 8˚C.
- Discard any remaining suspension 14 days after reconstitution.

**Capsules:**
- Store below 25˚C

**INTERACTIONS**

- Amoxicillin has a number of drug interactions; please consult PCH approved references, your ward pharmacist or Pharmacy on is 6456 0190 (option 1) for more information.
- IV aminoglycoside antibiotics (e.g. gentamicin and tobramycin) are inactivated by IV penicillins and cephalosporins. Aminoglycoside antibiotics are rapidly bactericidal and should be administered first. The line should then be flushed well with a compatible fluid and the penicillin administered.\(^7\)
- Probenecid inhibits excretion of penicillins which may increase amoxicillin levels and increase the risk of seizures in certain patients.\(^1, 9\)
- Amoxicillin inhibits methotrexate excretion and may result in excessive methotrexate levels.\(^6\)
- The use of allopurinol and amoxicillin together significantly increases the incidence of rash.\(^1, 6\)
- Amoxicillin increases the absorption of digoxin, increasing levels. A reduction in the dose of digoxin may be required.\(^1, 6\)
- The use of amoxicillin with warfarin or other coumarin derivatives (e.g. warfarin) may result in an increase in the INR and/or prolonged bleeding time. Monitor closely.\(^1, 2\)

**Please note:** The information contained in this guideline is to assist with the preparation and administration of amoxicillin. Any variations to the doses recommended should be clarified with the prescriber prior to administration**

**Related internal policies, procedures and guidelines**

- [Antimicrobial Stewardship Policy](Medication Management Manual)
- [ChAMP Empiric Guidelines](ChAMP Manual)
References


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