## MONOGRAPH

### Ceftriaxone Monograph - Paediatric

<table>
<thead>
<tr>
<th>Scope (Staff):</th>
<th>Clinical Staff- Medical, Nursing, Pharmacy</th>
</tr>
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<tbody>
<tr>
<td>Scope (Area):</td>
<td>Perth Children’s Hospital (PCH)</td>
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</tbody>
</table>

This document should be read in conjunction with this DISCLAIMER

### DESCRIPTION

- Ceftriaxone is a bactericidal broad spectrum third generation cephalosporin antibiotic.
- It interferes with bacterial cell wall peptidoglycan synthesis by binding to penicillin-binding proteins resulting in cell lysis.\(^{(1-5)}\)

### INDICATIONS AND RESTRICTIONS

**IV: Monitored (orange) antibiotic**

- If the use is consistent with a standard approved indication, this must be communicated to ChAMP by documenting that indication on all prescriptions (inpatient and outpatient).
- The ChAMP team will review if ongoing therapy is required and/or if the order does not meet ChAMP Standard Indications.
- If use is not for a standard approved indication, phone approval must be obtained from ChAMP before prescribing.
- Ceftriaxone is a broad spectrum cephalosporin and is active against the majority of community-associated enteric Gram-negative rods, beta-haemolytic Streptococci and *Streptococcus pneumoniae*.\(^{(3)}\) Ceftriaxone also has significant activity against gram negative organisms and also penetrates the CSF.\(^{(6)}\)

### CONTRAINDICATIONS

- Ceftriaxone is contraindicated in patients with a history of severe allergy to ceftriaxone, other cephalosporins or a severe or intermediate reaction to a penicillin antibiotic.
- Care should also be taken with carbapenems as cross reactivity may occur between penicillins, cephalosporins and carbapenems.\(^{(1)}\)
- Ceftriaxone is contraindicated in neonates receiving calcium containing fluids (including parenteral nutrition, Hartmann’s or Ringers solution).\(^{(7)}\)

### PRECAUTIONS

**Neonates less than 28 days of age:**

- Ceftriaxone has been associated with fatal systemic calcinosis in neonates.
- It is highly protein bound and may displace bilirubin from...
Ceftriaxone Monograph - Paediatric

<table>
<thead>
<tr>
<th><strong>FORMULATIONS</strong></th>
<th>Available at PCH:</th>
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<tbody>
<tr>
<td></td>
<td>Ceftriaxone (AFT) 1g Vial</td>
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<tr>
<td></td>
<td>Ceftriaxone (Alphapharm) 2g Vial</td>
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<tr>
<td><strong>Other formulations available:</strong></td>
<td>Ceftriaxone powder for injection 1g and 2g vial (multiple generic brands)</td>
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<thead>
<tr>
<th><strong>DOSAGE</strong></th>
<th>The doses listed below fall within the standard range. Higher doses may be prescribed for certain situations in consultation with Infectious Diseases or Clinical Microbiologists.</th>
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</thead>
<tbody>
<tr>
<td><strong>Neonates:</strong></td>
<td>Ceftriaxone should be avoided in neonates (&lt;1 month). If a third-generation cephalosporin is required, cefotaxime should be prescribed. Please refer to Neonatal Medication Protocols</td>
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<tr>
<td><strong>IV or IM:</strong></td>
<td><strong>Post exposure prophylaxis or treatment in neonates:</strong></td>
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<tr>
<td></td>
<td>50mg/kg (to a maximum of 125mg) as a single dose in discussion with Infectious diseases or clinical microbiology.</td>
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<tr>
<td></td>
<td><strong>IV or IM:</strong></td>
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<td></td>
<td><strong>Usual dose:</strong> 50mg/kg/dose (to a maximum of 2 grams) 24 hourly. (1, 4, 10)</td>
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<td></td>
<td><strong>Meningitis or severe sepsis:</strong> 100mg/kg/dose (to a maximum of 4 grams) 24 hourly OR 50mg/kg/dose (to a maximum of 1 gram)</td>
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</table>

albumin in neonates.\(^3\)

- Cefotaxime is therefore the preferred third-generation cephalosporin in this age group.
- If ceftriaxone must be used, do NOT administer ceftriaxone and IV calcium containing products within 48 hours of each other (via the same OR separate infusion lines/sites).\(^2, 7-9\)

**Patients older than 28 days:**

- Ceftriaxone and calcium containing solutions may be administered sequentially (or concurrently if using completely separate lines) as long as the lines are flushed well with a compatible fluid between infusions.\(^2, 7, 8\)
- IV aminoglycoside antibiotics 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 cephalosporin administered.\(^9\)
- Rapid IV infusion of high doses may result in seizures, especially in patients with renal impairment.\(^1\)
2 grams) 12 hourly.\(^{(1, 4, 10)}\)

**IM:**

**Meningococcal prophylaxis:**
- Children ≥ 1 month and < 12 years of age: 125mg as a single dose
- Children ≥ 12 years of age: 250mg as a single dose\(^{(1)}\)

**Haemophilus influenzae type b (Hib) prophylaxis:**
- Children ≥ 1 month: 50mg/kg/dose (to a maximum of 1 gram) once daily for TWO days.\(^{(1)}\)

**Post exposure prophylaxis or treatment of confirmed Gonococcal disease:**
- Children ≥ 1 month: 50mg/kg (to a maximum of 500mg) as a single dose.

- Refer to the [Medical Prophylaxis ChAMP empiric guidelines](#) and [Prescribing chemoprophylaxis to contacts of meningococcal disease](#) for further information on the use of ceftriaxone for medical prophylaxis.

### DOSAGE ADJUSTMENT

**Dose reduction required in renal impairment:**
- Dose reduction may be required in cases of significant renal impairment with a creatinine clearance of less than 10mL/minute.
- Maximum recommended daily dose of 50mg/kg/DAY or 2 grams per day (whichever is less). Contact Pharmacy for advice.\(^{(4, 6, 8)}\)

**Dosage reduction required in hepatic impairment:**
- No dosage adjustment is required in hepatic impairment unless in conjunction with severe renal impairment. Contact Pharmacy for advice.\(^{(4, 6, 8)}\)

### RECONSTITUTION

**IV:**

<table>
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<tr>
<th>Vial size</th>
<th>Volume</th>
<th>Concentration</th>
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<tr>
<td>1 gram</td>
<td>9.6mL</td>
<td>100mg/mL</td>
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<tr>
<td>2 gram</td>
<td>19.2mL</td>
<td>100mg/mL</td>
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- Further dilution with a compatible fluid to a final concentration of 40mg/mL or less is required prior to administration.\(^{(7-9)}\)
| **IM:** | • Reconstitute each 1gram vial with 2.1mL of lidocaine (lignocaine) 1% (10mg/mL) or water for injection. This results in a final concentration of 350mg/mL.\(^{(11)}\)  

**Note:** Preparations with lidocaine (lignocaine) 1% (10mg/mL) as diluent must NEVER be given intravenously.\(^{(6, 7, 8)}\) |
| **ADMINISTRATION** | **IV infusion (preferred):**  
• Dilute the required dose to a final concentration of 40mg/mL or weaker and infuse over 30 minutes.\(^{(4, 7, 8)}\)  
• In emergency situations or where there is a clinical need (e.g. HiTH) faster infusion times have been used.\(^{(4, 7, 8)}\) It should be noted that the faster infusion times have been associated with increased risk of seizures.\(^{(1)}\)  

**IV push:**  
• Dilute the required dose to a final concentration of 40mg/mL or weaker and administer as a push over 5 to 15 minutes.\(^{(1, 4, 8)}\)  

**IM injection:**  
• Administer up to 1gram with a maximum concentration of 350mg/mL via deep injection into a large muscle mass e.g. thigh, buttocks.  
• For doses higher than 1gram, the dose must be split between 2 sites.\(^{(7, 8)}\) |
| **MONITORING** | Renal, hepatic and haematological function should be monitored weekly with prolonged therapy (i.e. longer than 7 days) and/or with high dose treatment.\(^{(1)}\) |
| **ADVERSE EFFECTS** | **Common:** diarrhoea, nausea, vomiting, pain and inflammation at injection site, rash, headache, dizziness, allergy, *Clostridium difficile-*associated disease.\(^{(1)}\)  

**Rare:** neurotoxicity (e.g. confusion, seizures, encephalopathy), blood dyscrasias (e.g. neutropenia), thrombocytopenia, bleeding, renal impairment, pancreatitis, cholecystitis, pseudolithiasis (reversible biliary sludge formation due to calcium-ceftriaxone complex), nephrolithiasis (formation of calcium-ceftriaxone renal stones).  
Immunologic reactions including eosinophilia, drug fever, anaphylaxis, angioedema, urticaria, haemolytic anaemia, Stevens-Johnson syndrome, toxic epidermal necrolysis, interstitial nephritis, arthritis, serum sickness-like syndrome.\(^{(1)}\) |
| **COMPATIBLE FLUIDS** | • Sodium chloride 0.9%,  
• Glucose 5% and 10%  
• Glucose/sodium chloride solutions |
**Ceftriaxone is INCOMPATIBLE with calcium containing intravenous solutions including parenteral nutrition, Ringer’s and Hartmann’s solution because precipitation may occur.** *(7-9)*

| INTERACTIONS | Store vials below 25˚C *(5)*  
|--------------|---------------------------------|
| INTERACTIONS | Store syringes prepared by PCS between 2 and 8˚C *(7)*  

**Ceftriaxone has drug interactions; please consult PCH approved references (such as *Clinical Pharmacology*), your ward pharmacist or Pharmacy on extension 60190 for more information.**

- Ceftriaxone is incompatible with calcium containing intravenous solutions because precipitation may occur. Refer to precautions section for further information. *(7, 8)*
- IV aminoglycoside antibiotics 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 cephalosporin administered. *(4, 7)*
- The use of ceftriaxone in conjunction with warfarin may increase INR and increase the risk of bleeding. *(1, 6)*
- Ciclosporin (cyclosporin) levels may increase if ceftriaxone is added. There is limited information on this interaction, close monitoring of ciclosporin (cyclosporin) levels is required. *(6)*
- The addition of furosemide (frusemide) to ceftriaxone may increase the risk of nephrotoxicity, especially in patients with renal impairment (including minor or transient renal impairment). *(6)*

| COMMENTS | Each 1 gram vial contains 83mg (3.6mmol) of sodium *(1)*  

| MANUFACTURER SAFETY DATA SHEET (SDS) | To access to the Manufacturer SDS for this product, use the following link to [ChemAlert](https://www.chemalert.com/).  

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**Please note: The information contained in this guideline is to assist with the preparation and administration of ceftriaxone. Any variations to the doses recommended should be clarified with the prescriber prior to administration**
Related internal policies, procedures and guidelines

- Antimicrobial Stewardship Policy
- ChAMP Empiric Guidelines

Useful resources

- KEMH Neonatal Medication Protocols

References


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<th>Details</th>
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<td>Head of Department – Infectious Diseases</td>
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<tr>
<td>Reviewer / Team</td>
<td>Children’s Antimicrobial Management Program Pharmacist</td>
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