

Vancomycin – continuous infusion regimen

2020

Newborn Use Only

Alert	S4-High risk medicine. Antimicrobial Stewardship Team recommends this drug is listed as Restricted. Continuous infusion regimen optimises achievement of steady state target concentration with fewer dose adjustments and a lower total daily dose in comparison to intermittent regimen.															
Indication	Infections due to susceptible strains of Staphylococci (including MRSA), Streptococci, Enterococci, Diptheroids, Listeria monocytogenes, Actinomycetes, Bacillus spp.															
Action	Bactericidal agent which interferes with cell wall synthesis, inhibits RNA synthesis and alters plasma membrane function.															
Drug Type	Glycopeptide antibiotic.															
Trade Name	Vancomycin Sandoz Vycin. DBL Vancomycin Hydrochloride, Vancocin CP, Vancomycin Alphapharm, Vancomycin AN powder for infusion.															
Presentation	Vancomycin hydrochloride 500 mg vial Vancomycin hydrochloride 1000 mg vial															
Dosage / Interval	<p>Loading dose 15 mg/kg over 1 hour, immediately followed by Continuous infusion as per the table below.*</p> <table border="1"> <thead> <tr> <th>Serum Creatinine (micromol/L)</th> <th>Corrected gestational age (CGA)</th> <th>Dose</th> </tr> </thead> <tbody> <tr> <td><40</td> <td>≥40 weeks</td> <td>2.1 mg/kg/hour (equivalent to 50 mg/kg/day)</td> </tr> <tr> <td><40</td> <td><40 weeks</td> <td>1.7 mg/kg/hour (equivalent to 40 mg/kg/day)</td> </tr> <tr> <td>40–60</td> <td>All</td> <td>1.25 mg/kg/hour (equivalent to 30 mg/kg/day)</td> </tr> <tr> <td>>60</td> <td>All</td> <td>0.8 mg/kg/hour (equivalent to 20 mg/kg/day)</td> </tr> </tbody> </table> <p>Example: 3kg baby at 41 weeks corrected gestational age with serum Cr 37 = 2.1 mg/kg/hour x 3.0 kg = 6.3mg/hour</p> <p>Measure vancomycin concentration 24 hours (18–30 hours) and 48 hours after the commencement of infusion and then every 3 days. See dose adjustment in Monitoring section.</p> <p>Prescription order:</p> <ol style="list-style-type: none"> loading dose on ONCE ONLY section of the medication chart Infusion dose in mg/kg/hour on fluid chart. 	Serum Creatinine (micromol/L)	Corrected gestational age (CGA)	Dose	<40	≥40 weeks	2.1 mg/kg/hour (equivalent to 50 mg/kg/day)	<40	<40 weeks	1.7 mg/kg/hour (equivalent to 40 mg/kg/day)	40–60	All	1.25 mg/kg/hour (equivalent to 30 mg/kg/day)	>60	All	0.8 mg/kg/hour (equivalent to 20 mg/kg/day)
Serum Creatinine (micromol/L)	Corrected gestational age (CGA)	Dose														
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Dose adjustment	Therapeutic hypothermia - Refer to vancomycin intermittent version. ECMO - Refer to vancomycin intermittent version. Renal impairment – Refer to dosing section. Hepatic impairment – Refer to vancomycin intermittent version.															
Route	IV															
Preparation/Dilution	<p>500mg VIAL Add 10 mL of water for injection to the 500 mg vial to make a 50 mg/mL solution</p> <p>FURTHER DILUTE Draw up 5 mL (250 mg of vancomycin) of the above solution and add 45 mL glucose 5% or sodium chloride 0.9% to make a final volume of 50 mL with a final concentration of 5 mg/mL.</p> <p>1g VIAL Add 20 mL of water for injection to the 1g vial to make a 50 mg/mL solution</p> <p>FURTHER DILUTE Draw up 5 mL (250 mg of vancomycin) of the above solution and add 45 mL glucose 5% or sodium chloride 0.9% to make a final volume of 50 mL with a final concentration of 5 mg/mL.</p> <p>Special circumstances To prepare 10 mg/mL concentration For fluid restricted infants, vancomycin can be diluted to 10 mg/mL solution, however this dilution increases the risk of infusion-related events (see adverse reactions).</p> <p>500mg VIAL Add 10 mL of water for injection to the 500 mg vial to make a 50 mg/mL solution</p> <p>Further Dilute Draw up 10 mL (500 mg of vancomycin) of the above solution and add 40 mL glucose 5% or sodium</p>															

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	<p>chloride 0.9% to make a final volume of 50 mL with a final concentration of 10 mg/mL. To prepare 10 mg/mL concentration</p> <p>1g VIAL Add 20 mL of water for injection to the 1g vial to make a 50 mg/mL solution</p> <p>Further Dilute Draw up 10 mL (500 mg of vancomycin) of the above solution and add 40 mL glucose 5% or sodium chloride 0.9% to make a final volume of 50 mL with a final concentration of 10 mg/mL.</p>																
Administration	<p>Loading dose: IV infusion over ONE hour. Maintenance infusion: Continuous IV infusion. Change solution every 24 hours.</p>																
Monitoring	<p>Renal function, full blood count, hearing function and serum vancomycin concentrations.</p> <p>Target trough concentration 10–20 mg/L Aim for higher trough level of 15–20 mg/L in suspected severe sepsis e.g., MRSA, bone infection, meningitis, endocarditis. Measure vancomycin concentration 24 hours (18–30 hours) after commencement of infusion AND 24 hours after each change of infusion rate.</p> <table border="1"> <thead> <tr> <th>Level 1 24 hours after commencement</th> <th>Dose</th> <th>Level 2</th> <th>Consecutive levels</th> </tr> </thead> <tbody> <tr> <td>15-25mg/mL</td> <td>Same</td> <td>48 hours After first level</td> <td>Day 6, day 9, day 12, day15 Every 3 days</td> </tr> <tr> <td><15mg/mL</td> <td>Increase</td> <td>24 hours After dose adjustment</td> <td>48 hours if targeted level achieved followed by every 3 days</td> </tr> <tr> <td>>25mg/mL</td> <td>Decrease</td> <td>24 hours After dose adjustment</td> <td>48 hours if targeted level achieved followed by every 3 days</td> </tr> </tbody> </table> <p>Repeat steady state level more frequently if</p> <ol style="list-style-type: none"> 1. 10% change in body weight OR 2. 25% change in serum creatinine OR 3. age-related dose adjustment OR 4. interruption in IV infusion OR 5. infant receives indomethacin. <p>If vancomycin level <15 or >25 mg/L: Adjust dose using below calculation: Adjusted dose (mg/kg/hour) = last maintenance dose (mg/kg/hour) x (20mg/mL ÷ last vancomycin concentration)</p> <p><i>For example:</i></p> <ol style="list-style-type: none"> 1. Last dose was 2.1 mg/kg/hour and the last vancomycin concentration was 12 mg/L: Adjusted dose: $2.1 \text{ mg/kg/hour} \times (20 \text{ mg/L} \div 12 \text{ mg/L}) = 3.5 \text{ mg/kg/hour}$ 2. Last dose was 2.1 mg/kg/hour and the last vancomycin concentration was 28 mg/L: Adjusted dose: $2.1 \text{ mg/kg/hour} \times (20 \text{ mg/L} \div 28 \text{ mg/L}) = 1.5 \text{ mg/kg/hour}$ <p>Adjustment to > 4.2 mg/kg/hour (100mg/kg/day) should be in consultation with pharmacist and consultant.</p>	Level 1 24 hours after commencement	Dose	Level 2	Consecutive levels	15-25mg/mL	Same	48 hours After first level	Day 6, day 9, day 12, day15 Every 3 days	<15mg/mL	Increase	24 hours After dose adjustment	48 hours if targeted level achieved followed by every 3 days	>25mg/mL	Decrease	24 hours After dose adjustment	48 hours if targeted level achieved followed by every 3 days
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Contraindications	Known hypersensitivity to vancomycin.																
Precautions	Use with caution in patients with renal impairment or those receiving other nephrotoxic, neurotoxic or ototoxic drugs.																
Drug Interactions	<p>Neurotoxic and nephrotoxic drugs – concurrent use of these agents may contribute to the additive neurotoxic and nephrotoxic effects.</p> <p>Diuretics – potent diuretics (e.g. furosemide [frusemide]) may add to the ototoxic effect.</p> <p>Neuromuscular blocking agents (e.g. pancuronium, suxamethonium, vecuronium) – vancomycin may enhance neuromuscular blockade.</p> <p>Vancomycin may be combined with an aminoglycoside, cephalosporin or rifampicin for synergistic</p>																

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	activity.
Adverse Reactions	Infusion related events: Rapid infusion may cause red man syndrome – a predominately histamine mediated reaction with pruritus, tachycardia, hypotension and rash. It appears rapidly and usually dissipates in 30–60 minutes, but may persist for several hours. Increasing the infusion time usually eliminates the risk for subsequent doses. Anaphylactic reactions may occur. Severe reactions may require treatment with adrenaline (epinephrine), corticosteroids and oxygen. Phlebitis and tissue irritation with necrosis may occur, especially after extravasation. Intramuscular injection is not recommended. Neurotoxicity, ototoxicity and nephrotoxicity – these are more pronounced with the addition of other medications such as aminoglycosides or furosemide (frusemide). Neutropenia and thrombocytopenia have been reported in adults; risk is increased with prolonged therapy >1 week and they appear to be reversible when vancomycin is discontinued.
Compatibility	Fluids: Glucose 5%, glucose 10%, sodium chloride 0.9%. Y site: Amino acid solutions and fat emulsions, aciclovir, adrenaline (epinephrine) hydrochloride, amifostine, amiodarone, anidulafungin, atracurium, caspofungin, cisatracurium, dobutamine, dopamine, dexmedetomidine, esmolol, filgrastim, fluconazole, gentamicin, granisetron, hydromorphone, insulin regular, labetalol, linezolid, magnesium sulfate, meropenem, midazolam, milrinone, morphine sulfate, mycophenolate mofetil, noradrenaline (norepinephrine), palonosetron, pancuronium, pethidine, potassium chloride, remifentanil, tigecycline, vecuronium, zidovudine.
Incompatibility	Y-site: Albumin, aminophylline, azathioprine, beta-lactam antibiotics (e.g. penicillins, cephalosporins), bivalirudin, calcium folinate, chloramphenicol, daptomycin, foscarnet, furosemide (frusemide), ganciclovir, heparin sodium, indometacin, ketorolac, methylprednisolone sodium succinate, moxifloxacin, omeprazole, rocuronium, sodium bicarbonate, sodium valproate, streptokinase, urokinase.
Stability	Administer immediately, discard unused portion of reconstituted solution. Infusion solution is stable for 24 hours below 25°C.
Storage	Store below 25°C. Protect from light.
Special Comments	If IV infusion is interrupted frequently or for longer periods of time, recommend changing over to intermittent regimen. In severe sepsis, if the IV infusion is interrupted for short duration (e.g. up to 4 hours), consider giving the missed dose over an hour followed by the continuous infusion at the original rate.
Evidence summary	Refer to full version.
Practice points	Refer to full version.
References	Refer to full version.

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