

Louth: Antimicrobial Guidelines - Louth Hospitals: Antimicrobial Guidelines: Neonatal - ■Vancomycin IV

Vancomycin Hydrochloride

Vancomycin is a bactericidal antibiotic with activity against some aerobic and anaerobic bacteria including multi-resistant staphylococci.

MEDICATION SAFETY ISSUES

- Incompatible with Cephalosporins, Phenobarbital and Piperacillin-tazobactam.[1]
- Red man syndrome: flushing and hypotension if administered too quickly.
- Vancomycin exposure may be associated with hearing impairment in neonates.[2] Concomitant use of other ototoxic medication, e.g. furosemide and loop diuretics, should be avoided if possible.

USES

Drug of choice for serious infections caused by methicillin-resistant staphylococci and penicillin-resistant pneumococci.[1]

PRESENTATION

Vancomycin Hydrochloride 500mg Powder for concentrate for solution for infusion.[3]

DOSAGE [4-6] :

DOSE: 15mg/kg for all ages without renal impairment.

Preterm (<37/40 weeks gestation)		
Weight	≤7 days of age	>7 days of age
<1.2kg		18 HOURLY
1.2-2kg		12 HOURLY
>2kg	12 HOURLY	8 HOURLY
Term (≥ 37/40 weeks gestation)		
≤7 days of age	>7 days of age ≤ 28 days of age	
12 HOURLY	8 HOURLY	
Term >28 days		
6 HOURLY		

If renal impairment, contact Consultant Microbiologist or Pharmacy for advice.

RECONSTITUTION

Warning- reconstitution is a two step process

Step 1 The displacement value for Vancomycin Mylan brand 500mg (stocked in OLOL) is 0.3ml. Add 9.7ml of Water for Injection to a 500mg vial and shake gently to dissolve. The resulting solution contains **50mg/ml vancomycin** .

Step 2 Further dilute 1ml of the reconstituted (50mg/ml) vancomycin solution with 9ml of compatible fluid (e.g. Sodium chloride 0.9%, Glucose 5%). Ensure adequate mixing by inverting the syringe at least 10 times. The resulting solution contains **5mg/ml of vancomycin** .

ADMINISTRATION

Use immediately once reconstituted and diluted. Infuse the prescribed dose over at least 60 minutes.

STORAGE

Do not store above 25° C. Use immediately once reconstituted.

MONITORING

Record vancomycin levels and response on the Vancomycin Monitoring Form (see Appendix 1).

Sub-therapeutic levels can result in treatment failure or the emergence of drug resistance.

Toxic or high levels of vancomycin can result in nephrotoxicity and/or ototoxicity. Monitor creatinine and urea at least twice weekly for the duration of treatment. If the patient is on additional nephrotoxic medication (e.g. NSAID's, aciclovir, aminoglycosides, diuretics, omeprazole), monitor renal function more frequently.

Indication	Target Trough Concentration
Uncomplicated infections	10 to 20 mg/L
Complicated infections: (e.g. Bacteraemia, endocarditis, osteomyelitis, meningitis, necrotising fasciitis and empyema)	15 to 20 mg/L
Dosing Frequency	When to take a trough level
18 HOURLY	Up to ONE HOUR before the 2 nd dose When levels are therapeutic, repeat every 2 days
12 HOURLY	Up to ONE HOUR before the 3 rd or 4 th dose When levels are therapeutic, repeat every 2 days
8 HOURLY	Up to ONE HOUR before 4 th or 5 th dose When levels are therapeutic, repeat every 2 days
6 HOURLY	Up to ONE HOUR before 4 th , 5 th or 6 th dose When levels are therapeutic, repeat every 3 days
<p>In patients with normal renal function, DO NOT withhold the next dose while awaiting the result of the trough level – this may result in the patient being under dosed.</p> <p>If patient has renal impairment, contact Consultant Microbiologist or Pharmacy for advice.</p>	

Vancomycin Targets and Timing of Levels:

Trough Level	Management	Timing of Next Level
Less than 5mg/L	<p>Preterm & term < 1 month: Increase frequency 18hours■12hours■8hours>6 hours. For example 18 hours then increase to 12 hourly.</p> <p>Term >1 month : Increase by 20%.</p>	Complete 24 hours of new regime before checking next level. Following two consecutive levels within therapeutic range repeat every 2-3 days and monitor renal function.
5-9mg/L	Increase by 10%	
10-20mg/L	No change (unless target level is 15-20mg/L for complicated infections* contact micro/ID)	*Complicated infections: Severe infection, reduced sensitivities, bacteraemia, endocarditis, osteomyelitis, meningitis, necrotising fasciitis and empyema
21-24mg/L	Decrease by 10% & Contact Micro	
≥ 25mg/L	Contact microbiology/ ID or Pharmacy for advice	

SIDE EFFECTS

- Nephrotoxicity and ototoxicity.
- Rash and hypotension (red man syndrome) if given too quickly.
- Phlebitis which can be minimized by slow infusion and dilution of the drug.

SAMPLE CALCULATION

0.86kg neonate 28 weeks corrected gestational age.

Dose: 15mg/kg = 15mg x 0.86kg = 12.9mg

Reconstitute and dilute one 500mg vial of vancomycin following the directions above.

The resulting solution contains 5mg/ml of vancomycin.

5mg in 1ml is equivalent to 1mg in 0.2ml

12.9mg in 2.58ml

Infuse a total volume of 2.58ml at a rate of 2.58ml/hr over 60 minutes.

REFERENCES

Louth: Antimicrobial Guidelines - Louth Hospitals: Antimicrobial Guidelines - Last Updated: Jan. 6, 2025, 9:56 a.m., printed: Jan. 8, 2025, 8:56 a.m.

1. Reuters, T., *Neofax A manual of drugs used in neonatal care* . Vol. 24. 2011.
2. Vella-Brincat, J.W., et al., *Are gentamicin and/or vancomycin associated with ototoxicity in the neonate? A retrospective audit*. *Neonatology*, 2011. **100** (2): p. 186-93.
3. Limited, H.U. *Vancomycin Hydrochloride 500 mg and 1 g Powder for Concentrate for Infusion* . 2009; Available from: <http://www.medicines.org.uk/emc/medicine/20059/SPC> .
4. British Medical Association, et al., *BNF for Children*. Accessed via www.medicinescomplete.com November 13th 2018. 2018, BMJ Group and Pharmaceutical Press: London.
5. Pickering, L.K., *2009 Red Book: Report of the Committee on Infectious Diseases* . 28th ed ed. 2009: American Academy of Paediatrics.
6. uptodate.com. *Vancomycin: Pediatric Drug Information* . 2018.

Appendix 1: Neonatal Vancomycin Monitoring Form - see hardcopy in NICU folder

Summary of Changes from Previous Versions

Date	Change
Jul 2019	<p>Revision 2 of the Rotunda Neonatal Vancomycin Monograph received with permission (approved in the Rotunda in Dec 2018). Changes from previous version:</p> <ul style="list-style-type: none"> • Medication Safety Issues: Risk of ototoxicity added. • Dosage: Dose regimen changed based on audits undertaken in the Rotunda Hospital, which found frequent low trough level results with the previous dosing regimen from BNFC. Updated dosing regimen based on American Academy of Paediatrics Red Book 2009. • Monitoring: New addition of Vancomycin Monitoring Form (see Appendix 1). Addition of advice to monitor urea and creatinine at least twice weekly and more frequently if patient on other nephrotoxic medications. • Table of when to take trough levels updated. • Addition of a new table on the management of subsequent doses based on trough level results. • Sample calculation - similar calculation to previous version, neonate weight different. • Side effects - section shortened to the main side effects only. See BNFC for full information. <p>Additional information included in OLOL monograph:</p> <ul style="list-style-type: none"> • Contact Micro/Pharmacy for advice on dosing regimen if renal impairment. • Added displacement value for vancomycin to reconstitution section. • Contact Micro/Pharmacy for advice on whether to hold dose pending level result if renal impairment.
June 2017	<p>Vancomycin Flynn brand now stocked in OLOL. Displacement value of 500mg vial now 0.4ml. Monograph updated to reflect this.</p>
Jan 2015	<p>This is the first version of this guideline. It is based on the Rotunda Hospital Neonatal Monograph for Vancomycin, Doc. No. 1, Revision No. 0, date of issue 10/11/14.</p> <p>Changes in OLOL monograph compared to the Rotunda monograph:</p> <ul style="list-style-type: none"> • Medication Safety: further detail on "red man" syndrome from BNFC. • Dose: added to check BNFC and seek advice on dose if patient has renal impairment. • Reconstitution: option to further dilute 2ml of 50mg/ml with 18ml of diluent if high dose • Monitoring: added to contact Consultant Neonatologist if trough level out of range, hold if > 20mg/L. • Adverse Effects: full list from BNF for Children included.