VANCOMYCIN (FOR IV USE IN ADULTS)
RESTRICTED USE ANTIBIOTIC

Presentation:

Vials contain 500mg or 1g dry powder

Indication:

RESTRICTED USE This is a restricted antibiotic and should be prescribed in accordance with the Antimicrobial Prescribing Guidelines or on a Consultant Microbiologists recommendation.

Loading dose:

Based on **ACTUAL** body weight.

ACTUAL BODY WEIGHT	DOSE	DILUTION VOLUME 0.9% Sodium chloride	DURATION OF INFUSION
<40 Kg	750mg	250mL	90 minutes
40-59 Kg	1g	250mL	120 minutes
60-90 Kg	1.5g	500mL	180 minutes
>90 Kg	2g	500mL	240 minutes

Maintenance dose :

Give the first maintenance infusion 12 or 24 hours after the loading infusion according to dose interval below.

eGFR (mL/min)	DOSE OF VANCOMYCIN	Dose interval	Volume of 0.9% Sodium chloride
<20	***PLEASE DISCUSS WITH CLINICAL MICROBIOLGIST***		
20-29	500mg	24 hours	250mL
30-39	750mg	24 hours	250mL
40-54	500mg	12 hours	250mL
55-74	750mg	12 hours	250mL
75-90	1g	12 hours	250mL
>90	1.25g	12 hours	250mL

The maintenance dose must be REVIEWED in light of the first trough level taken and adjusted appropriately to achieve the desired target range.

Target Range:

DOCUMENT in the notes & drug chart.

The standard range is **10-20mg/L**

EXCEPTIONS:

- *Staphylococcus aureus* infections
- Deep-seated infections (i.e. infective endocarditis, osteomyelitis)

In these instances the target range is **15-20mg/L**

DISCUSS with a Microbiologist if you are unsure what target range to use.

Monitoring

All patients require plasma vancomycin measurements – this is done by taking a trough sample (pre-dose)

Dosing Interval	Time of 1st trough level	Further Monitoring
Twice daily dosing	Before 3rd or 4th dose	every 2 - 3 days, or daily if the patient has unstable renal function
Once daily dosing	Before 2nd or 3rd dose	

GIVE the prescribed dose immediately after the TROUGH level, DO NOT wait for results.

MONITOR RENAL FUNCTION throughout treatment with Vancomycin.

CIVA prep[n] available:

York – Yes - for second and subsequent doses - order through your Ward Pharmacist
Scarborough – No

Diluent and dilution instructions:

Reconstitute 500mg with 10mL water for injection
Reconstitute 1g with 20mL water for injection

The concentrated solution **must be diluted further** to the final volume with sodium chloride 0.9% or glucose 5%.

The final solution should not normally be more concentrated than 5mg/mL, i.e. dilute as follows:-

Dose	Infusion Solution
500mg	250mL
750mg	250mL
1g	250mL
1.25g*	250mL
1.5g*	500mL
2g*	500mL

*Doses above 1g are higher than those in the product licence

Flush solutions
Sodium chloride 0.9% or glucose 5%

Administration:

Doses should be administered at a rate not exceeding 10mg/minute:-

Dose	Administration Time
500mg	60 minutes
750mg	90 minutes
1g	120 minutes
1.25g	150 minutes
1.5g	180 minutes
2g	240 minutes

pH/compatibility:

Specialist technical information
pH: 3.5 to 3.8 (diluted solution 5mg/mL)
Sodium content: negligible

Stability in solution
Vancomycin should be used immediately and any unused portion discarded.

Compatibility
IV medicines should not be mixed together. Advice should be sought from a pharmacist in special circumstances.

Extravasation:

Vesicant.

Follow Trust Extravasation Policy to **COOL AND LOCALISE**
Monitor the extravasation site twice daily for signs of blistering or tissue damage. Inform the doctor immediately if there are signs of tissue breakdown.

Vancomycin has a low pH and may cause venous irritation and tissue damage in cases of extravasation. If a central venous access device is unavailable, administer via a large peripheral vein monitoring insertion site closely using a recognised phlebitis scoring tool. Resite cannula at first signs of inflammation.

Additional Information:	**Adverse effects:** Rapid infusion may cause severe hypotension (including shock and cardiac arrest), wheezing, dyspnoea, urticaria, pruritus, flushing of the upper body ('red man' syndrome), pain and muscle spasm of back and chest. Stop the infusion if they occur. A longer infusion time or premedication with an antihistamine may limit the reaction. Peripheral administration may cause injection site pain and thrombophlebitis - rotate injection sites. Vancomycin may also cause hypersensitivity reactions, rashes (including exfoliative dermatitis), anaphylaxis, and drug fever. Vancomycin has been associated with the bullous eruption disorders, Stevens-Johnson syndrome, toxic epidermal necrolysis and linear IgA bullous dermatosis.
Therapeutic Drug Monitoring (TDM)	
How to take trough levels:	**Pre-dose level ('trough'):** Take a serum sample (8mL clotted sample) just before the dose is administered. Levels are measured in microbiology. Please send a pre-dose level together with a microbiology request form stating the following information: • **Dose and frequency of vancomycin** • **Time of last infusion** • **Sample type, i.e. pre-dose** • **Time of blood sampling** Blood for levels should never come from the device used to give the drug as the drug binds strongly to plastics and elutes into samples irrespective of volume discarded initially prior to sampling. Do not delay treatment by waiting for the result of the vancomycin level but give the dose - UNLESS the patient is in renal impairment or had a previously high level and it is essential to know the result before giving the dose.
Trough levels out of range?	Questions to ask: 1. Have all doses been given correctly? a. Missed or notably delayed doses can lead to erroneous results 2. Were the levels taken at the correct time? a. Levels taken too long before a dose/too soon after a dose are not true trough levels and will give higher results b. Was the trough level taken before the appropriate dose as per the table above? 3. Where was the sample taken from? a. Samples taken from the same line that the vancomycin was infused through will give falsely high levels b. Samples taken from the same limb as a running IV fluids infusion may give falsely low levels 4. What is the patient's up to date renal function? a. Deteriorating renal function reduces clearance of vancomycin and will lead to higher trough levels b. Improving renal function increases clearance of vancomycin and will lead to lower trough levels c. If the **renal function has changed** the patient may need their maintenance dose adjusting.

Vancomycin concentration	Suggested dose change
<10 mg/L	Increase the dose by 50% and consider reducing the dosage interval or seek advice
10 – 15 mg/L	If the patient is responding, maintain the present dosage regimen. If the patient is seriously ill, consider increasing the dose amount or reducing the dosage interval to achieve a trough level of 15 – 20 mg/L.
15 – 20 mg/L	Maintain the present dosage regimen
>20 mg/L	Stop, repeat level until <20 mg/L and seek advice re dose reduction

Additional References:

1. The Medusa Injectable Medicines Guide
2. Vancomycin Summary of Product Characteristics (SPC) http://emc.medicines.org.uk
3. British National Formulary (BNF) http://www.bnf.org
4. Renal Drug Database https://renaldrugdatabase.com/
5. York Teaching Hospital Antimicrobial Stewardship Adult Formulary (see posters on wards or guidelines on intranet)
6. Intravenous Vancomycin Use in Adults Intermittent (Pulsed) Infusion; Scottish Antimicrobial Prescribing Group 2015

TDM Evidence base

A. H. Thomson, C. E. Staatz, C. M. Tobin, M. Gall and A. M. Lovering Journal of Antimicrobial Chemotherapy (2009) 63, 1050–1057 Development and evaluation of vancomycin dosage guidelines designed to achieve new target concentrations

Michael Rybak, Ben Lomaestro, John C. Rotschafer, Robert Moellering Jr, William Craig, Marianne Billeter, Joseph R. Dalovisio, and Donald P. Levine Am J Health-Syst Pharm. 2009; 66:82-98 Therapeutic monitoring of vancomycin in adult patients: A consensus review of the American Society of Health-System Pharmacists, the Infectious Diseases Society of America, and the Society of Infectious Diseases Pharmacist