Intravenous Vancomycin Use in Adults ≥ 16 years (Continuous Infusion)

Background

This policy, which was written by the Scottish Antimicrobial Prescribing Group (SAPG) based upon NHS Greater Glasgow and Clyde guidance and adapted for use within Ayrshire and Arran, covers the use of intravenous (IV) vancomycin prescribed as a **continuous infusion**.

Continuous infusion of vancomycin is for treatment only and is preferred, when practical, for patients with severe or deep-seated infections (e.g. pneumonia, endocarditis, bone and joint infections).

Vancomycin can also be administered as an intermittent (pulsed) infusion – refer to **separate guidance**.

This policy does not apply to the use of vancomycin in patients treated in Renal units or receiving haemodialysis or haemofiltration.

Contra-indications and cautions

- Contra-indications to vancomycin therapy – hypersensitivity.
- Cautions for vancomycin therapy:
    - To avoid the risk of vancomycin infusion reactions, pain or muscle spasm, ensure that the administration rate is not faster than 500 mg per hour.
    - Concurrent administration of neurotoxic and / or nephrotoxic agents increases the risk of vancomycin toxicity. Review therapy and consider amending or withholding nephrotoxic drugs during treatment with vancomycin. Where possible, avoid co-administration with the following:
        - amphotericin
        - potent diuretics
        - aminoglycosides
        - NSAIDs
        - ACE inhibitors
    - The above list is not exhaustive – consult the Summary of Product Characteristics eSPC for a full list (www.medicines.org.uk).
    - Due to potential ototoxicity, vancomycin should be avoided in patients with previous hearing loss.

Prescribing and documentation

- The NHS Ayrshire & Arran (NHS A&A) continuous vancomycin prescribing, administration and monitoring chart must be used when vancomycin is prescribed as per this guideline.
- The chart should be used for prescribing doses of vancomycin in conjunction with the existing inpatient prescribing chart (e.g. Kardex or electronic prescribing) and medica0l/nursing documentation. These charts contain a stepwise approach to safe and effective prescribing and key points of advice on monitoring, interpreting and re-prescribing.
- An NHS A&A online vancomycin calculator is available and should be used to calculate the initial dose requirements.

STEP 1: Prescribe the loading dose and maintenance continuous infusion

- To reduce the risk of mortality, commence vancomycin administration within 1 hour of recognition of sepsis.
- *If creatinine is known* – use the online calculator (preferred method). The guidelines (below) in Table 1 (loading dose) and Table 2 (maintenance continuous infusion dose) can be used if the online calculator is not available. The dose amount and dosage interval are based on estimated creatinine clearance (Box 1) and **actual** body weight.
- *If creatinine is not known* – calculate and prescribe a loading dose based on actual body weight (Table 1). Calculate the maintenance continuous infusion dose once the creatinine is available.

Box 1: Estimation of creatinine clearance (CrCl)

The following 'Cockcroft Gault' equation can be used to estimate creatinine clearance (CrCl)

$$\text{CrCl (mL/min)} = \frac{[140 - \text{age (years)}] \times \text{weight (kg)} \times 1.23 \text{ (male) OR } \times 1.04 \text{ (female)}}{\text{serum creatinine (micromol/L)}}$$

Cautions

- Use actual body weight or maximum body weight whichever is lower.
  For maximum body weight table see www.sapg.scot/media/4471/maximum-body-weight-table.pdf
- In patients with low creatinine (< 60 micromol/L), use 60 micromol/L.
- Note: Use of estimated glomerular filtration rate (eGFR) is not recommended

LOADING DOSE

Table 1: Initial vancomycin LOADING dose

Actual body weight	Dose	Volume of sodium chloride (0.9%) *	Duration of infusion
< 40 kg	750 mg	250 mL	1.5 hours
40 – 59 kg	1000 mg	250 mL	2 hours
60 – 90 kg	1500 mg	500 mL	3 hours
> 90 kg	2000 mg	500 mL	4 hours

* Glucose 5% may be used in patients with sodium restriction.

Volumes used are for peripheral administration. More concentrated solutions (10mg/ml) must be given via a central line.

MAINTENANCE CONTINUOUS INFUSION

- Start the continuous infusion **immediately** after the loading infusion is complete.

Table 2: Vancomycin MAINTENANCE continuous infusion dose

Vancomycin continuous infusion – initial MAINTENANCE dosage guidelines		
CrCl (mL/minute)	**Daily dose**	**Dose for continuous infusion over 12 hours**
< 20	Use pulsed infusion or follow Renal Unit guidelines	
20 – 29	500 mg	250 mg
30 – 39	750 mg	375 mg
40 – 54	1000 mg	500 mg
55 - 74	1500 mg	750 mg
75 - 89	2000 mg	1000 mg
90 - 110	2500 mg	1250 mg
>110	3000 mg	1500 mg

- For peripheral infusion dilute doses up to 1250 mg in 250 ml sodium chloride (0.9%) and doses above 1250 mg and up to 2000 mg in 500 mL sodium chloride (0.9%). More concentrated solutions (10mg/ml) must be given via a central line. Glucose 5% may be used in patients with sodium restriction.

Note that patients who have unusual characteristics, such as weight <40kg, weight >120kg, age >90 years may require dose adjustments and require close monitoring. Contact Pharmacy for advice.

STEP 2: Monitor the vancomycin concentration and reassess the continuous infusion dose

Concentrations are meaningless unless the dose & sample times are recorded accurately

- Due to wide variability in the handling of vancomycin, early analysis of a vancomycin concentration is required to ensure that the dosage regimen is appropriate.
- Take a sample after 12 – 24 hours of starting the continuous infusion then every 1 - 2 days; or daily if the patient has unstable renal function.
- Monitor creatinine daily.
- Record the time of the blood sample on the request form and the sample tube.

Target vancomycin concentrations

- **Target steady state concentration range: 15 – 25 mg/L**
- If the patient is **seriously ill (severe or deep-seated infections), the target range is 20 – 25 mg/L.** If the measured concentration is < 20 mg/L, consider increasing the dose amount.
- If the patient is failing to respond, seek advice from microbiology or an infection specialist.

Adjustment of vancomycin doses - continuous infusion

- Always check that the dosage history and sampling time are appropriate before interpreting the result.
- Seek advice from pharmacy or microbiology if you need help to interpret the result.

If the measured concentration is unexpectedly HIGH or LOW, consider the following:

- Were the dose and sample times recorded accurately?
- Was the correct dose administered?
- Was the sample taken from the line used to administer the drug?
- Has renal function declined or improved?
- Does the patient have oedema or ascites?

Table 3: Adjustment of Vancomycin Doses – continuous infusion

Vancomycin concentration	Suggested dose change
<15 mg/L	Increase the 12 hourly dose by 250 mg
15 - 25 mg/L	If the patient is responding, maintain the present dosage regimen. If the patient is seriously ill, consider increasing the dose amount to achieve a steady state concentration of 20 – 25 mg/L.
26 - 30 mg/L	Decrease the 12 hourly dose by 250 mg
>30 mg/L	Stop until < 25 mg/L then restart at a lower dose

If in doubt, take another sample before modifying the dosage regimen and / or contact pharmacy for advice

General points

- Document any action taken in the medical notes.
- Undertake pre-prescribing checks (Box 2) to assess the risk of toxicity.
- Review the need for vancomycin daily.
- If a patient requires to be switched from continuous to pulsed infusion contact pharmacy for advice.

Box 2: Toxicity

- Monitor creatinine daily. Seek advice if renal function is unstable (e.g. a change in creatinine level)
- Signs of renal toxicity include increase in creatinine or decrease in urine output / oliguria
- Consider an alternative agent if creatinine is rising or the patient becomes oliguric
- Vancomycin may increase the risk of aminoglycoside induced ototoxicity.

Bibliography: Scottish Antimicrobial Prescribing Group Intravenous Vancomycin use in Adults Continuous infusion, June 2019. Accessed 14th March 2025