Trust Guideline for the use of Parenteral Vancomycin in Adults

Document Control:

For Use In:	Norfolk and Norwich University Hospitals		
	All clinical areas where Vancomycin is prescribed (excluding critical care complex and theatres)		
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V9	March 2021	Caroline Hallam	Teicoplanin made into a separate guideline.
V10	April 2022	Caroline Hallam	Adjusted body weight information added
V11	February 2023	Caroline Hallam	Maximum dose added
V12	August 2023	Caroline Hallam	Document transferred to new Trust Procedural document template
V13	June 2024	Caroline Hallam	Appendix added

Previous Titles for this Document:

Previous Title/Amalgamated Titles	Date Revised
None	Not applicable

Distribution Control

Printed copies of this document should be considered out of date. The most up to date version is available from the Trust Intranet.

Consultation

The following were consulted during the development of this document:
Antimicrobial Subgroup Committee

Monitoring and Review of Procedural Document

The document owner is responsible for monitoring and reviewing the effectiveness of this Procedural Document. This review is continuous however as a minimum will be achieved at the point this procedural document requires a review e.g. changes in legislation, findings from incidents or document expiry.

Relationship of this document to other procedural documents

This document is a clinical guideline applicable to Norfolk and Norwich University Hospitals please refer to local Trust's procedural documents for further guidance, as noted in section 4.

Guidance Note

This guideline has been approved by the Trust's Clinical Guidelines Assessment Panel as an aid to the diagnosis and management of relevant patients and clinical circumstances. Not every patient or situation fits neatly into a standard guideline scenario and the guideline must be interpreted and applied in practice in the light of prevailing clinical circumstances, the diagnostic and treatment options available and the professional judgement, knowledge and expertise of relevant clinicians. It is advised that the rationale for any departure from relevant guidance should be documented in the patient's case notes.

The Trust's guidelines are made publicly available as part of the collective endeavour to continuously improve the quality of healthcare through sharing medical experience and knowledge. The Trust accepts no responsibility for any misunderstanding or misapplication of this document**.**

Contents Page

1. Introduction

1.1. Rationale

Vancomycin is a glycopeptide antibiotic routinely used to treat gram-positive bacteraemia. To be effective, vancomycin requires a serum concentration which exceeds the minimum inhibitory concentration of the micro-organism being treated. Vancomycin requires regular serum concentration monitoring as supra-therapeutic levels increase the risk of severe side effects including nephrotoxicity and ototoxicity. Additionally, rapid infusion can cause 'red man' syndrome and therefore, administration is limited to 10mg/min.

1.2. Objective

The objective of the guideline is to:

- Standardise the loading doses given to patients
- Ensure patients are prescribed an appropriate maintenance dose
- Appropriate monitoring is carried out throughout the duration of treatment

1.3. Scope

This guideline covers the use of intravenous vancomycin prescribed for adult patients (16+ years old).

It excludes patients on the Critical Care Complex (CCC) and paediatrics.

1.4. Glossary

The following terms and abbreviations have been used within this document:

Term	Definition
EPMA	Electronic Prescribing and Medicines Administration
Loading dose	A large dose given quickly to ensure therapeutic efficacy in a timely manner
Vancomycin	A glycopeptide antibiotic given by intravenous infusion

2. Responsibilities

2.1. Medical staff

Medical staff are responsible for prescribing Vancomycin according to this guideline

2.2. Nursing staff

Nursing staff are responsible for administering vancomycin according to this guideline

2.3. Pharmacists

Pharmacists are responsible for auditing compliance and checking prescriptions and administration against this guideline

3. Processes to be followed

3.1. Prescribe Vancomycin Loading Dose as a STAT

(For patients with a CrCL<20mL/min, haemodialysis or peritoneal dialysis pts see page 9, no loading dose required in renal pts)

- Prescribe a STAT dose on EPMA based on patient's ACTUAL body weight.
- The next dose will be given 12/24 hours later so choose an appropriate time on EPMA

VANCOMYCIN LOADING DOSE	
Actual body weight	**Dose**
< 40 kg	**750 mg in 250 mL 0.9% sodium chloride over 1.5 hours**
40 - 59 kg	**1000 mg in 250 mL 0.9% sodium chloride over 2 hours**
60 - 90 kg	**1500 mg in 500 mL 0.9% sodium chloride over 3 hours**
>90 kg	**2000 mg in 500 mL 0.9% sodium chloride over 4 hours**

3.2. Prescribe Vancomycin Maintenance Dose as a regular dose
(to start at the correct time AFTER the loading dose)

- Prescribe a maintenance dose to start at the correct time AFTER the loading dose (12 or 24 hours), based on Creatinine Clearance (calculated using equation below).
- Change the date of the vancomycin level on EPMA so it is taken at the correct time.

VANCOMYCIN MAINTENANCE DOSE - INTERMITTENT INFUSIONS		
CrCL (mL/min)	**Dose amount**	**Dosage interval**
< 20	**See page 9**	
20 - 29	**500 mg over 1 h**	**24 hours**
30 - 39	**750 mg over 1.5 h**	**24 hours**
40 - 54	**500 mg over 1 h**	**12 hours**
55 - 74	**750 mg over 1.5 h**	**12 hours**
75 - 89	**1000 mg over 2 h**	**12 hours**
90 - 110	**1250 mg over 2.5 h**	**12 hours**
> 110	**1500mg over 3 h**	**12 hours**

Calculating the patients Creatinine Clearance

Calculate the patient's creatinine clearance (CrCl) using the Cockcroft-Gault equation. Click here for the Cockcroft and Gault Calculator or use the calculation below:

CrCl (mL/min) = F (140-age) x weight (kg) (F=1.04 females, 1.23 for males)

Serum creatinine (micromols/L)

- **Use actual body weight (ABW) or ideal body weight (IBW), whichever is lower**
- **Ideal body weight (kg):**
- **Men = 50 + (2.3 x no. of inches over 5 ft.) Women = 45.5 + (2.3 x no. of inches over 5 ft.)**
- **In obese patients (>20% above their IBW) adjusted body weight should be used to calculate CrCl**
- **Adjusted BW = IBW + 0.4(ABW – IBW)**
- **In patients with low creatinine (<60micromol/L), use 60micromol/L. Do not use eGFR**

3.3. Taking Levels and Ongoing Monitoring

(see page 9 for pts with CrCL <20mL/min or peritoneal dialysis patients)

Take a pre-dose blood sample (clotted blood) for serum vancomycin trough level (within 1 hour of next vancomycin dose being due)

- Before 4th dose if on BD dosing
- Before 3rd dose if on OD dosing
- Before 2nd dose if on 48-hourly dosing

Record the time that the last dose was given and the time that the blood sample was taken on the request form, and record the sample time on the sample tube.

ADJUSTMENT OF INTERMITTENT INFUSION DOSAGE REGIMEN	
Vancomycin level	**Suggested dose change**
< 10mg/L	Increase dose by 50% and consider reducing the dosage interval or seek advice (for doses above 2g bd discuss with pharmacy/microbiology for advice)
10-15mg/L	If the patient is responding, maintain the present dosing regimen If the patient is seriously ill, consider increasing the dose amount or reducing the dosage interval to achieve a trough level of 15-20mg/L
15-20mg/L	Within target range for treatment of severe infections (bacteraemia, infective endocarditis, osteomyelitis, meningitis, pneumonia and severe skin and soft tissue infections e.g. necrotising fasciitis). Maintain present dosage regimen. If treating less severe infections, a pre-dose level of 15-20mg/L is acceptable
> 20mg/L	Stop until < 20mg/L then seek advice. Dose reduction or increase in dosing interval necessary

- Take the first pre-dose (trough) level as advised in the table above.
- Record the exact time of all vancomycin samples on the request form.

- If the renal function is stable, give the next dose before the trough result is available. If the renal function is deteriorating, withhold until the result is available and follow advice in table Please discuss with microbiology/pharmacy if further advice is needed.
- Interpret levels as above. If the trough is within the normal range and renal function remains stable repeat trough level every 2-3 days. If the renal function is unstable, daily levels are required.
- Monitor creatinine daily.

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?
- Was the sample taken during drug administration?
- Has renal function declined or improved?
- Does the patient have oedema or ascites?

Toxicity

- Monitor creatinine daily. Seek advice if renal function is unstable (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 – use caution if co-prescribing.

4. Renal patients (CrCl<20mL/min or dialysis (peritoneal and haemo) patients

1. Maintenance Dose in Renal Patients

The maintenance dose to be administered as follows:
1g Vancomycin in 200mL 0.9% sodium chloride over 100 minutes. Vancomycin may be dialysed out so should be given in the last 100 minutes of dialysis.

2. Sampling

A blood sample for a Vancomycin serum concentration should be taken after 24 hours for non-dialysis/peritoneal dialysis patients and at the start of each subsequent haemodialysis sessions for haemodialysis patients.

Notes:

- Samples taken from dialysis patients should be labelled as urgent before sending to the lab.

Table 4: Interpretation of Vancomycin levels in Renal Patients

Vancomycin level	Action
<15mg/L	Give a further dose of Vancomycin. Recheck levels in 24 hours for non-dialysis/PD patients Recheck levels just before the start of the next dialysis session for haemodialysis patients
15-25mg/L	Do not give a further dose. Recheck levels in 24 hours for non-dialysis/PD patients and at each dialysis session for HD patients
>25mg/L	Do not give a further dose. Recheck levels in 48 hours for non-dialysis/PD patients and at each dialysis session for HD patients

5. Intravenous (IV) Vancomycin for Haemodialysis Patients

6. References

- James Paget Hospital Guideline Management of Intermittent Vancomycin Infusion in Adults: Prescribing, Administration and Monitoring. February 2019
- Scottish Antimicrobial Prescribing Group (NHS Scotland) IV Vancomycin use in Adults (Intermittent (Pulsed) infusion. Scottish Medicines Consortium; 2019

7. Audit of the process

Compliance with the process will be monitored through the following:

Key elements	Process for Monitoring	By Whom (Individual / group /committee)	Responsible Governance Committee /dept	Frequency of monitoring
Loading doses	audit	Antmimicrobial Pharmacist	Antimicrobial Subcommitee meeting	Yearly
Maintenance doses	audit	Antmimicrobial Pharmacist	Antimicrobial Subcommitee meeting	Yearly
Blood level monitoring	audit	Antmimicrobial Pharmacist	Antimicrobial Subcommitee meeting	Yearly
Datix reports	Ad hoc	Antmimicrobial Pharmacist	Antimicrobial Subcommitee	Ongoing

			meeting	

The audit results are to be discussed at an Antimicrobial subgroup committee meeting to review the results and recommendations for further action.

Appendix - Monitoring of vancomycin levels for outpatients dialysing at off-site dialysis units (Norfolk and Norwich Kidney Centre and Cromer Dialysis Unit)

This guidance is only valid for patients dialysing three times a week (MWF or TTS), with a mild to moderate and non-deep seated infection aiming for a vancomycin target level of < 15mg/L who are prescribed vancomycin doses of up to and including 1g.

If treating a severe or deep-seated infection (e.g. bacteraemia, infective endocarditis, osteomyelitis, meningitis, pneumonia and severe skin and soft tissue infections e.g. necrotising fasciitis) with a vancomycin target level of 15-20mg/L please contact the on call nephrologist or renal pharmacist for advice. These patients should not be started on or discharged to off-site dialysis units on vancomycin without prior discussion with nephrology/microbiology/pharmacy.

For patients newly started on vancomycin at an off-site dialysis unit:

- Administer prescribed dose of vancomycin at the end of the first dialysis session
- Take a vancomycin level at the beginning of the second dialysis session. The result of the level will not be available until the third dialysis session.
- Administer prescribed dose of vancomycin at the end of the second dialysis session
- On the third dialysis session take a level at the beginning of dialysis. Then review the vancomycin level taken on the previous session:

Vancomycin level	Action
<15mg/L	Administer the prescribed dose of vancomycin
≥15 mg/L	Omit the prescribed dose of vancomycin

- Carry on with the above method until vancomycin course complete.

For patients discharged from NNUHFT to a off-site dialysis unit:

- Take a vancomycin level at the beginning of the first dialysis session. The result of the level will not be available until the second dialysis session
- Review the vancomycin level from the previous dialysis session (last dialysis session at NNUHFT before transfer to off-site dialysis session):

Vancomycin level	Action
<15mg/L	Administer the prescribed dose of vancomycin
15 to <20mg/L	If vancomycin omitted the previous dialysis session administer

	the prescribed dose of vancomycin. If vancomycin was administered the previous dialysis session then omit the prescribed dose of vancomycin
≥20mg/L	Omit the prescribed dose of vancomycin

- On the second dialysis session take a level at the beginning of dialysis. Then review the vancomycin level taken on the previous dialysis session:

Vancomycin level	**Action**
<15mg/L	Administer the prescribed dose of vancomycin (usually 1g)
≥15 mg/L	Omit the prescribed dose of vancomycin

- Carry on with the above method until vancomycin course complete.

8. Equality Impact Assessment (EIA)

Type of function or policy	Existing

Division	All	**Department**	Pharmacy
Name of person completing form	Caroline Hallam	**Date**	

Equality Area	Potential Negative Impact	Impact Positive Impact	Which groups are affected	Full Impact Assessment Required YES/NO
Race	No	No	N/A	No
Pregnancy & Maternity	No	No	N/A	No
Disability	No	No	N/A	No
Religion and beliefs	No	No	N/A	No
Sex	No	No	N/A	No
Gender reassignment	No	No	N/A	No
Sexual Orientation	No	No	N/A	No
Age	No	No	N/A	No
Marriage & Civil Partnership	No	No	N/A	No
EDS2 – How does this change impact the Equality and Diversity Strategic plan (contact HR or see EDS2 plan)?		No effect on equality/diversity		

- **A full assessment will only be required if: The impact is potentially discriminatory under the general equality duty**
- **Any groups of patients/staff/visitors or communities could be potentially disadvantaged by the policy or function/service**
- **The policy or function/service is assessed to be of high significance**

IF IN DOUBT A FULL IMPACT ASSESSMENT FORM IS REQUIRED

The review of the existing policy re-affirms the rights of all groups and clarifies the individual, managerial and organisational responsibilities in line with statutory and best practice guidance.