

## APPLICATION OF THIS PROTOCOL:

- Intravenous Vancomycin for the treatment of selective gram-positive organisms including but not limited to:
  - Methicillin-resistant Staphylococci (eg: MRSA/MRCONS)
  - Enterococci (eg: *Enterococcus faecium*)
  - Rhodococci (eg: *Rhodococcus hoagii*)
- This protocol is **NOT** applicable to the treatment of *Clostridioides difficile* infection (CDI) using Oral Vancomycin



If in any doubt, call:  
**TDM Pharmacy** at  
 Ext 4124 (Office Hours)  
 or  
**Refer to ID**

## Step 1: Loading Dose (LD)

» Administer the Loading Dose (LD) as soon as possible!

TABLE A: Loading Dose for Normal Renal Function or Renal Impairment but **NOT on Haemodialysis (HD)**

TABLE A	Renal Function*		Remarks
	CrCl < 30, NOT on HD	CrCl ≥ 30	
Actual Body Weight	20 mg/kg IV STAT	20-25 mg/kg IV STAT	1. Loading Dose - To be given to <b>ALL</b> patients regardless of renal function 2. Vancomycin doses should be calculated based on <b>Actual Body Weight</b> 3. Max Vancomycin dose: <b>2 g/DOSE or 4 g/DAY</b>
< 50 kg	1,000 mg	1,000 mg	
50 – 59 kg	1,250 mg	1,250 mg	
60 – 69 kg	1,500 mg	1,500 mg	
70 – 79 kg	1,500 mg	1,750 mg	
80 – 89 kg	1,750 mg	2,000 mg	
90 – 99 kg	2,000 mg	2,000 mg	
≥ 100 kg	2,000 mg	2,000 mg	

\* Renal Function - CrCl (ml/min) → [\[Click here for CrCl Calculator\]](#)

TABLE B: Loading Dose for **ESRF Patients on Haemodialysis (HD)**

TABLE B	Vancomycin initiated or planned to be initiated <b>BEFORE dialysis starts</b>		Vancomycin planned to be given <b>DURING dialysis</b>	Remarks
	15-20 mg/kg IV STAT	* <b>TOP-UP DOSE</b> (5 mg/kg) (to be given 1 hour before HD ends)	25 mg/kg IV STAT (to be given 1 hour before HD ends)	
Actual Body Weight	If HD occurs on the same day as the loading dose, administer a <b>TOP-UP DOSE*</b> post-HD			1. Vancomycin doses should be calculated based on <b>Actual Body Weight</b> 2. Max Vancomycin dose: <b>2 g/DOSE or 4 g/DAY</b>
< 50 kg	1,000 mg	250 mg	1,250 mg	
50 – 59 kg	1,000 mg	300 mg	1,500 mg	
60 – 69 kg	1,250 mg	350 mg	1,750 mg	
70 – 79 kg	1,250 mg	400 mg	1,750 mg	
80 – 89 kg	1,500 mg	450 mg	2,000 mg	
90 – 99 kg	1,500 mg	500 mg	2,000 mg	
≥ 100 kg	2,000 mg	500 mg	2,000 mg	

\* Hospital Sungai Buloh uses high-flux membrane dialyzers for haemodialysis

Dosing recommendations for HD patients were made in consultation with the Nephrology team (Dr Jeevita and PF Ms Teh Khai Mei).



# Hospital Sungai Buloh Vancomycin Protocol

Launched: 15 August 2022, Updated: 17 April 2024

QUICK LINKS:

Step 1: Loading Dose (LD)

Step 2: Maintenance Dose (MD)

Step 3: Administration (Dilution & Rate)

Step 4: TDM

Step 5: Lab/Patient Monitoring

## Step 2: Maintenance Dose (MD)

TABLE C: Vancomycin Maintenance Dose Based on Body Weight and Renal Function

TABLE C	Renal Function*				
	CrCl <15 or HD	CrCl 15-29	CrCl 30-49	CrCl 50-59	CrCl > 60
Actual Body Weight	-	7.5 mg/kg Q24H	7.5-15 mg/kg Q12-24H	15 mg/kg Q12H	15-20 mg/kg Q8-12H
40 – 49 kg	The maintenance dose is based on Vancomycin TDM after the loading dose.	500 mg OD	500 mg OD	750 mg OD	500 mg BD
50 – 59 kg		500 mg OD	750 mg OD	750 mg OD	750 mg BD
60 – 74 kg		500 mg OD	750 mg OD	500 mg BD	1,000 mg BD
75 – 89 kg		750 mg OD	500 mg BD	750 mg BD	750 mg TDS
> 90 kg		750 mg OD	750 mg BD	1,000 mg BD	1,000 mg TDS**

Then, adjust subsequent maintenance doses based on TDM level (refer to Step 4)  
(While waiting for the TDM result, continue serving the Vancomycin unless pt has severe AKI or poor Urine Output)

\* Renal Function - CrCl (ml/min) → [\[Click here for CrCl Calculator\]](#)

\*\* Consider conservative dosing for patients at risk for Acute Kidney Injury (AKI) (e.g., elderly, concurrent nephrotoxic drugs) – refer ID if in doubt

TABLE D	Standardized Administration Time for Vancomycin Maintenance Dose in HSgB
Vancomycin Frequency	Administration Time
OD	6 AM
BD	6 AM, 6 PM
TDS	6 AM, 2 PM, 10 PM
QID	6 AM, 12 PM, 6 PM, 12 AM

## Step 3: Administration (Dilution & Infusion Rate)

TABLE E Vancomycin Administration: Dilution & Infusion Rate by Dose

Dose	Volume of diluents (NS or D5)		Duration of infusion	<p><b>MAXIMUM INFUSION RATE: 10 mg/min.</b></p> <p>Infusing too fast may cause rapid infusion-related reactions (Red Man Syndrome*).</p> <p><b>*RED MAN SYNDROME / VANCOMYCIN INFUSION REACTION (VIR):</b></p> <ul style="list-style-type: none"> <li>Red Man Syndrome is commonly used to describe vancomycin infusion reaction (VIR) &amp; is the most commonly reported Vancomycin adverse reaction.</li> <li>VIR is not an allergic reaction and is not a contraindication to vancomycin use</li> <li>Symptoms of VIR: itching, flushing and erythematous rash, usually involving the face, neck, and trunk.</li> <li>Slowing the infusion rate will alleviate symptoms in most cases &amp; giving antihistamines may also help.</li> </ul>
	Central line <i>(max conc: 10 mg/mL)</i>	Peripheral line <i>(max conc: 5 mg/mL)</i>		
500 mg	50 mL	100 mL	1 hour	
750 mg	100 mL	200 mL	1.5 hour	
1,000 mg	100 mL	200 mL	2 hours	
1,250 mg	200 mL	250 mL	2.5 hours	
1,500 mg	200 mL	500 mL	2.5 hours	
1,750 mg	200 mL	500 mL	3 hours	
2,000 mg	200 mL	500 mL	4 hours	

## Step 4: Therapeutic Drug Monitoring (TDM)



**TDM level is MEANINGLESS unless the dose is properly served & sampling time is recorded!**

1. Record the **time each infusion started & ended** on [Vancomycin AUC Monitoring Form](#) (eg: infusion started at 6 am & completed at 7.30 am)
2. Record the **time sample was taken** on [Vancomycin AUC Monitoring Form](#) (eg: pre-level taken at 5.30 am & post-level taken at 9 am)

### WHEN TO TAKE TDM SAMPLE?

Time of the first Vancomycin level depends on the **frequency** of Vancomycin **MAINTENANCE DOSE**:

#### Vancomycin Regimen:

#### Loading Dose (LD)

#### Maintenance Dose (MD)

Load (ESRF not on HD) :  LD +  24H (Take random TDM level after **24H** of Loading Dose)

Load (ESRF, regular HD) :  LD +  HD (Take random TDM level in the morning **pre-HD**)

Load + EOD Dosing :  LD +  MD 1 +  MD 2 (TDM 30 mins before the **2nd** Maintenance Dose)

Load + OD Dosing :  LD +  MD 1 +  MD 2 +  MD 3 (TDM 30 mins before the **3rd** Maintenance Dose)

Load + BD Dosing :  LD +  MD 1 +  MD 2 +  MD 3 +  MD 4 (TDM 30 mins before the **4th** Maintenance Dose)

Load + TDS Dosing :  LD +  MD 1 +  MD 2 +  MD 3 +  MD 4 (TDM 30 mins before the **4th** Maintenance Dose)

For any TDM enquiries, kindly call Pharmacy:


- TDM - Ext 4124 (Office Hour) or
- IP Pharmacy - Ext 4110 (AOH) or
- ED Pharmacy- Ext 3210 (AOH)

**If the sampling time falls after office hours (AOH), it is advisable to recommend taking the TDM sample the next morning (on a working day)**

**EXAMPLE:**  
Mr Unknown was prescribed with IV Vancomycin 2 g STAT and 750 mg TDS at 9.45 pm on 13/8/22.  
Based on the guide above, the first Vancomycin level should be taken **30 minutes before the 4<sup>th</sup> Maintenance Dose**.  
Refer to the medication chart below:

IN-PATIENT PRESCRIPTION		TIME:	DATE:							
Start Date: <b>13/08/22</b>	End Date: <b>21/08/22</b>		13/8	14/8	15/8	16/8	17/8	19/8	20/8	
Name: <b>Mr Unknown</b>	Ward: <b>5A</b>									
R/N: <b>SB00123456</b>	Bed No: <b>28</b>	6 am		↓ <b>Start of Maintenance Dose</b> 1 750mg	4 750mg					
Rx:		2 pm		2 750mg						
		10 pm		3 750mg						
				↑ <b>2 g Loading Dose</b>						
Prescribed by: <i>Dr MO</i>	Authorized by: <i>Dr Specialist</i>									

Take TDM Vancomycin trough level here, at 5.30 am, 30 minutes before the 4<sup>th</sup> maintenance dose.



**Use Plain Tube for TDM Sample**

### WHICH SAMPLING METHOD TO CHOOSE: TROUGH VS AUC?

Indication of Vancomycin	Target Vancomycin Level	Samples to be Taken	
		Pre-level (Trough)	Post-level (Peak)
		1. MRSA Infection o Bacteremia o Endocarditis o Pneumonia o Bone/Joint Infection o Neutropenic fever	For pts with stable renal function, including stable CKD: • AUC <sub>24</sub> 400 - 600 mg.h/L  For pts with unstable renal function (eg: AKI or HD): • Trough of 15- 20 mg/L (10.4 - 13.8 µmol/L)
2. CNS Infection	• Trough of 15 - 20 mg/L (10.4 - 13.8 µmol/L)	✓ 30 minutes BEFORE the dose is served	✗
3. SSTI or UTI	• Trough 10 - 15 mg/L (6.9 - 10.4 µmol/L)	✓ 30 minutes BEFORE the dose is served	✗
4. MRCONS or Enterococcus faecium	• Trough of 10 - 20 mg/L (6.9 - 13.8 µmol/L)	✓ 30 minutes BEFORE the dose is served	✗

## Step 5: Patient / Laboratory Monitoring



### 1. Renal Profile (RP)

→ Seek advice if pt has signs of renal toxicity - increase in SCr by 26  $\mu\text{mol/L}$  or increase in SCr of 50% or more from baseline within 48 Hours [refer to KDIGO].

#### Every 2-3 days

→ For haemodynamically stable patients.

#### Daily

→ For patients with rapidly changing renal function or critically ill.

→ For patients with risk factor(s) for nephrotoxicity. Eg: Elderly, concurrent nephrotoxic drug, TDM Vancomycin trough > 15 mg/L.



### 2. Urine Output (Input/Output Chart)

→ Seek advice if Urine Output reduced to < 0.5 ml/kg/H for > 6 Hours.

#### Daily

→ A decrease in urine output can be detected earlier than increases in SCr, enabling dose adjustment before further vancomycin accumulation can occur.



### 3. White Blood Cell count (WBC)

#### Twice a week



### 5. Vital Signs:

- Temperature
- Heart rate
- Blood pressure

#### Daily

### DISCLAIMER:

- This protocol provides general advice based on published evidence and expert opinion for hospital-wide standardization of practice. This guide may not cover all aspects of clinical practice, thus healthcare practitioners are encouraged to review patient details and professionally assess the relevance of this protocol to each clinical situation.
- Referral to ID or AMS Team is strongly recommended for all MRSA or Vancomycin cases.
- This guide is subject to periodic updates. We assume no responsibility for any party who referred to an outdated version of this protocol.

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- Additionally, proper credit and acknowledgement must be given to Hospital Sungai Buloh, indicating the adoption and adaptation of the referenced materials.

### References:

1. MOH Clinical Pharmacokinetics Pharmacy Handbook 2nd Edition
2. Detroit Medical Center Vancomycin Dosing in Adults – Clinical Guidelines
3. Therapeutic monitoring of vancomycin for serious MRSA infections: A revised consensus guideline and review by the ASHSP, the IDSA, the PIDS, and the SIDP. *Am J Health-Syst Pharm.* 2020;77:835-864
4. Hospital Sungai Buloh Dilution Protocol