Government of **Western Australia**
North Metropolitan Health Service
Women and Newborn Health Service

Vancomycin Dose Management in Neonates

Getting the basics right

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Background

Vancomycin is commonly used in neonatal antimicrobial regimens to treat coagulase negative staphylococcal infections (CoNS). Different regimens are currently used across Neonatal Intensive Care Units (NICU) in Australasia, creating variation in dosing schedules and adjustments.

This results in:

- More changes than necessary
- Non-uniform care
- Increased risk of resistance

Aim

To optimise vancomycin management in a NICU setting through development of a dose adjustment guideline.

Methods

Review of Vancomycin levels in KEMH NICU patients from 2012 – 2016 with confirmed bacteraemia requiring extended therapy

- 48 Patients
- 163 Vancomycin levels
- 91 Interventions

A first order elimination dose adjustment algorithm was developed based on:

1. Literature review of Australian practice guidelines
2. Consultation with medication and academic staff

Development of proposed vancomycin dose adjustment guideline to achieve a target concentration of 15 – 20 mg/L.

Retrospective applied vancomycin dose algorithm to the 91 interventions.

Initially **30** levels <15mg/L

After current practice dose adjustment

33.3% (13) levels
In range (15-20mg/L)

After proposed guideline dose adjustment algorithm

61.5% (24) levels
In range (15-20mg/L)

A two-fold increase in patients achieving target concentration after one dose adjustment rather than after multiple dose adjustments. This improves patient outcomes as it enables treatment to be optimised sooner.

Results

Initially 36.3% (32) of doses achieved 15-20mg/L. After an adjustment in practice, only half (16) remained within the range. When the proposed guideline (Figure 1) was retrospectively applied, no adjustments were required and all (32) would have remained in the target range (15-20mg/L).

This would potentially result in:

✓ No unnecessary dose adjustments

✓ Decreased risk of serum concentrations

✓ Decreased risk of fluctuating concentration due to dose changes

Initially 19 levels were >20mg/L. In practice 40% (8) were adjusted to 15-20mg/L. With a proposed guideline dose adjustment 57% (11) would have achieved 15-20mg/L. Note: Levels >20mg/L need to be reviewed to consider patient condition

Dose Adjustment:

The following table aims to target a vancomycin trough level of 15-20mg/mL

Maximum dose of 50mg/kg/day.

Only adjust a dose after confirming last doses were given correctly and at stated times, in addition to checking relevant microbiology results.

Reported Trough level	Current Dose Frequency	Suggested adjustment
Less than 7 mg/L	Every 12 hours	Use the same dose, Increase frequency to every 8 hours.
	Every 8 hours	Increase dose by 75% (1.75 times current dose) and keep frequency at every 8 hours
7 to 10 mg/L	Every 12 hours	Use the same dose, Increase frequency to every 8 hours.
	Every 8 hours	Increase dose by 60% (1.6 times current dose) and keep frequency at every 8 hours
11 to 12 mg/L	Every 12 hours	Keep the frequency the same.
	Every 8 hours	Increase dose by 40% (1.4 times current dose)
13 to 14 mg/L	Every 12 hours	Keep the Frequency the same.
	Every 8 hours	Increase dose by 25% (1.25 times current dose)
15 to 20 mg/L	Every 12 hours	No Adjustment required.
	Every 8 hours	
21 to 22mg/L	Every 12 hours	Continue current dose. Check renal function (Creatinine, Urea and Electrolytes)
	Every 8 hours	Repeat level in 24 hours. Do NOT withhold dose unless worsening renal function.
Vancomycin trough levels >23mg/L consultation with Microbiology and Pharmacy		
23 to 25 mg/L	Every 12 hours	Check Renal Function (Creatinine, Urea and Electrolytes)
	Every 8 hours	Do NOT withhold dose unless worsening renal function. Reduce dose by 20%. (0.8 times current dose) – frequency to remain the same. Repeat level in 24 hours.
>25 mg/L	Every 12 hours	Withhold further doses and contact Microbiology. Check Renal Function (Creatinine, Urea and Electrolytes)
	Every 8 hours	Repeat level 24 hours after last dose (write urgent on pathology form).

Figure 1: *Proposed vancomycin dose adjustment guideline*

Conclusion

The application of the proposed guideline demonstrated a near two fold increase in the proportion of levels that would achieve therapeutic concentration following dose adjustments. This proposed guideline assists in optimising vancomycin therapy, warranting prospective evaluation in neonates with CoNS where vancomycin is indicated.

References

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