

Guideline for gentamicin dosing in infective endocarditis in adults

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Amendment Form

Version	Date Issued	Brief Summary of Changes	Author
2		<ul style="list-style-type: none">• Highlights the need to monitor for ototoxicity and nephrotoxicity in view of prolonged treatment courses• Dosing regimen based on Creatinine Clearance and Actual Body Weight• More detailed interpretation of levels and dose adjustments	Dr Bala Subramanian

USE THIS GUIDELINE FOR:

- Dosing and monitoring of low dose gentamicin for endocarditis due to gram-positive organisms. Used in conjunction with a second antibiotic (e.g. penicillin or teicoplanin)

NOT APPROPRIATE FOR USE IN:

- Gram-negative infections. Refer to the standard or 'once daily' high dose gentamicin guideline.
- Surgical prophylaxis. Please refer to relevant section in the Trust antimicrobial guidelines.
- Acute Kidney injury (AKI)

Administration

- Doses should be administered by IV bolus injection over 3 – 5 minutes.

Calculating the dose

- Use Actual Body Weight (ABW) to determine dose as per the table below, even if obese, up to a maximum dose of 120mg.
- Calculate the patient's Creatinine Clearance.
- $CrCl = \frac{(140 - \text{age}) \times \text{Weight (kg)}}{\text{Serum Creatinine } (\mu\text{mol/L})} \times 1.23$ (male) or 1.04 (female)

Gentamicin Synergistic Dosing Guidelines					
	Patient Weight (Actual body weight)				
Creatinine Cl (ml/min)	<45kg	45 – 65 kg	66 – 85kg	86 – 110kg	>110kg
<25	40mg	60mg	80mg	100mg	120mg
	Check gentamicin level after 24 hours. Do NOT give a further dose until the concentration is <1mg/L				
25 – 44	40mg 24 hourly	60mg 24 hourly	80mg 24 hourly	100mg 24 hourly	120mg 24 hourly
>44	40mg 12 hourly	60mg 12 hourly	80mg 12 hourly	100mg 12 hourly	120mg 12 hourly

Monitoring levels

- Levels should be taken to guide subsequent dosing.
- Aiming for **trough (taken just before next dose due) of <1mg/L AND peak (taken EXACTLY one hour post-dose) of 3-5mg/L.**
- First levels should be taken **one hour after dose 3 (peak) and immediately before dose 4 (trough).** Do NOT delay giving the fourth gentamicin dose while waiting for the trough concentration to be reported, unless there are concerns over deteriorating renal function.

- Please note: Information required on clinical request form: the indication for gentamicin use (e.g. infective endocarditis) and whether the sample is PRE or POST dose, time and date of the sample and the actual dose given in mg/L
- If levels AND renal function are stable, levels can then be monitored twice weekly.
- If renal function OR levels are unstable, check both daily until levels AND renal function are stable.

Interpreting levels

	TARGET GENTAMICIN LEVEL		
Indication	Pre-dose (trough)	One hour post dose (peak)	Action
Infective endocarditis – gram positive organisms	< 1mg/L	3 – 5mg/L	Continue current dosing regimen and monitor pre- and post-dose levels twice weekly provided renal function is stable

- If levels are outside the target range:
 - Check if level taken at the correct time with respect to dose.
 - Check that renal function has not changed enough to require an alteration in dose frequency prior to using the table below.

Level	Action
If trough is >1mg/L (High Trough)	Reduce frequency of dosing (e.g. from 12-hourly to 24-hourly) Recheck trough level when next dose is due and do not re-dose until <1mg/L
If peak is <3mg/L (Low Peak)	Increase the dose following discussion with microbiologist or pharmacist.
If peak is >5mg/L and trough is normal (<1mg/L)	Reduce the dose following discussion with microbiologist or pharmacist
If both peak and trough are above the target range	OMIT the next dose Discuss with Microbiologist before recommencing therapy

- Please contact your Ward Pharmacist or Consultant Microbiologist for further advice on changes to the dose and/or dosing interval

Monitor for adverse effects

Nephrotoxicity

- Check creatinine twice weekly and monitor for signs of renal injury. If gentamicin levels are high, then monitor renal function daily.
- If rising creatinine or oliguria, discuss with Microbiologist or Pharmacist regarding whether to continue gentamicin therapy
- Nephrotoxicity is more likely if prescribed alongside other nephrotoxic agents. Review these regularly during gentamicin treatment

Ototoxicity

- Can occur even when levels are within range
- More common with prolonged treatment
- Monitor carefully if patients are on other concomitant ototoxic agents (e.g. loop diuretics)
- Monitor for new tinnitus, dizziness, poor balance, hearing loss. Ask patients to report any such symptoms. Stop Gentamicin if this occurs and discuss with Microbiologist.
- Refer to audiology for assessment if gentamicin is to continue for more than 7 days.

References

1. Guidelines for the diagnosis and antibiotic treatment of endocarditis in adults: a report of the Working Party of the British Society of Antimicrobial Chemotherapy. *J Antimicrob Chemother* 2012;67:269 – 289
2. NHS Highland Treatments and Medicines: Guidelines for gentamicin dosing in infective endocarditis in adults. Accessed online 9/3/2021.
3. Blackpool Teaching Hospitals Guideline: Gentamicin Adult Dosing Treatment published December 2017. Accessed online 23/3/2021.