Gentamicin Dosing, Administration & Monitoring Guidelines for Adults for Empirical Therapy

Summary of Recommendations

- **Are there any contraindications/precautions to gentamicin?**
  - A history of previous aminoglycoside-associated vestibular/auditory toxicity
  - A history of a serious hypersensitivity reaction to aminoglycosides
  - Myasthenia gravis
  - Pre-existing vestibular / auditory impairment
  - Renal impairment (< 40mL/min) or rapidly changing renal function / acute kidney injury
  - A family history of aminoglycoside-induced auditory toxicity
  - Advanced age (80 years or older)
  - Pregnancy (Pregnancy Category D) & should only be used for life-threatening conditions under specialist advice
  - Amyloidosis

  Use alternative class of antibiotic
  Consult Infectious Diseases for advice

- **Determine dosing weight**
  - Use **actual body weight** for patients who are not obese
  - Use **adjusted body weight** for obese patients (i.e. actual body weight > 120% of ideal body weight)
  
  \[\text{Adjusted Body Weight} = \text{Ideal Body Weight} + [0.4 \times (\text{Actual Body Weight} - \text{Ideal Body Weight})]\]

  Adult Ideal Body Weight (IBW) calculator: Australian Medicine Handbook – Adult IBW Calculator or see overleaf for IBW table

- **Estimate renal function**
  - Use eGFR as reported

  In patients with sepsis and septic shock, prompt antibiotic administration confers a survival benefit, so do not delay gentamicin administration to ascertain renal function.

- **Empirical aminoglycoside dosage for the treatment of infection in adults**

<table>
<thead>
<tr>
<th>Severity</th>
<th>Renal function</th>
<th>Dose* (Maximum daily dose of 700mg in septic shock or 500mg in sepsis; For calculated doses &gt; maximum dose, consider Infectious Diseases advice)</th>
<th>Dosing frequency</th>
<th>Maximum number of empirical doses**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Septic Shock</td>
<td>More than 60mL/min/1.73m²</td>
<td>7 mg/kg</td>
<td>Single-dose</td>
<td>Monitor concentrations for ongoing dosing</td>
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<tr>
<td>Sepsis</td>
<td>More than 60mL/min/1.73m²</td>
<td>5 mg/kg</td>
<td>24-hourly</td>
<td>3 doses (at 0, 24 and 48 hours)</td>
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<td></td>
<td>40 to 60 mL/min/1.73m²</td>
<td>4 to 5 mg/kg</td>
<td>36-hourly</td>
<td>2 doses (at 0 and 36 hours)</td>
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<td></td>
<td>Less than 40mL/min/1.73m²</td>
<td>Consult Infectious Diseases for dosing advice or for selection of an alternative agent.</td>
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</tbody>
</table>

*Round dose to the nearest multiple of 20mg
**For most patients gentamicin can be changed to a beta-lactam or another less toxic agent once initial microbiology results become available. The Infectious Diseases team is available to advise on alternative antimicrobials.

- **Dose administration**
  - Gentamicin should be diluted in 100mL of compatible fluid (e.g. 0.9% sodium chloride) and infused over 30 minutes before any other antibiotic; or
  - Where indicated (e.g. in theatre prior to induction or as the first dose in the treatment of patients with sepsis or septic shock), the dose may be administered in 20mL of 0.9% sodium chloride as a bolus over 5 minutes before any other antibiotic
### Indications

Gentamicin use is limited to the following indication (*unless use is in accordance with an approved protocol or approval is obtained from Infectious Diseases*):

- As part of an empirical therapy for up to 48 hours or less for suspected or proven gram-negative sepsis or septic shock

### Important caveats when using this guideline

- The dosing, redosing, and therapeutic drug monitoring recommendations below do not replace a thorough assessment of individual patient’s medical context.
- Importantly, for patients with known underlying renal impairment, at risk of acute kidney injury, and in those on potentially concomitant nephrotoxic medications (e.g. ACEi, ARBs, NSAIDs, cyclosporin, tacrolimus) caution should be exercised in calculating gentamicin doses and in redosing intervals.
- Advice from Infectious Diseases should be sought for complex patients or clinical situations.

### Therapeutic Drug Monitoring (TDM)

For most patients, gentamicin should be ceased within 48 hours of initiation. If the patient has normal renal function, monitoring of gentamicin plasma concentrations is not required in this timeframe.

- When Infectious Diseases has approved ongoing gentamicin therapy, advice will be provided on appropriate TDM including timing and frequency of plasma sampling.
- Consider monitoring for patients receiving empirical therapy (up to 48 hours of therapy) if renal function is unstable (e.g. critically ill patients with septic shock, suspected acute renal failure, or chronic kidney disease) or in patients with altered pharmacokinetics. Infectious Diseases is available to provide advice on alternative antimicrobials or TDM requirements.

### Renal function – Baseline & ongoing monitoring

- Serum creatinine should be checked and renal function estimated (eGFR) before commencing an aminoglycoside wherever possible.
- Daily urea & electrolytes should be performed during empirical therapy and renal function assessed prior to each subsequent dose.
- For patients in whom deterioration of renal function is likely, careful serial assessment of renal function and consideration of gentamicin levels to assess for gentamicin accumulation should be made prior to redosing.

### Additional Advice & Support

The Infectious Diseases team is available to provide advice on dosing and monitoring of gentamicin therapy for specific patients as requested.

Where therapy is anticipated to be prolonged (> 5 days duration), there is a real risk of ototoxicity and nephrotoxicity; refer also to **Guideline for toxicity monitoring of patients receiving prolonged aminoglycoside therapy.**

### Ideal Body Weight Table

**Male** = 50kg + 0.9kg/each cm over 152cm (2.3kg/each inch over 5ft)

**Female** = 45.5kg + 0.9kg/each cm over 152cm (2.3kg/each inch over 5ft)

<table>
<thead>
<tr>
<th>Height (cm)</th>
<th>Male (kg)</th>
<th>Female (kg)</th>
</tr>
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### References

PROCEDURE DETAILS

Procedure Name
Gentamicin dosing, administration & monitoring guidelines for adults for empirical therapy v2.0

Policy Reference
PL 2016/0048
Medicines Management Committee Policy

Supersedes
Gentamicin dosing, administration & monitoring guidelines for adults for empirical therapy v1.0

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