UCDMC ADULT AMINOGLYCOSIDE DOSING AND MONITORING GUIDELINES

DOsing

Cockcroft-Gault equation: CrCl (mL/min) = \( \frac{(140 - \text{Age}) \cdot \text{Weight}^+}{(72 + \text{SCR})} \) * (0.85 if female)

+ To choose correct weight, compare total body weight (TBW) to ideal body weight (IBW):
  - If TBW > 130% IBW, use ABW (adjusted body weight)
  - If TBW < IBW, use TBW

ABW = IBW + 0.4 x (TBW – IBW)

IBW: Males = 50 kg + 2.3 kg for every inch > 60 inches
     Females = 45 kg + 2.3 kg for every inch > 60 inches

1. High-Dose, Extended-Interval Dosing (once-daily)

Preferred dosing strategy for patients requiring gram-negative antimicrobial activity, as it optimizes concentration-dependent killing, post-antibiotic effect, and helps minimize accumulation within renal tubule and inner ear

- Use TBW unless > 120% IBW, then use ABW

<table>
<thead>
<tr>
<th>Creatinine Clearance</th>
<th>Gentamicin/Tobramycin</th>
<th>Amikacin</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 60 mL/min</td>
<td>7 mg/kg q24hr</td>
<td>15 mg/kg q24hr</td>
</tr>
<tr>
<td>40 – 59 mL/min</td>
<td>7 mg/kg q36h</td>
<td>15 mg/kg q36h</td>
</tr>
<tr>
<td>30 – 39 mL/min</td>
<td>7 mg/kg q48hr</td>
<td>15 mg/kg q48hr</td>
</tr>
<tr>
<td>&lt; 29 mL/min or requiring hemodialysis</td>
<td>Contact clinical pharmacist</td>
<td></td>
</tr>
</tbody>
</table>

1.1. Exceptions: The dosing recommendations above should not be applied in the following: endocarditis, cystic fibrosis, pregnancy, myasthenia gravis, mycobacterium infections (i.e. TB), and burn patients.

1.2. Timing of levels

Initial Monitoring: Draw a random level 8-12 hours after the dose. Use the Hartford Nomogram (on page 3) to determine dosage interval. For amikacin, divide concentration by 2. Use trough level monitoring if not dosing at 7 mg/kg (GEN/TOB) or 15 mg/kg (AMK) or in patients with significant changes in volume of distribution (i.e. sepsis).

- Trough Goal: Gentamicin/Tobramycin < 2 mg/L (ideally 0)
  Amikacin < 4 mg/L (ideally 0)

Peak (efficacy): Consider drawing a peak ONLY if patient will remain on aminoglycoside for >7 days against a known pathogen. Draw level ~4 hours after the dose to account for distribution phase and calculate backwards (2nd level/trough must be drawn to calculate k).

- Goal peak should be 8 – 10 times the MIC for the aminoglycoside.
2. Conventional dosing for gram-negative infections/Synergy dosing for gram-positive infections:

<table>
<thead>
<tr>
<th>Creatinine Clearance</th>
<th>Gentamicin/Tobramycin</th>
<th>Gentamicin Synergy</th>
<th>Amikacin</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 60 mL/min</td>
<td>1.7 mg/kg q8hr</td>
<td>1 mg/kg q8h</td>
<td>7.5 mg/kg q12h or 5 mg/kg q8h</td>
</tr>
<tr>
<td>40 – 59 mL/min</td>
<td>1.7 mg/kg q12hr</td>
<td>1 mg/kg q12h</td>
<td>5 – 7.5 mg/kg q12h</td>
</tr>
<tr>
<td>20 – 39 mL/min</td>
<td>1.7 mg/kg q24hr</td>
<td>1 mg/kg q24h</td>
<td>5 – 7.5 mg/kg q24h</td>
</tr>
<tr>
<td>&lt; 20 mL/min or</td>
<td></td>
<td>Contact clinical pharmacist</td>
<td></td>
</tr>
<tr>
<td>requiring hemodialysis</td>
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</table>

3. Renal impairment:

Patients who are in renal failure, receiving dialysis, or have unstable renal function or acute kidney injury should initially be given a one-time dose of Amikacin 7.5 mg/kg or Gentamicin/Tobramycin 1.7 mg/kg and therapeutic drug monitoring utilized to guide further dose administration.

- For hemodialysis, re-dose when post-HD concentration is < 4 mg/L for Amikacin or < 2 mg/L for Gentamicin/Tobramycin

4. Monitoring

Drug levels are indicated in patients who fit one of following criteria below. Repeat levels at minimum once weekly.

1. Will receive > 3 days of therapy and has one of the following:
   a. Significant risk of treatment failure (meningitis, septic shock, massive fluid overload, burns)
   b. Significant risk of toxicity (age > 50 years, concomitant nephrotoxins such as vancomycin or amphotericin B, liver failure, malnutrition)
   c. Unstable renal function or any renal impairment (CrCl < 50 mL/min)

2. Will receive long-term therapy (> 7 days)

Ordering of drug levels can be delayed in the following patients:

- Being treated empirically and culture results may lead to discontinuation of the aminoglycoside
- Have previous antibiotic levels which can be used for accurate dosing calculations (assuming renal function has remained stable)
- Are being treated for a UTI

For any additional dosing/monitoring assistance, please contact the ID pharmacist
HARTFORD NOMOGRAM (for Amikacin, divide concentration by 2 before plotting on nomogram)