Tobramycin Guidance

This guideline is for adult cystic fibrosis patients only. For other respiratory or cardiology patients please see relevant policy for the condition you are treating.

Exclusion criteria
Therapy with aminoglycoside antibiotics is not considered appropriate in patients with the following:

- acute kidney failure (>50% increase in baseline serum creatinine or oliguria >6 hours in previous 48 hours)
- chronic kidney disease (eGFR < 30ml/min/1.73m²)
- previous serious adverse event to aminoglycoside antibiotics

Cautions
Renal function should be checked at baseline before starting treatment.

Senior consultation required BEFORE starting treatment in the following situations:

- Patients on other nephrotoxic drugs such as NSAIDs or ACE inhibitors, even if renal function is normal
  - Post-transplant patients taking tacrolimus or ciclosporin which are nephrotoxic; consider alternative treatment or monitor serum concentrations and renal function regularly. (NB: immunosuppressant drug concentrations should also be monitored when starting any antibiotics).

- Situations affecting fluid balance, distribution or elimination such as:
  - Rising creatinine ensure renal function checked regularly; monitor serum concentrations regularly, review dose and consider alternative treatment.
  - Pregnancy use alternative agent or use once daily dose to limit exposure to baby; seek advice and monitor regularly.
  - Ascites risk of accumulation, monitor serum concentrations daily or avoid.
  - ITU admission may require higher dose, and risk of renal impairment; check levels daily and monitor renal function.

In these situations alternative therapy should be considered or monitoring of renal function and tobramycin concentrations should be carried out more frequently (up to daily).

Vestibular and oto-toxicity can occur at normal levels.

- Patients should be warned to report any dizziness, unsteadiness on feet, tinnitus, bobbing oscillopsia (vertical bouncing of surroundings), hearing loss, nausea and vomiting.
- Toxicity is due to accumulation within the inner ear and is more likely following prolonged and repeated courses.
- Therapy should be stopped in patients showing any signs of toxicity.
1. Dosage Calculation – 1\textsuperscript{st} course on BD dose

- Determine current \textbf{body weight} (kg) and \textbf{height} (cm).
- If BMI > 30 kg/m\textsuperscript{2} use ideal body weight for calculation.
- Calculate \textbf{Body Surface Area} (m\textsuperscript{2}) (BSA calculator can be found at: http://www.empr.com/dubois-dubois-bsa-calculator/article/170202/)
- Calculate dose using table below.

| Dose = 120mg/m\textsuperscript{2} body surface area TWICE daily 12 hours apart (round doses to nearest 20mg), given as an IV bolus over 4-5 minutes. |

- Prescribe dose at \textbf{8 am and 8 pm} on the in-patient prescription and administration chart and document details on the Tobramycin Monitoring Sheet (see page 4).

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
\textbf{BSA (m\textsuperscript{2})} & \textbf{12 hourly dose} & \textbf{Volume (ml)} & \textbf{No. Vials} \\
\hline
<1.15 & 120 mg & 3.0 & 2 \\
1.16 – 1.32 & 140 mg & 3.5 & 2 \\
1.33 – 1.49 & 160 mg & 4.0 & 2 \\
1.50 – 1.65 & 180 mg & 4.5 & 3 \\
1.66 – 1.82 & 200 mg & 5.0 & 3 \\
1.83 – 1.99 & 220 mg & 5.5 & 3 \\
2.00 – 2.16 & 240 mg & 6.0 & 3 \\
2.17 – 2.33 & 260 mg & 6.5 & 4 \\
\hline
\end{tabular}
\end{table}

- Two nurses should always check the dose and volume before administration.

2. Dosage Calculation – subsequent courses

- Prescribe the dosage regimen that was previously identified as satisfactory for the patient. This information can obtained from:
  \begin{itemize}
  \item the monitoring forms filed in the tobramycin folder in the CF office
  \item the patient’s medical notes
  \end{itemize}
• Recalculate dose if a significant change (e.g. >10%) in body weight or renal function has occurred since previous course.

3. Monitoring of Tobramycin Concentrations

• Results are meaningless unless the dose and sample times are recorded accurately.

• Use the monitoring form to document clearly the EXACT times that doses are administered and the time that blood samples are taken (see next page).

• Check trough and peak concentrations on the 2nd or 3rd dose.

| Trough | take immediately before a dose is given |
| Peak   | take EXACTLY one hour after a dose is given |

• Target concentrations:

| Trough | < 2 mg/L |
| Peak   | 8 – 12 mg/L |

• Samples should be ordered on Trak and sent to WGH biochemistry during normal working hours.

4. Dose adjustment

Results within target range (and no risk factors for accumulation - see page 1):

• continue current dose and repeat serum concentrations once a week

Table 2. Dose adjustments for results out with target range

<table>
<thead>
<tr>
<th>low peak</th>
<th>7.0 – 7.9 mg/L</th>
<th>Move up by one dose band (see table 1).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 6.9 mg/L</td>
<td>Confirm timings and dose administered correctly. Contact pharmacist for advice.</td>
</tr>
<tr>
<td>high peak</td>
<td>&gt; 12 mg/L</td>
<td>If trough &lt; 1mg/L – continue with current dose. Trough &gt; 1mg/L - decrease dose by 20%.</td>
</tr>
<tr>
<td>high trough</td>
<td>&gt; 2 mg/L</td>
<td>Withhold dose. Check renal function. Confirm dose and timings correct. Obtain senior review and inform pharmacist. Either increase interval or stop treatment.</td>
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</tbody>
</table>

• Refer all levels out with range to pharmacist (pager 8445).
• Always confirm EXACT timings of dose and samples when reviewing results out with target range.
• If samples were not collected at the correct times, keep on same dose and re-check BEFORE making dose adjustments.
• This is a guide only. Please seek expert advice if you are not sure.
• Following any dose adjustment, the peak and trough concentrations should be re-checked on the 2nd or 3rd dose.
Tobramycin Monitoring Sheet

| Patient name | Age | Weight | kg |
| CHI Number | | Height | cm |
| Address | or attach addressograph | BMI | kg/m² |
| Telephone number | | Serum creatinine | μmol/L |
| | | Cr clearance | ml/min |
| BSA | | m² |

Calculated by: 

- Record baseline weight and renal function before starting therapy.
- Calculate creatinine clearance as below:

\[
CrCl \text{ (ml/min)} = (140 - \text{Age (yrs)}) \times \text{weight (Kg)} \times 1.23 \text{ (male) or 1.04 (female)}
\]

Serum creatinine (micromol/L)

- The previous dosage regimen may be prescribed for subsequent courses provided there has been no significant change in renal function or body weight.
- Peak and trough concentrations should be measured on 2nd or 3rd dose.
- Target ranges are peak: 8 – 12 mg/L and trough: < 2 mg/L.

<table>
<thead>
<tr>
<th>DOSING</th>
<th>MONITORING</th>
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<tbody>
<tr>
<td>Date</td>
<td>Dose (mg)</td>
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Written by: D McCabe, April 2011
Approved by: HC Rodgers, A Innes, A Greening, I Laurenson
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