TRUST POLICY

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The Policy framework requires that the policy is fully reviewed on the date shown, but it is also possible that significant changes may have occurred in the meantime.

The most up to date policy will always be available on the Intranet Policy web site and staff are reminded that assurance that the most up to date policy is being used can only achieved by reference to the Policy web site.

March 2009

Once Daily Tobramycin: Administration and Monitoring in Adults

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Date of Issue: March 2009               Review Date: March 2012
<table>
<thead>
<tr>
<th>Authorisation</th>
<th>Name and Position</th>
<th>Date Approved</th>
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<tbody>
<tr>
<td>Responsible Authors</td>
<td>Israr Baig&lt;br&gt;Senior Clinical Pharmacist&lt;br&gt;Marcus Jones&lt;br&gt;Formulary Pharmacist</td>
<td>10&lt;sup&gt;th&lt;/sup&gt; March 2009</td>
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<td>Assured by</td>
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Consideration at authorised groups (e.g. Board, Board sub committees, Policy Group, Clinical policies Sub Group, Departmental meetings etc)

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<tr>
<th>Name of Group</th>
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<tr>
<td>Antibiotics Sub-group</td>
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Objective:
Policy for the administration and monitoring of once-daily tobramycin at Gloucestershire Hospitals NHS Foundation Trust (GHNHSFT).

Background/policy statement:
Gentamicin is the aminoglycoside of choice at GHNHSFT due to its lower cost and suitability for most infections requiring treatment with an aminoglycoside. Tobramycin and amikacin are normally reserved for treatment of infections that are resistant to gentamicin, or on the advice of a Consultant Microbiologist. Tobramycin is the aminoglycoside of choice for patients with cystic fibrosis for the treatment of infective exacerbations caused by Pseudomonas aeruginosa.

Aminoglycoside antibiotics such as tobramycin must be administered parenterally as they are poorly absorbed from the GI tract. In general, once-daily administration is now recommended in most clinical situations. Once daily tobramycin is:

- As effective as multiple dosing regimes
- Less toxic (less nephrotoxicity & ototoxicity)
- More convenient to administer and monitor
- More economical

Exclusions:
Once daily dosing is inappropriate and should not be used in:

- Pregnancy
- Major Burns
- Ascites

Caution:
Tobramycin should be used with caution in patients with renal impairment. See Appendix 1 for dosage recommendations.
Dosage:

Patients without cystic fibrosis:
Give 3-5mg/kg (3mg in patients >65 years of age) once daily as an intravenous infusion in 100mls of dextrose 5% or sodium chloride 0.9% over 60 minutes. Round dose up or down to the nearest 40mg.

Cystic Fibrosis patients:
Give 8-10mg/kg once daily as an intravenous infusion in 100mls of dextrose 5% or sodium chloride 0.9% over 60 minutes. The maximum recommended dose of tobramycin in adult patients with CF is 660 mg. Round dose up or down to the nearest 40mg. Patients who have previously received treatment with tobramycin and have achieved satisfactory plasma tobramycin levels may be prescribed the previous dose regimen provided that their weight and renal function have not changed.

| Use ideal body weight (IBW) rather than actual body weight (ABW) because tobramycin distributes poorly in fat. For obese patients (BMI >30 or >120% of ideal body weight) it is recommended that the dose is calculated using the patient’s obese dosing body weight (ODBW):
| Obese dosing body weight (ODBW) = IBW + 0.4 (ABW - IBW)
| To calculate ideal body weight, use the following equation:
| Ideal body weight (Male) = 50kg + (2.3kg x height in inches over 5 feet)
| Ideal body weight (Female) = 45.5kg + (2.3kg x height in inches over 5 feet)

When to give the dose
The first dose of tobramycin may be given at any time of day (i.e. as soon as it is needed).

Subsequent doses should be moved to a time that is convenient for both the patient (i.e. not overnight) and the Chemical Pathology Department (i.e. no samples for tobramycin levels should be sent for testing between 11pm and 6am).

Evening dosing is recommended. To facilitate this, the second dose may be given 18 to 36 hours after the first dose provided that the first tobramycin level is within the recommended range (see monitoring/interpretation below) and the patient’s renal function has not changed significantly.

Monitoring:
A post-dose level is required. Obtain a single serum sample 12 or 18 hours after the dose. Send sample to CHEMICAL PATHOLOGY. Blood sample forms must include:

- Date and time of last dose
- Date and time sample taken
- Dose per kg used (e.g. 5mg/kg)
- Dosing regimen (e.g. daily dosing)

Target serum concentration for once-daily tobramycin:

- 12 hours post dose = <2mg/L
- 18 hours post dose = <1mg/L
Interpretation:

- **If Serum tobramycin concentration is:**
  - $<2\text{mg/L (12 hrs post infusion)}$ or $<1\text{mg/L (18 hrs post infusion)}$ then the present dose is correct for the patient’s existing renal function. This shows no accumulation; therefore continue with the same daily dose.

- **If Serum tobramycin concentration is:**
  - $>2\text{mg/L (12 hrs post infusion)}$ or $>1\text{mg/L (18 hrs post infusion)}$ then the present dose is too high for the patient’s existing renal function. Dose reduction to a new dose will be required as per this equation:

  \[
  \text{New Dose} = \frac{\text{Previous daily dose} \times \text{Target serum value}}{\text{Actual serum level}}
  \]

  Serum tobramycin levels should be rechecked 12 to 18 hours after the new dose.

- **If tobramycin levels are within the recommended range with normal renal function then monitor levels and U&Es twice weekly. Note: weekly levels are acceptable for cystic fibrosis patients whose treatment course is expected to exceed 2 weeks.**

Caution must be used when using this graph to interpret levels taken from patients with renal dysfunction, as their concentration-time-curve may be different. If the serum tobramycin level is $\leq 2\text{mg/l after 12 hours}$ and $\leq 1\text{mg/l after 18 hours}$ it is safe to give the next dose on time. If the level falls in the intermediate area a dose reduction needs to be made, this reduced dose can be given when the next dose is due. **Omit the dose if the level is in the potentially toxic area and urgently seek advice from a Microbiologist.**
Dose adjustment for impaired renal function

Cockroft-Gault equation for estimating creatinine clearance:

\[
\text{Creatinine Clearance (GFR)} = \frac{(140 - \text{Age}) \times \text{Weight (Kg)}}{\text{Serum Creatinine (µmol/litre)}} \times F
\]

Where \( F = 1.23 \) (For Men)
\[ \quad 1.04 \] (For Women)

### Dose adjustment recommendations:

<table>
<thead>
<tr>
<th>GFR (ml/min)</th>
<th>Dose</th>
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<tr>
<td>30-70</td>
<td>3-5mg/kg once-daily</td>
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<tr>
<td>10-30</td>
<td>2-3mg/kg once-daily</td>
</tr>
<tr>
<td>5-10</td>
<td>2mg/kg every 48 to 72 hours according to levels</td>
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Always keep in mind that the potential nephrotoxicity of tobramycin may worsen residual renal function.

For further advice or clarification please contact:

- Microbiology: CGH ext. 4430 GRH ext. 5052
- Medicines Information: CGH ext. 3030 GRH ext. 6108

Selected References:

**Once Daily Tobramycin: Administration and Monitoring in Adults**

**Dose** = 3 - 5mg/kg * (3mg in patients >65 years old)  
**Dose** = 8 - 10mg/kg * for Cystic Fibrosis Patients

For tobramycin dose calculations always use ideal body weight (IBW) rather than actual body weight (ABW) as tobramycin distributes poorly in fat.

* For obese patients (BMI >30 or >120% of ideal body weight) it is recommended that the dose is calculated using the weight obtained from the following formula:

\[
\text{Obese Dosing Body Weight} = \text{IBW} + 0.4(\text{ABW} - \text{IBW})
\]

Where ABW = Actual body weight  
&_IBW = Ideal body weight  
For Male = 50kg + (2.3kg x height in inches over 5 feet)  
For Female = 45.5kg + (2.3kg x height in inches over 5 feet)

**Administration**

Once daily as an intravenous infusion in 100mls of Dextrose 5% or Sodium Chloride 0.9% over 60 minutes. Evening administration recommended.

**Exclusions**

Once daily tobramycin is inappropriate and should not be used in:

- **Pregnancy**
- **Major burns**
- **Ascites**

Caution in renal impairment (GFR <30) - see full policy on intranet for dosing guidelines in renal impairment

**Monitoring**

A post-dose level is required. Obtain a single serum sample 12 to 18 hours after the dose. Send sample to CHEMICAL PATHOLOGY.

Blood sample forms must include:

- Date and time of drug administration  
- Date and time of blood sampling  
- Dose per kg used (e.g. 5mg/kg)  
- Dosing regime (e.g. daily dosing)

**Target serum tobramycin concentration:**

12 hours post dose = <2mg/L  
18 hours post dose = <1mg/L

If tobramycin levels are within the recommended range, with normal renal function, monitor levels / U&Es twice weekly.

For further advice please contact MICROBIOLOGY CGH ext. 4430, GRH ext. 5052  
Full version of once daily tobramycin administration and monitoring policy is available on the intranet.