### Guideline for Prescribing and Administration of Tobramycin for Adult Bronchiectatic Patients

**Title of Guideline (must include the word “Guideline” (not protocol, policy, procedure etc)**

Guideline for prescribing and administration of tobramycin for adult bronchiectatic patients

**Author: Contact Name and Job Title**

Annette Clarkson (Specialist clinical pharmacist antimicrobials)  
Clare Horton-Smith (Specialist Respiratory Pharmacist)  
Luke Dowdeswell (Senior Clinical Pharmacist)

**Directorate & Speciality**

Acute medicine, respiratory

**Date of submission**

March 2017

**Explicit definition of patient group to which it applies (e.g. inclusion and exclusion criteria, diagnosis)**

Adult bronchiectatic patients.  
Excludes paediatrics, pregnancy, CF

**Version**

4

**If this version supersedes another clinical guideline please be explicit about which guideline it replaces including version number.**

1452  Prescribing and administration of tobramycin for adult bronchiectatic patients

**Changes to guideline**

Minor formatting

**Statement of the evidence base of the guideline – has the guideline been peer reviewed by colleagues?**

Local microbiological sensitivity surveillance  
Recommended best practice based on clinical experience of guideline developers

- **Evidence base: (1-5)**
  - 1a  meta analysis of randomised controlled trials
  - 1b  at least one randomised controlled trial
  - 2a  at least one well-designed controlled study without randomisation
  - 2b  at least one other type of well-designed quasi-experimental study
  - 3  well-designed non-experimental descriptive studies (ie comparative / correlation and case studies)
  - 4  expert committee reports or opinions and / or clinical experiences of respected authorities
  - 5  recommended best practise based on the clinical experience of the guideline developer

**Consultation Process**

Nottingham Antibiotic Guidelines Committee  
Nottingham University Hospitals Drugs and Therapeutics Committee  
Respiratory physicians Drs Lim and Harrison

**Ratified by:**

Trust doctors and pharmacists

**Review date:**

March 2020

**This guideline has been registered with the trust. However, clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date.**
For Cystic Fibrosis patients see separate guidance

Tobramycin is a restricted antibiotic- Gentamicin should be used as the 1st line aminoglycoside. Once daily Tobramycin should ONLY be initiated if advised by microbiology or the inclusion criteria below are met:

- Previous/current sputum culture sensitivities indicate gentamicin resistance
  or
- Patients who have had a poor response to gentamicin previously
- Carefully selected patients with Pseudomonas aeruginosa infection (e.g. when eradication of pseudomonas is anticipated or when underlying immunodeficiency may be present).

1. **Once daily dosing of tobramycin**

Baseline U&Es must be taken on admission these results should then be used to calculate creatinine clearance (CrCl) using the Cockcroft Gault equation (see below), a calculator is available on the antibiotic website.

The standard dose is **5mg/kg once daily maximum dose of 500mg** (round to the nearest 40mg) – see below for dose adjustment in renal impairment and obesity. **Where possible, prescribe the dose so that it can be given in the morning or at 12 noon to enable levels to be taken at a suitable time.**

1.1 **Dose adjustment in established renal impairment**

Dose reduction is required in renal impairment (see Table 1) as tobramycin is excreted into the urine by glomerular filtration. Dose reductions must be based on CrCl calculated using the Cockcroft-Gault equation (see below), rather than the automated MDRD eGFR produced by the clinical chemistry laboratory available on NOTIS. There can be a significant difference between the results of the two calculations.

<table>
<thead>
<tr>
<th>CrCl 10 – 40ml/min</th>
<th>CrCl &lt;10ml/min</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3mg/kg (max 300mg)</strong></td>
<td><strong>2 mg/kg (max 200mg)</strong></td>
</tr>
<tr>
<td>Check levels 18–24 hours after first dose.</td>
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</tr>
<tr>
<td>Re-dose only when levels &lt; 1 mg/L</td>
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Anuric and oliguric (<500ml/day) patients can be assumed to have a CrCl <10ml/min.
Calculation of creatinine clearance using cockcroft gault equation

The Cockcroft-Gault equation is used to calculate creatinine clearance as an estimate of glomerular filtration rate (GFR) for the purpose of drug dosing in renal impairment:

\[
\text{CrCl (ml/min)} = \frac{F \times (140 - \text{age}) \times \text{weight (kg)}}{\text{Serum creatinine (micromol/L)}}
\]

where: \( F = 1.23 \) for male patients, \( F = 1.04 \) for female patients

NOTE: If patient is anuric, morbidly obese or in acute renal failure this equation will not give a true reflection of CrCl.

A creatinine clearance calculator is available on the antibiotic intranet site. This can be accessed at: [http://nuhnet/diagnostics_clinical_support/antibiotics/Pages/Calc.aspx](http://nuhnet/diagnostics_clinical_support/antibiotics/Pages/Calc.aspx).

1.2 Dose adjustment in obese patients

If the patient is obese – defined as more than 20% of their ideal body weight (IBW) – a dose correction is required. It is recommended that in these cases the dosing calculator available on the antibiotic intranet site is used. This can be accessed at: [http://nuhnet/diagnostics_clinical_support/antibiotics/Pages/Tobraobeseimpkg.aspx](http://nuhnet/diagnostics_clinical_support/antibiotics/Pages/Tobraobeseimpkg.aspx).

This calculates a ‘dose determining weight’ for obese patients based on the patient’s ideal body weight and actual body weight and recommends an initial once daily Tobramycin dose using CrCl calculated via the Cockcroft-Gault equation. NOTE: This calculator can also be used in non-obese patients. The calculator will not produce reliable results in patients who are anuric or in acute renal failure as it uses CrCl as a measure of renal function. NOTE: No maximum value applies for a dose determining weight, however no dose of tobramycin should exceed 500mg.
2. **Therapeutic drug monitoring of tobramycin levels**

Tobramycin levels are available 24 hours a day, 7 days a week via clinical chemistry at QMC.

**Samples from the city campus must reach the pathology lab reception before 3pm weekdays for a same day result.**

If a sample is taken after 3pm or out of hours, the ward should contact the pathology lab at QMC on ext. 64932 to make them aware of the sample. The sample should then be placed in a sealed envelope marked clearly 'Clinical Pathology QMC ext. 64932 urgent sample' and sent via a taxi to QMC ED reception. The ED reception then contact the pathology lab on its arrival to inform them the sample has arrived.

- A trough, or pre-dose, level is required **18-24 hours** after the first dose. This should be sent in a gold top serum separator tube to clinical pathology.
- It is **not** necessary to do a post dose (or peak) level for once daily dosing.
- Capillary blood samples should **NOT** be used as they do not produce reliable results.
- On the sample request form state the date and time of last dose and the date and time level taken and the prescribed dose (without which the results cannot be interpreted).
- In a patient <65 years of age, if the serum creatinine is normal with good urine output give the second dose without waiting for the result. The result must be checked before the third dose.
- In a patient >65 years of age or with abnormal renal function or poor urine output, await the result before giving a second dose.
- Renal function should be checked at least three times a week and levels should be checked twice weekly during a treatment course, provided that renal function and urine output are stable.
- If renal function deteriorates then renal function should be checked daily and tobramycin levels closely monitored. A dose reduction may be required.
- Where indicated (i.e. clinically unwell with indwelling catheter) a fluid balance chart should be completed and urine output closely monitored.
### 2.1 Interpretation of TDM results

The pre-dose level must be low to minimise toxicity. If the pre-dose level returned is in range (<1mg/L): The current once daily dosing regime can be continued. A further pre-dose level should be performed following 3-4 more doses, provided that renal function is stable. If the pre-dose level returned is between 1-2mg/L and renal function is unchanged: The ongoing need for tobramycin therapy should be reviewed. If still indicated, reduce the dose:

<table>
<thead>
<tr>
<th>Current dosing regime</th>
<th>New dosing regime</th>
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<td>5mg/kg</td>
<td>3mg/kg</td>
</tr>
<tr>
<td>3mg/kg</td>
<td>2mg/kg</td>
</tr>
<tr>
<td>2mg/kg</td>
<td>Omit dose and repeat level the following day</td>
</tr>
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If the pre-dose level returned is >2mg/L or renal function has deteriorated: The ongoing need for tobramycin therapy should be reviewed. Serum creatinine and urine output should be checked. If tobramycin is still required, recheck level after 12-24 hours and only re-dose once a result of <1mg/L is obtained, using the regimen below:

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