In the case of hard copies of this policy the content can only be assured to be accurate on the date of issue marked on the document.

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 Gentamicin: Administration and Monitoring in Adults

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### DOCUMENT: Once Daily Gentamicin: Administration and Monitoring in Adults

<table>
<thead>
<tr>
<th>Authorisation</th>
<th>Name and Position</th>
<th>Date Approved</th>
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</thead>
</table>
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Consultant Microbiologist |               |
| Assured by             | Trust Policy Group                                     |               |

### Consideration at authorised groups (e.g. Board, Board sub committees, Policy Group, Clinical policies Sub Group, Departmental meetings etc)

<table>
<thead>
<tr>
<th>Name of Group</th>
<th>Minute details</th>
<th>Date considered</th>
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<tbody>
<tr>
<td>Antibiotics Sub-group</td>
<td></td>
<td>10th March 2009</td>
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</table>
Objective:
Policy for the administration and monitoring of once-daily gentamicin 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.

Aminoglycoside antibiotics such as gentamicin 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 gentamicin 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:

- Endocarditis
- Pregnancy
- Major Burns
- Ascites
- Osteomyelitis
- Myeloma patients

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

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.

*Use ideal body weight (IBW) rather than actual body weight (ABW) because gentamicin 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 gentamicin 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 gentamicin 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 gentamicin 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. A single serum sample should be obtained 12 to 18 hours after the dose and sent to CHEMICAL PATHOLOGY. As there is flexibility about the timing of the sampling, a time which is convenient for the patient and the laboratory should be chosen.

Samples should not be collected or sent for testing between 11pm and 6am.

Blood sample forms must include the following information:

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

Target serum concentration for once-daily gentamicin:

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

- **If Serum gentamicin 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 gentamicin 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 gentamicin levels should be rechecked 12 to 18 hours after the new dose.

- **If gentamicin levels are within the recommended range with normal renal function then monitor levels and U&Es twice weekly.**

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 gentamicin 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.**
Appendix 1

**Dose adjustment for impaired renal function**

Cockroft-Gault equation for estimating creatinine clearance:

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

Where F = 1.23 (For Men)
1.04 (For Women)

**Dose adjustment recommendations:**

<table>
<thead>
<tr>
<th>GFR (ml/min)</th>
<th>Dose</th>
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<tbody>
<tr>
<td>30-70</td>
<td>3-5mg/kg once-daily</td>
</tr>
<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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</table>

Always keep in mind that the potential nephrotoxicity of gentamicin 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 Gentamicin: Administration and Monitoring in Adults

**Dose** = 3 - 5mg/kg (3mg in patients >65 years old)

*Use ideal body weight rather than actual body weight as gentamicin 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 \( \text{ABW} = \text{Actual body weight} \)

\( \& \) \( \text{IBW} = \text{Ideal body weight} \)

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 gentamicin is inappropriate and should not be used in:

- Endocarditis
- Ascites
- Pregnancy
- Osteomyelitis
- Myeloma patients
- Major burns

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 gentamicin level:**

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

**Formula to re-calculate gentamicin dose:**

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

(round new dose to the nearest 40mg)

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

If gentamicin 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 Gentamicin Administration and Monitoring Policy is available on the intranet.