Blackpool Teaching Hospitals
NHS Foundation Trust

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Replaces: Version 3 Gentamicin Adult Dosing Treatment CORP/GUID/313	**Description of amendments:** Clarified age parameter that requires 3mg/kg dose – should be greater or equal to 70years. Removed max dose of 80mg for multiple daily dose in line with BSAC guidelines. Advice to monitor for side effects	
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1 PURPOSE

To ensure adequate dosing of gentamicin to effectively treat infection in adult patients, whilst protecting patients from toxicity due to overdose.

Gentamicin is an effective and valuable antibiotic for the treatment of infections due to Gram negative organisms. Gentamicin is administered intravenously and dosing must be adjusted for the patient's renal function and serum levels monitored to reduce the risk of the serious adverse effects of nephrotoxicity and ototoxicity. Prescribers should inform patients of these important side effects.

Gentamicin can be dosed using one of two dosing regimens:

- Extended interval (once daily) dosing
- Traditional multiple daily dosing.

Extended interval dosing (also known as "once-daily gentamicin") involves the use of a 5mg/kg dose administered as a 30-60minute infusion. The dosage interval (24, 36 or 48-hourly) is adjusted to ensure that serum levels fall below 1mg/L for at least 4 hours of the dosing interval. Selecting the optimum-dosing interval is achieved by monitoring pre-dose levels. Blood sampling is repeated after dose interval changes and twice weekly thereafter if renal function and fluid balance are stable. Extended interval gentamicin dosing has been found to be at least as effective as traditional multiple daily dosing and no more nephrotoxic. This dosing regime is also less complex to administer and monitor, therefore making it the dosing regimen of choice.

Traditional multiple daily dosing is used for the treatment of endocarditis.

This guideline provides advice on the dosing and monitoring of gentamicin using both regimens and taking into account the patient's renal function/age to ensure the most effective and safest dosing of this antibiotic.

2 TARGET AUDIENCE

This guideline includes:

- Dosing of gentamicin using the high-dose extended interval regimen, for the treatment of Gram negative sepsis.
- Dosing of gentamicin in elderly patients or those with severe renal impairment (CrCl 10-29.9ml/min) for the treatment of Gram negative sepsis.
- Dosing of gentamicin by traditional multiple daily dosing for infective endocarditis in adults.

3 GUIDELINE

3.1 Extended Interval Gentamicin Dosing

Click here for quick reference guideline.

This dosing regime is for the treatment of Gram negative sepsis in patients WITHOUT severe renal impairment (CrCl ≥30mL/min) - see section 3.5 on how to calculate creatinine clearance (CrCl).

Do NOT use this extended interval dosing for the following groups of patients (without discussion with pharmacist or microbiologist).

- Bronchiectasis
- Burns (>20% body surface area)
- Cystic fibrosis
- Ascites
- Infective endocarditis
- Renal impairment (Creatinine clearance <30mL/min), unstable or deteriorating renal function
- Renal dialysis.

3.1.1 Calculate Dose (5mg/kg)

Standard dose is 5mg/kg (max. 500mg) for gentamicin based upon actual body weight or adjusted body weight, rounded to the nearest 20mg.

If the patient is not obese, use the actual body weight to calculate the starting dose.

If the patient is obese (20% over ideal body weight), use the adjusted body weight to calculate the starting dose (see appendix 4 to determine the need to use adjusted body weight and how to calculate adjusted body weight).

3.1.2 Prescribe the First Dose on the Regular Antibiotics Section on the Drug Chart and Indicate on the Drug Chart the Need to Monitor Pre-dose Level before 2nd Dose

Check Gentamicin has not been given in the last 24 hours before prescribing or administering Gentamicin – check all current and previous prescriptions / A+E paperwork if applicable.

- Clear documentation and handover of critical medicines is essential to prevent errors.
- Communication of stat doses between prescriber and ward essential.

Dose to be administered, diluted in 100mL sodium chloride 0.9% or glucose 5%, over 30 - 60 minutes.[1,9]

3.1.3 Monitor Pre-Dose Level before 2nd Dose (1-4 Hours Before Next Dose Is Due)

Gentamicin is a nephrotoxic drug. Monitoring of pre-dose levels is required to ensure that the drug has been sufficiently cleared (pre-dose <1mg/L) from the body. Post-dose monitoring of levels is NOT required.

Where gentamicin is being used as a single dose either in surgical prophylaxis or adjuvant treatment, there is no need to take pre-dose levels as no subsequent doses are intended.

3.1.4 Interpreting Gentamicin Level

If NORMAL AND STABLE RENAL FUNCTION:

Monitor pre-dose level before 2nd dose, GIVE 2nd dose without waiting for level and review the result of the pre-dose level before prescribing and administering 3rd or subsequent doses.

Target pre-dose level LESS THAN 1mg/L

Normal pre-dose level (<1mg/L)

- Continue current regimen
- Repeat pre-dose levels after 3-4 days if renal function remains stable

Pre-dose level 1-2mg/L (and renal function unchanged)

- Check level taken at the correct time (1-4 hours before next dose was due)
- Increase the dosing interval to 36-hourly

Pre-dose level greater than 2mg/L

- Check level taken at the correct time (1-4 hours before next dose was due)
- Omit any further doses of gentamicin and discuss with Microbiology
- The need for gentamicin therapy MUST be reviewed

If the pre-dose level was not taken at the correct time the reported result must be interpreted with caution. Speak to pharmacy or microbiology for advice in this situation.

If the patient cannot safely be maintained on an extended interval dosing regimen, consider the renal dosing regimen.

3.1.5 Prescribing Subsequent Doses

Subsequent doses may be prescribed on the regular section of the drug chart, and administration boxes MUST be marked to ensure the correct dosing interval is followed, and indicate when the next level is due.

3.1.6 Monitoring Continuing Therapy

Repeat pre-dose level monitoring and serum creatinine twice weekly or more frequently in patients with unstable renal function.

Repeat pre-dose level monitoring **daily** if adjustments are being made or if the patient is **renally impaired**.

Assess the need for gentamicin daily and monitor for renal / ototoxicity.

Please Note
Gentamicin therapy is rarely required beyond 48 - 72 hours, with the exception of endocarditis. Any course intended beyond 48 – 72 hours MUST be discussed with a Consultant Microbiologist. The risk of nephrotoxicity and ototoxicity increases with prolonged course length.

3.2 Elderly/Renal (CrCl 10-29.9ml/min) Gentamicin Dosing

Click here for quick reference guideline.

This dosing regime should be used where the prescriber wishes to use an extended interval gentamicin dosing regime for the treatment of Gram negative sepsis in patients WITH severe renal impairment (Creatinine clearance <30mL/min- but discuss with microbiologist or pharmacy if <10mL/min or anuric) or elderly patients e.g. greater or equal to 70years.

3.2.1 Calculate Renal Dose (3mg/kg)

If the patient is not obese, use the actual body weight to calculate starting dose, (round to nearest 20mg).

If the patient is obese (20% over IBW), use the adjusted body weight to calculate starting dose. (See appendix 4 to determine the need to use adjusted body weight and how to calculate adjusted body weight).

3.2.2 Prescribe the First Dose on the "Once Only" Section on the Front of the Drug Chart

Check Gentamicin has not been given in the last 24 hours before prescribing or administering Gentamicin– check all current and previous prescriptions/A+E paperwork if applicable.

- Clear documentation and handover of critical medicines is essential to prevent errors.
- Communication of stat doses between prescriber and ward essential.

No subsequent doses should be prescribed on the regular section of the drug chart until a pre- dose level is taken and reviewed.

Dose to be administered, diluted in 100mL sodium chloride 0.9% or glucose 5%, over 30-60 minutes. 1,9

3.2.3 Take Level Immediately Before 2nd Dose Is Due

WAIT for level result.

3.2.4 Interpreting Gentamicin Level Result

Target pre-dose level LESS THAN 1mg/L

If level less than 1mg/L

- Prescribe 2nd dose on “once only” section of drug chart or regular section (highlighting the need to wait for pre-dose level)
- Repeat level 24 hours after dose administered (pre-dose before the next dose due)

If level 1mg/L OR greater than 1mg/L

- Do **NOT** prescribe any further doses
- Check level taken at the correct time (1-4 hours before next dose was due)
- Repeat level 24 hours later if it was taken at the correct time
- If level < 1mg/L, prescribe 2nd dose on “once only” section of drug chart or regular section (highlighting the need to wait for pre-dose level)
- If level still remains >1mg/L, keep repeating gentamicin level at periodic intervals until gentamicin level has fallen to <1mg/L

No further doses should be prescribed or administered until level is <1mg/L

If the pre-dose level was not taken at the correct time the reported result must be interpreted with caution. Speak to pharmacy or microbiology for advice in this situation

DAILY levels are required for patients on the renal/elderly gentamicin dosing regimen or those with unstable renal function.

Assess the need for gentamicin daily and monitor for renal/ototoxicity.

Please Note: **Gentamicin therapy is rarely required beyond 48 – 72 hours, with the exception of endocarditis. Any course intended beyond 48 hours in patients with CrCl <30mL/min MUST be discussed with a Consultant Microbiologist**. The risk of nephrotoxicity and ototoxicity increases with prolonged courses.

3.3 Traditional Multiple Daily Dosing of Gentamicin

Click here for quick reference guideline.

This dosing regime is for the treatment of patients with **endocarditis**.

3.3.1 Calculate Dose

1mg/kg 12hourly (modify according to renal function and levels) round to the nearest 20mg.

If patient is not obese, use actual body weight to calculate starting dose.

If patient is obese (20% over IBW), use adjusted body weight to calculate starting dose. (See appendix 4 to determine the need to use adjusted body weight and how to calculate adjusted body weight).

3.3.2 Prescribe Gentamicin at Chosen Dose and Dose Interval

The dosing regimens recommended above are starting dose regimens only. Blood levels must be monitored to ensure target peaks and troughs are achieved.

Dose to be administered as intravenous bolus over 3-5 minutes. 1,9

3.3.3 Monitoring Drug Levels

Check **pre-dose (trough) level around the 3rd or 4th dose** before administering the dose.

Administer dose. There is no need to wait for pre-dose level before administering dose, unless instructed to do so by your ward pharmacist or Consultant Microbiologist.

Check **one hour post-dose (peak) level around the 3rd or 4th dose**. Level to be taken one hour after completion of the bolus / infusion.

If **renally impaired**, check around the **2nd dose**.

Label your sample tubes and request form clearly with pre and post dose level as appropriate.

3.3.4 Interpreting Gentamicin Levels

BNF target blood levels are as follows:

	Gentamicin	
Indication	**Pre-dose (trough)**	**One hour post dose (peak)**
Infective endocarditis – gram positive	Less than 1mg/L	3-5mg/L

3.3.4.1 Pre-dose levels:

Normal pre-dose (<1mg/L)

- Regimen can be continued
- Further pre-dose levels MUST be monitored twice weekly so long as renal function is stable

Pre-dose level is between 1-3mg/L (and renal function unchanged)

- Check level taken at the correct time (1-4 hours before next dose was due)
- Increase the dosing interval e.g. from 12-hourly to 24-hourly

Pre-dose greater than 3mg/L

- Check level taken at the correct time (1-4 hours before next dose was due)
- Further gentamicin doses MUST be withheld
- Discuss with microbiology before recommencing therapy

3.3.4.2 One-hour post-dose levels:

Post-dose level is below the target range (<3mg/L)

- Check level taken at the correct time (1 hour after the completion of infusion/bolus)
- Gentamicin is subtherapeutic
- The dose should be increased

Post-dose level is above the target range (>5mg/L); pre-dose level is normal (<1mg/L)

- Check levels taken at the correct time
- Reduce the dose

Both the post-dose (>5mg/L) and pre-dose (>1mg/L) levels are above the target range

- Check levels taken at the correct time
- The next dose(s) MUST be omitted
- Discuss with Microbiology before recommencing therapy

If the pre- and/or post-dose level were not taken at the correct time the reported result must be interpreted with caution. Speak to pharmacy or microbiology for advice in this situation

Please contact your ward Pharmacist or Consultant Microbiologist for advice on changes to the dose and / or dosing interval.

3.3.5 Monitoring Continuing Therapy

Repeat drug level monitoring (peak and trough) levels and serum creatinine twice weekly, or more frequently if renally impaired.

Monitor for renal/ototoxicity.

3.4 How to calculate IBW and Adjusted Body Weight

Calculate the IBW first (or see appendix 4 - IBW table), then use IBW to calculate the adjusted body weight.

IBW men (kg) = 50 + 2.3 x every inch over 5 feet
IBW women (kg) = 45.5 + 2.3 x every inch over 5 feet

Adjusted body weight (Adj BW) = IBW + 0.4x (actual body weight – IBW)

3.5 How to calculate creatinine clearance

Click here for Creatinine Clearance calculator to estimate renal function

If the above hyperlink fails, please use the formula below to calculate Creatinine Clearance:

CrCl (mL/min) = F x (140-age) x weight* (kg)
Serum creatinine (micromoles/L)

Where F=1.23 for males and 1.04 for females

*If obese (>20% above IBW): Use Adjusted Body Weight (Adj BW) - see 3.4

3.6 Documentation

3.6.1 Monitoring

The time of gentamicin dosing MUST be clearly prescribed on the prescription. However, nursing staff must document the EXACT time of administration and EXACT time of sampling in the medical notes and cyberlab to facilitate interpretation of the results.

Example to be documented in the patient's medical notes:

Gentamicin is prescribed at 10:00 regularly (24hour clock)

Exact time of gentamicin sample taken…9:00…….(i.e.1-4hours before dose is given)

Exact time of gentamicin given:……10:00……..

3.6.2 Critical timing

If delay in the administration of gentamicin (greater than 1 hour) - the time of late administration must be documented on prescription chart and reason must be documented in the medical notes. This is particularly important for time critical antibiotic like gentamicin as the next dose may need to be delayed if previous dose given late.

4 ATTACHMENTS	
Appendix Number	**Title**
1	Extended interval gentamicin dosing guidelines summary (Adults)
2	Elderly/Renal (CrCl 10-29.9ml/min) gentamicin dosing guidelines summary (Adults)
3	Traditional multiple daily dosing guidelines summary (Adults)
4	Maximum body weight and IBW table
5	Gentamicin flow chart
6	Equality Impact Assessment Form

5 PROCEDURAL DOCUMENT STORAGE (HARD AND ELECTRONIC COPIES)
Electronic Database for Procedural Documents
Held by Procedural Document and Leaflet Coordinator

6 LOCATIONS THIS DOCUMENT ISSUED TO		
Copy No	**Location**	**Date Issued**
1	Intranet	21/12/2017
2	Wards, Departments and Services	21/12/2017

7 OTHER RELEVANT / ASSOCIATED DOCUMENTS	
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CORP/GUID/313	

8 SUPPORTING REFERENCES / EVIDENCE BASED DOCUMENTS
References In Full
British National Formulary online <Accessed Nov 2017> https://www.medicinescomplete.com/mc/bnf/current/PHP3478-gentamicin.htm?q=gentamicin&t=search&ss=text&tot=41&p=2#_hit
Gentamicin Adult Dosing Guideline. Southampton University hospitals NHS Trust. Kieran Hand. October 2007
Nicolau *et al*. Experience with a once-daily aminoglycoside program administered to 2,184 adult patients. Antimicrobial Agents and Chemotherapy, 1995; 39 (3): 650-655.
Barza et al. Single or multiple daily doses of aminoglycosides: a meta-analysis. BMJ ,1996; 312:338-344.
Ferriols-Lisart et al. Effectiveness and safety of once-daily aminoglycosides: A meta-anlysis. Am J Health-Syst Pharm, 1996; 53: 1141-50.
Bailey T et al. A meta-anlysis of extended-interval dosing versus multiple daily dosing of aminoglycosides. Clinical Infectious Diseases, 1997; 24:786-95.
http://www.medicines.org.uk/EMC/medicine/21758/SPC/Genticin+Injectable/ <accessed Nov 2017>
Royal college of obstetricians and gynaecologists. Green top guidelines 64a. 1st ed april 2012. Bacterial sepsis in pregnancy
Gould K, Denning D et al. Guidelines of the diagnosis and antibiotic treatment of endocarditis in adults: a report of the working party of the British Society for Antimicrobial Chemotherapy.JAC.Nov 14, 2011. p 1-21
UKMI. Q+A on How should antibiotics be dosed in obesity? 6th Nov 2013
Scottish Medicines Consortium NHS Scotland Jan 2013 Gentamicin calculation Resources. https://www.scottishmedicines.org.uk/SAPG/Quality_Improvement/Weight_Charts <accessed Nov 2017>

9 CONSULTATION / ACKNOWLEDGEMENTS WITH STAFF, PEERS, PATIENTS AND THE PUBLIC		
Name	**Designation**	**Date Response Received**
All	BTH pharmacists	

10 DEFINITIONS / GLOSSARY OF TERMS	

11 AUTHOR / DIVISIONAL / DIRECTORATE MANAGER APPROVAL			
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Date	Nov 2017	**Date**	December 2017

APPENDIX 1: EXTENDED INTERVAL GENTAMICIN DOSING GUIDELINES SUMMARY (ADULTS)	
Click here for full guideline	
Introduction	**Preferred regimen for the treatment of Gram negative sepsis** Do NOT use extended interval dosing for the following groups of patients: (without discussion with pharmacist or microbiologist) • Bronchiectasis • Burns (>20% body surface area) • Cystic fibrosis • Ascites • Infective endocarditis • Renal impairment (Creatinine clearance <30mL/min), unstable or deteriorating renal function (see Renal dosing) • Renal dialysis
Dose regimen	Gentamicin dose = 5mg/kg (maximum 500mg) Use adjusted body weight if obese (i.e. if 20% over ideal body weight) Round to nearest 20mg e.g.260mg if 50kg, 300mg if 60kg, 360mg if 70kg, 400mg if 80kg
Prescribing first dose	Check no previous dose given in last 24hours. May prescribe on regular antibiotics section and indicate on the drug chart the need to monitor Pre-dose Level before 2nd Dose
Administration	Dilute with 100mL sodium chloride 0.9% or glucose 5% and give by IV infusion over 30-60mins
What levels should I monitor?	**Pre-dose level** before 2nd dose (1-4 hours before next dose is due)
When should I take levels initially?	Check before 2nd dose due (unless single dose therapy)
Target assay levels	**Pre-dose level LESS THAN 1mg/L**
Recommendations for dose adjustment based on levels being taken at correct time	**Normal pre-dose level (<1mg/L)** -Continue current regimen -Repeat pre-dose levels after 3-4 days if renal function remains stable **Pre-dose level 1-2mg/L (and renal function unchanged)** -Increase the dosing interval to 36-hourly **Pre-dose level greater than 2mg/L** -Omit any further doses of gentamicin and discuss with Microbiology -The need for gentamicin therapy MUST be reviewed If the patient cannot safely be maintained on an extended interval dosing regimen, consider the renal dosing regimen.
Do I need to wait for the level result?	**IF NORMAL and STABLE RENAL FUNCTION - Monitor pre-dose level before 2nd dose, GIVE 2nd dose without waiting for level and review** for the result of the pre-dose level before prescribing and administering 3rd or subsequent doses
When should I repeat levels?	Check pre-dose levels every 3-4 days if renal function remains stable. Monitor pre-dose levels **daily** if adjustments are being made or if the patient is **renally impaired.** Review need daily and monitor for renal/ototoxicity
How do I prescribe subsequent doses?	Subsequent doses may be prescribed on the regular section of the drug chart, and administration boxes MUST be marked to ensure the correct dosing interval is followed, and indicate when the next level is due.

APPENDIX 2: ELDERLY/RENAL (CRCL 10-29.9ML/MIN) GENTAMICIN DOSING GUIDELINES SUMMARY (ADULTS)	
Click here for full guideline	
Introduction	This regimen should be used where the prescriber wishes to use an extended interval gentamicin dosing regimen for the treatment of Gram negative sepsis in patients WITH severe renal impairment (CrCl <30ml/min, but if <10ml/min or anuric - discuss with microbiologist or pharmacy) or elderly patients e.g. greater or equal to 70years
Dose regimen	Gentamicin dose = 3mg/kg (maximum 300mg) Use adjusted body weight if obese (i.e. if 20% over ideal body weight) Round to nearest 20mg e.g.160mg if 50kg, 180mg if 60kg, 220mg if 70kg, 240mg if 80kg
Prescribing first dose	Check no previous dose given in last 24hours Prescribe the first dose on the "once only" section of the drug chart
Administration	Dilute with 100mL sodium chloride 0.9% or glucose 5% and give by IV infusion over 30-60minutes
What levels should I monitor?	**Pre-dose level** before 2nd dose (1-4 hours before next dose is due)
When should I take levels initially?	Check before 2nd dose due (unless single dose therapy)
Target assay levels	**Pre-dose level LESS THAN 1mg/L**
Recommendations for dose adjustment based on levels being taken at correct time	**If level less than 1mg/L** • Prescribe 2nd dose on "once only" section of drug chart or regular section of the chart (but highlighting the need to wait for pre dose level before administration. • Repeat level 24 hours after dose administered (pre-dose before the next dose due) **If level 1mg/L OR greater than 1mg/L** • Do **NOT** prescribe any further doses • Repeat level 24 hours later • If level < 1mg/L, prescribe 2nd dose on "once only" section of drug chart or regular section of the chart (but highlighting the need to wait for pre dose level before administration. • If level still remains >1mg/L, keep repeating gentamicin level at periodic intervals until gentamicin level has fallen to <1mg/L **No further doses should be prescribed or administered until level is <1mg/L**
Do I need to wait for the level result?	**WAIT** for the result of the pre-dose level before prescribing and administering any subsequent doses
When should I repeat levels?	**DAILY** levels are required for patients on the renal gentamicin dosing regimen or those with unstable renal function.
How do I prescribe subsequent doses?	Subsequent doses may be prescribed on the **"once only"** section of the drug chart or regular section of the chart (but highlighting the need to wait for pre dose level before administration. Doses should only be administered once the pre-dose level is less than 1mg/L.
Continuation of treatment	If the patient requires gentamicin beyond 48 hours, this MUST be discussed with a Consultant Microbiologist. The risk of nephrotoxicity and ototoxicity increases with prolonged courses.

APPENDIX 3: TRADITIONAL MULTIPLE DAILY DOSING GUIDELINES SUMMARY (ADULTS)	
Click here for full guideline	
Introduction	Treatment of patients with endocarditis.
Dose regimen Creatinine Clearance calculator	1mg/kg 12 hourly - modified according to renal function and level (round to nearest 20mg). Use adjusted body weight if obese (i.e. if 20% over ideal body weight)
Prescribing first dose	Prescribe gentamicin at chosen dose and dose interval The dosing regimens recommended above are starting dose regimens only. Blood levels must be monitored to ensure target peaks and troughs are achieved.
Administration	IV bolus over 3-5 minutes. Dilution is not normally necessary.
What levels should I monitor?	Check Pre and Post dose levels around the 3rd or 4th dose. If renally impaired, check around the 2nd dose.
When should I take levels initially?	Check **pre-dose (trough) level around the 3rd or 4th dose** before administering the dose. Administer dose. There is no need to wait for pre-dose level to be reported before administering dose, unless instructed to do so by your ward pharmacist or Consultant Microbiologist. Check **one hour post-dose (peak) level around the 3rd or 4th dose**. Level to be taken one hour after completion of the bolus/infusion. If renally impaired, check around the 2nd dose. **Label your sample tubes and request form clearly with pre and post dose level as appropriate.**
Target assay levels	**Pre-dose (trough) level -less than 1mg/L for endocarditis** **One hour post dose (peak) level: 3-5mg/L for streptococcal or enterococcal infections e.g. endocarditis**
Recommendations for dose adjustment based on levels being taken at correct time **Please contact your ward Pharmacist or Consultant Microbiologist for advice on changes to the dose and/or dosing interval.**	**Pre-dose levels:** **Normal pre-dose (<1mg/L)** - Regimen can be continued - Further pre-dose levels MUST be monitored twice weekly so long as renal function is stable **Pre-dose level is between 1-3mg/L (and renal function unchanged)** - Increase the dosing interval e.g. from 12-hourly to 24-hourly **Pre-dose greater than 3mg/L** - Further gentamicin doses MUST be withheld - Discuss with microbiology before recommencing therapy **One-hour post-dose levels:** **Post-dose level is below the target range (<3mg/L)** - Gentamicin is sub-therapeutic - The dose should be increased **Post-dose level is above the target range (>5mg/L); pre-dose level is normal (<1mg/L)** - Reduce the dose **Both the post-dose (>5mg/L) and pre-dose (>1mg/L) levels are above the target range** - The next dose(s) MUST be omitted - Discuss with Microbiology before recommencing therapy

APPENDIX 4: MAXIMUM BODY WEIGHT/ IDEAL BODY WEIGHT TABLE

This table helps to determine whether patients are obese (i.e. actual body weight 20% over ideal body weight). If patient's actual weight is above the maximum body weight below - the adjusted body weight should be used to calculate gentamicin dose (see formula below). Otherwise, use actual body weight to calculate gentamicin dose.

Maximum body weight (MBW) table				
Height		Height	MBW (kg)	MBW (kg)
(ft	inches)	(cm)	(male)	(female)
5'	0"	152	60	55
5'	1"	155	62	58
5'	2"	158	66	60
5'	3"	160	68	62
5'	4"	163	71	66
5'	5"	165	74	68
5'	6"	168	77	71
5'	7"	170	79	74
5'	8"	173	82	77
5'	9"	175	85	79
5'	10"	178	88	82
5'	11"	180	90	85
6'	0"	183	94	88
6'	1"	185	96	90
6'	2"	188	98	94
6'	3"	191	101	97
6'	4"	193	104	99
6'	5"	195	107	101
6'	6"	198	109	105
6'	7"	201	113	108
6'	8"	203	115	110

Adjusted body weight calculation

Adjusted body weight = ideal body weight + 0.4 (actual body weight - ideal body weight)

APPENDIX 4: MAXIMUM BODY WEIGHT/ IDEAL BODY WEIGHT TABLE

Ideal Body Weight Tables (based on Devine Formula)

***women**: Ideal Body Weight (in kg) = 45.5 + 2.3 kg per inch over 5 feet*
***men**: Ideal Body Weight (in kg) = 50 + 2.3 kg per inch over 5 feet*

Female																	
Height Feet	5'	5'1"	5'2"	5'3"	5'4"	5'5"	5'6"	5'7"	5'8"	5'9"	5'10	5'11	6'	6'1"	6'2"	6'3''	6'4''
Height Inches	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
Height cm	152	155	157	160	163	165	168	170	173	175	178	180	183	185	188	190	193
IBW kg	45.5	47.8	50.1	52.4	54.7	57	59.3	61.6	63.9	66.2	68.5	70.8	73.1	75.4	77.7	80	82.3

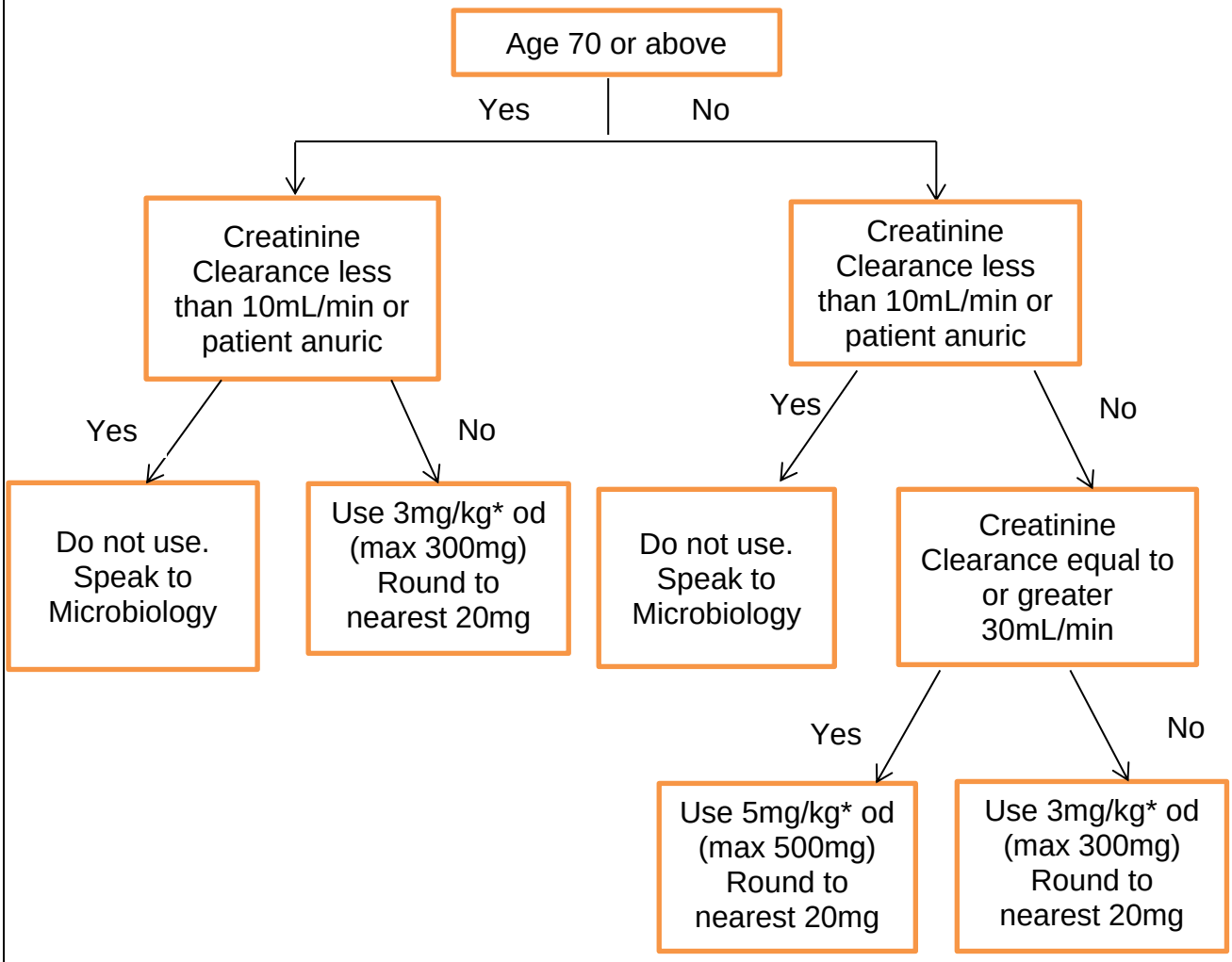
Male																	
Height Feet	5'	5'1''	5'2"	5'3''	5'4"	5'5"	5'6"	5'7"	5'8"	5'9"	5'10	5'11	6'	6'1"	6'2"	6'3"	6'4"
Height Inches	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
Height Cm	152	155	157	160	163	165	168	170	173	175	178	180	183	185	188	190	193
IBW kg	50	52.3	54.6	56.9	59.2	61.5	63.8	66.1	68.4	70.7	73	75.3	77.6	79.9	82.2	84.5	86.8

Adapted from Scottish Medicines Consortium NHS Scotland Jan 2013 Resources

APPENDIX 5: GENTAMICIN FLOW CHART

Do NOT use extended interval dosing for the following groups of patients: (without discussion with pharmacist or microbiologist)

- Bronchiectasis
- Burns (>20% body surface area)
- Cystic fibrosis
- Ascites
- Infective endocarditis – use traditional multiple dosing
- Renal impairment - unstable or deteriorating renal function – use with care
- Renal dialysis



*Use adjusted body weight if obese (i.e. if 20% over ideal body weight)

Review need daily and monitor for renal/ototoxicity

APPENDIX 6: EQUALITY IMPACT ASSESSMENT FORM

Department	Organisation Wide	**Service or Policy**	Guideline	**Date Completed:**	September 2012

GROUPS TO BE CONSIDERED

Deprived communities, homeless, substance misusers, people who have a disability, learning disability, older people, children and families, young people, Lesbian Gay Bi-sexual or Transgender, minority ethnic communities, Gypsy/Roma/Travellers, women/men, parents, carers, staff, wider community, offenders.

EQUALITY PROTECTED CHARACTERISTICS TO BE CONSIDERED

Age, gender, disability, race, sexual orientation, gender identity (or reassignment), religion and belief, carers, Human Rights and social economic / deprivation.

QUESTION	**RESPONSE**		**IMPACT**	
	Issue	Action	Positive	Negative
What is the service, leaflet or policy development? What are its aims, who are the target audience?	The Procedural Document is to ensure that all members of staff have clear guidance on processes to be followed. The target audience is all staff across the Organisation who undertakes this process.	Raise awareness of the Organisations format and processes involved in relation to the procedural document.	Yes – Clear processes identified	
Does the service, leaflet or policy/ development impact on community safety • Crime • Community cohesion	Not applicable to community safety or crime	N/A	N/A	
Is there any evidence that groups who should benefit do not? i.e. equal opportunity monitoring of service users and/or staff. If none/insufficient local or national data available consider what information you need.	No	N/A	N/A	
Does the service, leaflet or development/ policy have a negative impact on any geographical or sub group of the population?	No	N/A	N/A	
How does the service, leaflet or policy/ development promote equality and diversity?	Ensures a cohesive approach across the Organisation in relation to the procedural document.	All policies and procedural documents include an EA to identify any positive or negative impacts.		
Does the service, leaflet or policy/ development explicitly include a commitment to equality and diversity and meeting needs? How does it demonstrate its impact?	The Procedure includes a completed EA which provides the opportunity to highlight any potential for a negative / adverse impact.			
Does the Organisation or service workforce reflect the local population? Do we employ people from disadvantaged groups	Our workforce is reflective of the local population.			
Will the service, leaflet or policy/ development i. Improve economic social conditions in deprived areas ii. Use brown field sites iii. Improve public spaces including creation of green spaces?	N/A			
Does the service, leaflet or policy/ development promote equity of lifelong learning?	N/A			
Does the service, leaflet or policy/ development encourage healthy lifestyles and reduce risks to health?	N/A			
Does the service, leaflet or policy/ development impact on transport? What are the implications of this?	N/A			
Does the service, leaflet or policy/development impact on housing, housing needs, homelessness, or a person's ability to remain at home?	N/A			
Are there any groups for whom this policy/ service/leaflet would have an impact? Is it an adverse/negative impact? Does it or could it (or is the perception that it could exclude disadvantaged or marginalised groups?	None identified			

APPENDIX 6: EQUALITY IMPACT ASSESSMENT FORM

Does the policy/development promote access to services and facilities for any group in particular?	No			
Does the service, leaflet or policy/development impact on the environment • During development • At implementation?	No			

ACTION:			
Please identify if you are now required to carry out a Full Equality Analysis	~~**Yes**~~	**No**	**(Please delete as appropriate)**

Name of Author: **Signature of Author:**	**Michelle Wong**	**Date Signed:**	
Name of Lead Person: **Signature of Lead Person:**		**Date Signed:**	
Name of Manager: **Signature of Manager**	A Gibson	**Date Signed:**	