Guideline title: Once daily intravenous gentamicin for adult patients

Comments from Expert Advisory Group

Scope of this guideline:

- This guideline is to support those who prescribe, dispense and administer once daily gentamicin for adult patients.
- This guideline is used to inform the HSE AMRIC once daily gentamicin calculator for adults.
- Individual hospitals may have alternative gentamicin dosing guidelines for patients with cystic fibrosis, pregnant women, patients with septic shock/ severe sepsis, patients with ascites, patients with major burns, patients in critical care, or others – if this is the case follow local guidelines for dosing advice.
- The following patients should be discussed with Pharmacy, Clinical Microbiology/ Infectious Diseases, Nephrology prior to initiating gentamicin:
    - Patients on renal replacement therapy or dialysis
    - Patients with acute kidney injury
    - Patients who are anuric or with urine output less than 500 mL/day
    - Patients with renal impairment with creatinine clearance less than 30 mL/minute
    - Patients requiring gentamicin for treatment of infective endocarditis
    - Patients with known mitochondrial m.1555A>G mutation.
- Gentamicin is contraindicated in patients with myasthenia gravis.

Treatment

Section A: Once daily intravenous gentamicin dosing guideline for adults

1. Select patient appropriately & check if gentamicin is recommended for that indication in local antimicrobial guidelines

- Treatment should be reviewed within 24 hours and daily thereafter. In many cases, a single dose is sufficient. In general, gentamicin treatment duration should be kept to 3 days maximum, unless specifically advised otherwise by Clinical Microbiology/ Infectious Diseases.
- Consider renal function, weight, hydration status and concomitant nephrotoxic and neurotoxic medicines.
- Vestibular and ototoxicity is independent of serum gentamicin level and may occur at greater than 3 days treatment: assess patient for these potential side effects and advise patient to report new symptoms related to hearing or balance.

2. Calculate gentamicin dose using AMRIC once daily gentamicin calculator for adults

Check patient parameters listed here and document in the patient's clinical notes
Input the listed parameters to AMRIC once daily gentamicin calculator for adults

- Actual body weight - for pregnant patients use booking weight
- Height
- Serum creatinine

Prescribe actual dose in mg (NOT as mg/kg) on medication chart

3. Check serum creatinine daily

- Ensure patient well-hydrated
- If creatinine increases from baseline, review patient and consider holding gentamicin until latest pre-dose/ trough level and creatinine available – review indication for continued gentamicin & discuss with Clinical Microbiology/ Infectious Diseases or Pharmacy if required

4. Take a pre-dose/ trough serum gentamicin level before the SECOND dose

- Take level at least 18 hours after FIRST dose
- Clearly indicate date and time of sample collection **and** date and time of preceding gentamicin dose

5. Follow recommendation below based on level result. AIM FOR PRE-DOSE/ TROUGH LEVEL <1 mg/L	
Pre-dose/ trough level result	**Action**
Less than 1 mg/L	Review if gentamicin is still indicated. If yes, and renal function stable, give next dose as prescribed. If yes, but renal function abnormal or deteriorating, consider full clinical picture and use the gentamicin calculator again to re-calculate dose if needed.
Greater than or equal to 1 mg/L	• Review if gentamicin is still indicated • Is the result for a true pre-dose/ trough sample i.e. was the sample taken at least 18 hours after the last dose? • Was the trough sample a peripheral blood sample i.e. not collected from a vascular access device/ line? • Was the last dose correct based on weight and renal function? • Is renal function stable? If answer to all the above is Yes, then a **dose adjustment is required** – contact microbiology/ infectious diseases or pharmacy to discuss on a case-by-case basis. If renal function is not stable then hold gentamicin and contact microbiology/ infectious diseases or pharmacy to discuss.
Next dose due and pre-dose/ trough level result unavailable	If patient less than 65 years with CrCl greater than 80 mL/minute and with good urine output, give next dose at scheduled time. If patient over 65 years, or with CrCl less than 80 mL/minute or with poor urine output, it is generally preferable to await the result of the gentamicin pre-dose/ trough level before giving the next dose. If gentamicin is to be continued ensure there is an order placed for a pre-dose/ trough level prior to the next subsequent dose.

6. Repeat pre-dose/ trough level as recommended (note: in general, gentamicin treatment duration should be kept to 3 days maximum unless specifically advised otherwise by Clinical Microbiology/ Infectious Diseases).	
Creatinine normal	Twice weekly
Creatinine abnormal or deteriorating	Daily

Section B: Once daily gentamicin dosing information for adults and associated formulas
ONLY use instructions below to calculate dose if gentamicin calculator not available:

1. Check following patient parameters and document in the patient's clinical notes

- Actual body weight - for pregnant patients use booking weight
- Height
- Serum creatinine

2. Calculate ideal body weight (IBW)

- IBW (kg) = R + (2.3 X inches over 5 feet) [R = 50 for males and 45.5 for females]
- Or IBW (kg) = R + 0.91(height – 152.4 cm) [R = 50 for males and 45.5 for females]

3. Assess if adjusted/ obese dosing weight (ODW) required

- **Obese patient:** ODW is used to calculate gentamicin dose if patient's actual body weight is more than 120% of their ideal body weight - use ODW to calculate CrCl & dose
  - ODW (kg) = IBW + [0.4 x (actual body weight – IBW)]
- **Non-obese patient:** Use actual body weight to calculate gentamicin dose

4. Estimate the patient's creatinine clearance (CrCl)

CrCl = ((140 – age) x (IBW in kg)* x K) / serum creatinine (micromol/L)
K = 1.23 for males and 1.04 for females
*If actual body weight is less than IBW, use actual body weight in this equation

Note the serum creatinine must be relatively stable for the equation to be valid (e.g. <5% change in serum creatinine on previous day's value). In patients with severe malnutrition, sarcopenia or amputees the equation may substantially overestimate the actual creatinine clearance

5: Select a dose from the table below (Table 1), [If obese, use **Adjusted/ Obese Dosing Weight;** If non-obese use **Actual Body Weight** (See Step 3 above)]

Table 1: Dose recommendations for once daily intravenous gentamicin for adult patients

CrCl (mL/min)	Dose: round to nearest multiple of 40 mg
Greater than 50	5 mg/kg daily (up to a max of 480 mg)
10 to 50	3 mg/kg daily (up to a max of 280 mg)
Less than 10	1.5 mg/kg STAT (up to a max of 160 mg) & only re-dose when serum level less than 1 mg/L

6. Prescribe actual dose in mg (NOT as mg/kg) on medication chart

Glossary of abbreviations used in guideline:

AMRIC	Antimicrobial resistance and infection control team, Health Services Executive
BMI	Body mass index
CrCl	Creatinine clearance
IBW	Ideal body weight
ODW	Adjusted/ obese dosing weight

Patient Information

- How to take your antibiotics patient information leaflet

Safe Prescribing

- HSE AMRIC intravenous to oral switch tool kit
- Consult Stockley's interaction checker on www.medicinescomplete.com (access available on HSE computers)
- Consult the Health Products Regulatory Authority (HPRA) website for detailed drug information (summary of product characteristics and patient information leaflets).
- Dosing details, contraindications and drug interactions also available in the British National Formulary (BNF) on www.medicinescomplete.com (access available on HSE computers)