Louth: Antimicrobial Guidelines - Louth Hospitals: Antimicrobial Guidelines: Neonatal - ■Gentamicin IV

Neonatal - Gentamicin IV

Aminoglycoside antibiotic of choice [1].

MEDICATION SAFETY ISSUES

1. Extended-interval regimen used for neonates – **check dose interval carefully** , **monitor trough levels** .
2. The National Patient Safety Agency (NPSA) issued a patient safety alert in 2010 on the safer use of intravenous gentamicin in neonates [2]. A review of neonatal medication incidents identified that gentamicin was involved in 15% of all reported neonatal medication incidents. The most frequently reported incident (36%) related to administration at the incorrect time.
3. Following reports that some batches of gentamicin sulphate active pharmaceutical ingredient (API) used to manufacture gentamicin may contain higher than expected levels of histamine, which is a residual from the manufacturing process, monitor patients for signs of histamine-related adverse reactions; particular caution is required in patients taking concomitant drugs known to cause histamine release, in children, and in patients with severe renal impairment [1].
4. **Contraindicated in mothers and newborn babies of mothers with Myasthenia Gravis** . Aminoglycosides may impair neuromuscular transmission.
5. **Caution** in babies undergoing therapeutic cooling due to reduced renal function. Seek Consultant advice before prescribing.

USES

Neonatal sepsis and other severe infections when indicated [1].

PRESENTATION

Cidomycin Paediatric® 20mg/2ml ampoules [3].

DOSAGE [1]

Age	Dose	Frequency
Neonate less than 7 days after birth	5mg/kg	Every **36** hours
Neonate more than 7 days after birth	5mg/kg	Every 24 hours

Caution - the main adverse effects of gentamicin (nephrotoxicity and ototoxicity) are dose related. Whenever possible, treatment should not exceed 5 days to minimise risk of toxicity [1].

Renal Impairment : Refer to BNFc and seek advice – change in dosing interval may be required [1].

RECONSTITUTION

The 20mg/2ml vials are already in liquid form. May be further diluted with Sodium Chloride 0.9% or Glucose 5% if required to give a convenient volume for IV infusion [1,4].

ADMINISTRATION

Administer by IV infusion over 30 minutes [1,4].

SAMPLE CALCULATION

3.5kg neonate < 7 days after birth with queried sepsis. Dose 5mg/kg every 36 hours = 17.5mg.

Vial contains 20mg/2ml = 17.5mg/1.75ml. Withdraw 1.75ml from vial and give over 30 minutes.

STORAGE

Store unopened vials at room temperature below 25 ^{o} C. Once reconstituted, use immediately [3]. Discard any unused portions.

MONITORING

- Risk of nephrotoxicity - maintain adequate hydration and monitor renal function closely [1]. Caution if concomitant administration of other nephrotoxic medicines.

- Risk of ototoxicity - review concomitant ototoxic medicines [1]. If furosemide required (potentially ototoxic), separate administration from gentamicin by as long a period as practicable.
- Monitor gentamicin trough levels as directed below.

TROUGH LEVEL MONITORING

- Check trough level immediately before next dose is due.
- Document the date/time of blood sample and the date/time of last dose administered clearly on the laboratory request form. This will allow accurate interpretation of trough level results.

When to check first trough level [5-7]

Neonate Category	First Trough Level	Comment
Normal renal function / No concern regarding renal function (for example, urea and creatinine normal, urine output ≥ 1ml/kg/hour)	Before **3 rd** dose	Give 3 rd dose without waiting for trough level result.
Reduced urine output or uncertainty of adequate renal clearance Examples: • Receiving therapeutic hypothermia • Sepsis-induced renal impairment	Before **2 nd** dose	**Discuss with Consultant Neonatologist** whether to give 2 nd dose or wait for trough level result before giving dose. Risk/benefit decision – treatment of acutely septic neonate versus concern over renal function.
Corrected gestational age < 32 weeks and more than 7 days after birth , prescribed gentamicin every 24 hours	Before **2 nd** dose	Give 2 nd dose without waiting for trough level result. Previously, this patient group received gentamicin every 36 hours, therefore with shortened dosing interval of 24 hours, it is prudent to check trough level pre-2 nd dose.

Interpretation of trough level result [1,7]

Trough	Action
Acceptable: < 2mg/L **(< 1mg/L if more than 3 doses given)**	Continue same gentamicin dose and dose-interval.
High: ≥ 2mg/L (≥ 1mg/L if more than 3 doses given)	Hold next dose. Repeat trough level 12 hours later. If level is due out-of-hours, please contact biochemistry laboratory staff in advance to arrange processing of the result. Wait for trough level result before giving a further dose: • If repeat trough level result in range, restart gentamicin at same dose and extend dosing interval by 12 hours (for example, from 24 to 36 hourly or from 36 to 48 hourly). Reassess dosing interval if renal function improves. • If repeat trough level result is still high, review if gentamicin therapy still required. If so, repeat trough level every 12 to 24 hours until level reported in range. Restart at same dose and extend dosing interval to reflect the time period required to clear the previous dose.

When to check subsequent trough levels

Neonate Category	Subsequent Trough Levels
Reduced urine output or uncertainty of adequate renal clearance	Before every dose or every alternate dose (Consultant decision)
Normal renal function	Before every third dose

ADVERSE EFFECTS

The important adverse effects of the aminoglycosides are nephrotoxicity and irreversible ototoxicity (including vestibular and auditory damage) [1,4]. See BNF for Children [1] or Summary of Product Characteristics [3] for further information on possible adverse effects.

REFERENCES

1. British Medical Association, Royal Pharmaceutical Society of Great Britain, Royal College of Paediatrics and Child Health, et al. BNF for Children. London: BMJ Group, Pharmaceutical Press and RCPCH Publications Limited; 2020. Available from www.medicinescomplete.com , accessed 23/11/2020.
2. National Patient Safety Agency (NPSA). Safer use of intravenous gentamicin for neonates. Patient Safety Alert! NPSA/2010/PSA001. Available from www.npsa.nhs.uk , accessed 10/12/14.
3. Sanofi-Aventis Ireland Limited. Summary of Product Characteristics for Cidomycin Paediatric® 20mg/2ml Solution for Injection. 2020. Available from www.hpra.ie , accessed 23/11/2020.
4. Medusa Injectable Drugs Guide. Gentamicin Paediatric Monograph, 2020. Available from www.medusa.wales.nhs.uk , accessed 23/11/2020.
5. Department of Health and Government of South Australia, South Australian Neonatal Medication Guidelines - Gentamicin 2017. Available from http://www.sahealth.sa.gov.au/wps/wcm/connect/34c75d004cd7d772b93bb9a496684d9f/gentamicin_Mar2015.pdf?MOD=AJPERES&CACHEID=34c75d004cd7d , accessed 23/11/2020.
6. Ainsworth SB. Neonatal Formulary 7: Web Commentary for Gentamicin. Wiley Blackwell & BMJ Books. Updated Jul 2014. Available from http://www.neonatalformulary.com , accessed 26/11/18.
7. Gentamicin Project Improvement Group as part of the National Quality Improvement Programme, HSE/RCPI. Gentamicin Guidelines for once daily usage in adult and paediatric settings. 2016. Available from www.rcpi.ie .

Summary of Changes from Previous Versions

Date	Change
Feb 2021: Rev. No. 1	Updated based on Rotunda Gentamicin Monograph Feb 2019. Changes to OLOL monograph: • Medication Safety Issues: Additions of point numbers 3,4,5 as per Rotunda • Dosage: Whenever possible, treatment should not exceed 5 days to minimise risk of toxicity – reduced from 7 days as per BNFc/Rotunda monograph to 5 days then review as per practice in LH. • References updated, reference No. 7 added in OLOL.
August 2015	This is the first version of this guideline.