

Gentamicin for Nebulisation

Areas of responsibility for the sharing of care

For the long-term prophylaxis of chronic lung infections in non-CF bronchiectasis

The following guidelines are designed to provide information relating to Gentamicin for nebulisation and to outline the responsibilities of the primary and secondary care teams in the prescribing of Gentamicin for nebulisation.

Summary

Indication

Long term prophylaxis for patients with chronic lung infection

Dose

Doses used include:

Gentamicin 80mg/2ml + 1ml sodium chloride 0.9% nebulised twice daily

Gentamicin 160mg/4ml nebulised once or twice daily

Dose, nebuliser system and required consumables will be communicated to GP and patient by secondary care clinician

Adverse Reactions

Cough, bronchospasm

(Also potential for ototoxicity and nephrotoxicity if systemically absorbed)

Toxicity Monitoring

Renal function to be checked annually.

Audiometry testing if suspicious of ototoxicity.

Efficacy Monitoring

Specific monitoring for efficacy to be carried out by secondary care

Introduction

The targeted delivery of aerosolised antibiotics offers a real therapeutic option in patients with bronchiectasis by reducing bacterial burden and associated inflammation and promoting healing, limiting symptoms, and improving quality of life. Nebulised gentamicin has been shown to reduce bacterial load and sputum volume and improve breathlessness and exercise capacity (Lin HC, 1997). These findings were supported in a randomised controlled trial of 12 months of nebulised gentamicin or normal saline in patients with non-

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CF bronchiectasis and chronic lung infection including, but not exclusively, *pseudomonas aeruginosa*. There was a significant reduction in sputum bacterial density, 30% eradication of *pseudomonas* and 92% eradication of other organisms, greater exercise capacity, fewer exacerbations, increased time to first exacerbation and improvements in quality-of-life scores (Murray MP, 2011). Nebulised gentamicin is one of the treatment recommendations specified in the British Thoracic Society Non-CF bronchiectasis guidelines (Hill AT, 2011) (Pasteur MC, 2010).

Responsibilities and Roles

Tertiary Care Clinician Responsibilities

1. To diagnose chronic infection likely to respond to nebulised gentamicin in Non-CF Bronchiectasis patients based on a timely and comprehensive assessment.
2. To discuss benefits and adverse effects of treatment with the patient.
3. To initiate nebulised gentamicin and ensure a fully monitored test dose is carried out before a continuous prescription is requested.
4. To supply the initial 28 days treatment of gentamicin.
5. To provide the nebuliser system and train the patient/carer in the use of the nebuliser and preparation of the medication.
6. To co-ordinate servicing/maintenance of the nebuliser system.
7. To monitor for response and adverse drug reactions (ADRs) during the first test dose and the initiation period.
8. To liaise with the general practitioner (GP) to share the patient's care when the test dose has been carried out and proven benefit has been established.
9. To outline to GP when therapy may be stopped assuming no improvement is recognised in the patient's condition.
10. To review the patient's condition and efficacy of treatment annually with consideration at each review as to whether treatment needs to continue.
11. To evaluate adverse drug reactions raised by the GP and evaluate any concerns arising from physical checks & reviews undertaken by the GP.
12. To advise the GP on related issues such as drug interactions etc.
13. To advise the GP on supply issues related to the prescribing of nebulised gentamicin
14. To provide to the patient ongoing supplies of:
 - a. Expiratory filter pads (Philips Respironics Filter media for Side Stream Plus) x1 per dose
 - b. Side Stream Plus chamber with expiratory filter (required annually).

GP Responsibilities

1. To monitor the patient's overall health and wellbeing. (Note that specific efficacy monitoring will be undertaken by tertiary care (see "Monitoring" page 4). Gentamicin blood level monitoring is not required).
2. To observe patient for evidence of adverse drug reactions or any abnormalities and raise with the tertiary care clinician if necessary.

3. To provide:
 - a. Gentamicin 80mg/2ml injection solution
 - b. Sodium Chloride 0.9% solution for nebulisation or Sodium Chloride 0.9% solution for injection (for patients prescribed 80mg dose)
 - c. 5ml Syringes x 1 per dose
 - d. Needle x 1 per dose
4. To arrange supply and disposal of sharps bins as required.
5. To ensure advice is sought from the tertiary care clinician if there is any significant change in the patient's physical health status.
6. To reduce and stop treatment in line with tertiary care clinician's original request.

Patient's role:

1. Report any adverse effects to their GP whilst using nebulised gentamicin.
2. Ensure they have a clear understanding of their treatment.
3. Correctly store and administer the nebuliser solution.

Special warning/advice to patient

Whilst on treatment, patients should continue with their standard treatments as clinically necessary. Where several different respiratory therapies are used, the following order is recommended: bronchodilator, sodium chloride 6% or 7% (hypertonic saline), chest physiotherapy, other inhaled medicines, and finally nebulised gentamicin.

Back-up advice and support

Consultant and medical staff are always available to give advice and can be contacted through the main hospital switchboard.

Papworth Hospital Main Switchboard	01480 830541
CCLI Specialist Nurses	ext: 4079/4456 (bleep 685)
Dr C Haworth	ext: 4656 (bleep 363)
Dr. H Barker	ext: 4697 (bleep 142)
Dr. N Shafi	ext: 4793 (bleep 864)
Dr C Johnson	ext: 6009 (bleep 068)
	Fax: 01480 364330
Siobhan Pryke – CCLI Lead Physiotherapist	ext: 4215 (bleep 079)

Pharmacy advice:

Pharmacy Medicines Information Service (For Healthcare Professional only)	01480 364179 (direct line) (Mon-Fri 9am-5pm)
Pharmacy Medicines Helpline (answer phone) (for patients only)	01480 364739 (response to queries: Mon-Fri 9am-5pm)

Out of hours, contact the on-call pharmacist via switchboard.

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Indications / Therapeutic use:

Nebulised gentamicin is indicated in patients with chronic lung infection in non-CF bronchiectasis. This is an unlicensed use.

Gentamicin is used 2nd line after the patient has failed to respond to (or failed to tolerate) appropriate oral antibiotic prophylaxis.

Dosage and Administration:

The recommended doses are:

- 80mg nebulised twice daily
- 160mg nebulised once or twice daily

The first dose of the medicine should be given under hospital supervision in case of bronchospasm.

For an 80mg dose, 2ml (1 ampoule) of gentamicin 80mg/2ml injection solution should be mixed with 1ml sodium chloride 0.9%.

For a 160mg dose, 4ml (2 ampoules) of gentamicin 80mg/ml injection should be used undiluted.

Gentamicin is nebulised using a Philips Respironics Porta-neb nebuliser.

Gentamicin should not be mixed or diluted with any other medicines or solutions.

There is no commercially available gentamicin nebuliser solution. Doses should be prepared from gentamicin 80mg/2ml solution for injection. This is an unlicensed used.

Cautions / Contraindications:

Nebulised gentamicin injection is contraindicated in any patient with a known hypersensitivity to gentamicin or a diagnosis of Myasthenia Gravis

Gentamicin should be used with caution in patients with renal impairment or pre-existing vestibular or hearing impairment. Caution should also be exercised in patients with visual impairment due to the catastrophic consequences of hearing loss.

Adverse effects:

Nebulised gentamicin is generally well tolerated. The commonest adverse effects reported are coughing and bronchospasm. Bronchospasm can sometimes be controlled with a 2.55mg dose of nebulised salbutamol five minutes before nebulising gentamicin.

There is a potential for the systemic absorption of gentamicin following nebulisation.

Adverse effects of systemic therapy include:

- Ototoxicity (vestibular damage, tinnitus, hearing loss)
- Nephrotoxicity

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Other rare adverse effects from systemic therapy include pseudomembranous colitis and central neurotoxicity.

Monitoring:

All specific monitoring for efficacy will be carried out by the Cambridge Centre for Lung Infection at Papworth Hospital.

For the initial test dose in hospital, the patient will have their pre-dose and post-dose FEV₁ and FVC measured and will also be monitored for post-dose wheeze and bronchoconstriction. If wheezing or bronchoconstriction occur, the test may be repeated 24 hours later with a dose of 2.5 – 5mg nebulised salbutamol prior to dosing with gentamicin.

Ongoing efficacy monitoring:

- Monitor respiratory function – FEV₁ and FVC
- Monitor for reduction in frequency of IV and oral antibiotic treatment.
- Monitor for improvement in subjective symptoms

Toxicity monitoring:

- Ototoxicity – audiometry assessment if any symptoms of dizziness, imbalance or hearing impairment are reported by the patient.
- Reduced renal clearance – including serum urea and creatinine, before commencing treatment, and at least every 12 months thereafter.

Drug Interactions:

Concurrent and/or sequential use with other nephrotoxic or ototoxic medicines should be avoided. Some diuretics can enhance aminoglycoside toxicity.

Availability:

Gentamicin 80mg/2ml injection solution is available in 2ml glass ampoules and glass vials. Sodium chloride 0.9% nebuliser solution is available in 2.5ml plastic ampoules. Alternatively, sodium chloride 0.9% solution for injection is available in 5ml plastic ampoules.

Cost:

Please refer to the latest edition of the BNF or contact the Pharmacy department at Papworth Hospital for more information.

References:

- Hill AT, P. M. (2011). Primary care summary of the British Thoracic Society Guideline on the management of non-cystic fibrosis bronchiectasis. *Prim Care Respir J*, 135-140.

- Lin HC, C. H. (1997). Inhaled gentamicin reduces airway neutrophil activity and mucus secretion in patients with stable chronic bronchitis. *Am J Respir Crit Care Med*, 20242029.
- Murray MP, G. J. (2011). A randomised controlled trial of nebulized gentamicin in non-cystic fibrosis bronchiectasis. *Am J Respir Crit Care Med*, 491-499.
- Pasteur MC, B. D. (2010). British Thoracic Guideline for non-CF bronchiectasis. *Thorax*, i1-58.

Document Management

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