Clinical Guideline

INTRAVESICAL GENTAMICIN INSTILLATION

SETTING	Bristol Children's Hospital & South-West region
FOR STAFF	Specialist paediatric urologists, paediatric nephrologists, or regional paediatricians with a nephrology interest
PATIENTS	Children with recurrent UTI's

Background

Intravesical gentamicin instillation is an option for children with complex urological conditions (e.g. neuropathic bladder, posterior urethral valves, megacystis) who are experiencing recurrent urinary tract infections (UTI's) despite oral antibiotic prophylaxis.

Gentamicin is an aminoglycoside antibiotic used to treat aerobic gram-negative infections. When administered parenterally it achieves concentrations of 50-200μg/ml in the bladder secondary to renal excretion. Gentamicin levels need to be carefully monitored following parenteral administration as gentamicin is associated with nephrotoxicity and ototoxicity.

Intravesical instillation achieves good gentamicin concentrations within the bladder without the need for intravenous access and often without the need for monitoring of serum gentamicin levels as systemic absorption of gentamicin is generally low. Intravesical gentamicin can be administered at home following satisfactory completion of training by caregivers.

Intravesical gentamicin instillation has been shown to be safe (in terms of systemic absorption, nephrotoxicity and ototoxicity), well-tolerated and efficacious for both treatment (86% success) and prophylaxis (significantly reduced cumulative risk of breakthrough UTI compared to oral prophylaxis) of UTI.

Requirements for commencement of intravesical gentamicin

- Intravesical gentamicin instillation should only be commenced on an individual patients basis by a specialist paediatric urologist. A paediatric nephrologist, or a regional paediatricians with a nephrology interest, can also start intra-vesical gentamicin following consultation with a paediatric urologist.
- The patient must have either an indwelling catheter/suprapubic button in situ or be able to undertake clean intermittent catheterisation (CIC) either urethrally or via a Mitrofanoff channel
- The patient will stop oral antibiotic prophylaxis while using intravesical gentamicin
- The patient must meet one of the indications as documented below

Indications

- ***Treatment*** of a symptomatic documented UTI where the bacteria are resistant to oral antibiotics but sensitive to gentamicin
- ***Prophylaxis*** of recurrent breakthrough UTI while taking oral antibiotic prophylaxis at appropriate dose and where the bacteria are sensitive to gentamicin

Contraindications

- No indwelling catheter/suprapubic button in situ or CIC not established
- History of allergy, intolerance or ototoxicity related to gentamicin
- Bacterial resistance to gentamicin on urine culture and sensitivity results associated with the current or a recent previous UTI
- Patients with acute pyelonephritis
    - flank tenderness
    - pyrexia/systemically unwell
    - USS evidence of pyelonephritis
- Patients who are unwilling to have finger prick/venepuncture for gentamicin levels +/- serum creatinine monitoring (if required)

Prescribing

- **Inpatients:** gentamicin should be prescribed on the hospital drug chart
- **Outpatients:** an electronic prescription is required on a monthly basis

Dosage

The recommended gentamicin concentration is 4mg/10ml obtained in pre-filled syringes which are available as 8mg/20ml or 20mg/50ml. Alternatively 0.5ml (20mg) of a standard 80mg/2ml gentamicin vial can be made up to 50ml with 0.9% saline.

The volume instilled is based on the size of the bladder – this can be ascertained from imaging (e.g. USS) or usual catheter urine volumes.

- **Small bladders (<80ml or <2yrs age)**
    - 20ml instillation (8mg gentamicin in 20ml)
- **Larger bladders (>80ml or >2yrs age)**
    - 50 ml instillation (20mg gentamicin in 50ml)

Frequency of instillation

- ***Treatment*** of acute symptomatic UTI
    - Instillation twice daily (12 hourly) for 7 days
    - To be administered at the same times each day

- ***Prophylaxis*** of recurrent UTI
    - Instillation:
        - once daily for 10 days then
        - alternate days for 4 weeks then
        - once per week for 2 months then
        - stop
    - To be administered at the same time each day

Duration of instillation

- Leave gentamicin in the bladder for 1 hour and then drain via catheter (either indwelling or after passing another catheter)

Monitoring of gentamicin levels

- Monitoring of serum gentamicin levels is not required in the majority of patients as systemic absorption from the bladder is low
- Monitoring is required in those with renal impairment and in patients with a bladder augmentation in whom systemic absorption may be greater
- Gentamicin levels (either fingerprick or venepuncture) are taken on day 1, day 3, day 7 and day 14. Blood samples are collected immediately following drainage of gentamicin from the bladder
- Serum gentamicin levels should be <1μg/ml. If the level is > 1μg/ml then the treatment course should be stopped, the renal function assessed and the case discussed with the Consultant Paediatric Urologist

Cost

Gentamicin injection	Gentamicin prefilled syringes (Stockport)
20mg/2ml= £0.72/amp 80mg/2ml= £1.65/amp	20mg in 50ml N.S. PFS: £14.86 each 8mg in 20ml N.S. PFS: not yet available (predicted available by Summer 22)
	£20 delivery charge Lead time- 1-2 weeks Shelf life 56 days Needs to be stored in fridge

Appendix x – Evidence of Learning from Incidents

The following table sets out any incidents/ cases which informed either the creation of this document or from which changes to the existing version have been made.

Incidents	Summary of Learning

Table A

REFERENCES	1. Marei, M., Jackson, R., Keene, D.J.B. (2021). Intravesical gentamicin instillation for the treatment and prevention of urinary tract infections in complex paediatric urolog patients: evidence for safety and efficacy. J Ped Urol. 17: 65.e1-65.e11. 2. Mouhssine, M., Al Ani, D., Al Shibli, A et al. (2023). Intravesical gentamicin instillation in the prevention of recurrent urinary tract infections in children with neurogenic bladder – a single-center retrospective observational study. J Ped Urol. 19: 64.e1-64.e7. 3. Huen, K.H., Nik-Ahd, F., Chen, L et al. (2019). Neomycin-polymyxin or gentamicin bladder instillations decrease symptomatic urinary tract infections in neurogenic bladder patients on clean intermittent catheterisation. J Ped Urol. 15: 178.e1-178.e7. 4. Wan, J., McGuire, E.J., Kozminski, M et al. (1994). Intravesical instillation of gentamicin sulfate: in vitro, rat, canine and human studies. Urology. 43 (4): 531-536 5. Pietropaolo, A., Jones, P., Moors, M et al. (2018). Use and effectiveness of antimicrobial intravesical treatment for prophylaxis and treatment of recurrent urinary tract infections (UTIs): a systematic review. Cur Urol Rep. 19 (10):78
RELATED DOCUMENTS AND PAGES	None
AUTHORISING BODY	Department of Paediatric Urology, Bristol Children's Hospital
SAFETY	No issues
QUERIES AND CONTACT	[redacted], Consultant Paediatric Urologist
AUDIT REQUIREMNTS	The outcome for all patients receiving intra-vesical gentamicin will be audited regularly

Plan Elements	**Plan Details**
The Dissemination Lead is:	[redacted]
Is this document: A – replacing the same titled, expired guideline, B – replacing an alternative guideline, C – a new Guideline:	C: new guideline
If answer above is B: Alternative documentation this guideline will replace (if applicable):	
This document is to be disseminated to:	Specialist paediatric urologists, paediatric nephrologists, or regional paediatricians with a nephrology interest

Method of dissemination:	Email
Is training required and how will this be delivered:	No specific training is required

Document Change Control

Date of Version	Version Number	Lead for Revisions	Type of Revision	Description of Revision
Aug 23	1.0	Paediatric urologist	New guideline	-