

# Guideline

## Antibiotic Lock Therapy for Catheter Related Blood Stream Infections

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<b>Supercedes</b>	5.0				
<b>Applicable to</b>	All CHQ Staff				
<b>Authorisation</b>	Executive Director Clinical Services				

### Purpose

This guideline provides best practice recommendations for the management of catheter-related infections, using Antibiotic lock therapy, especially in high risk patients.

### Scope

This guideline provides information for all Children's Health Queensland (CHQ) Clinical Staff.

### Related documents

- [CHQ-PROC-03450 Venous Access Device \(VAD\) - Insertion and Management of Peripheral and Central Venous Access Devices](#)
- [CHQ-PROC-01001 Medication – Prescribing](#)
- [CHQ-PROC-01039 Medication - Administration](#)
- [CHQ-PROC-01036 Antimicrobial: Prescribing and Management](#)
- [CHQ Antimicrobial Restriction list](#)

### Forms and templates

- [CHQ Individual Patient Request for approval of a non-LAM medicine or indication or Antimicrobial](#)
- [CHQ C.GOV Individual Patient approval \(IPA\)– online IPA request](#)

## Guideline for use of antibiotic lock therapy in the treatment of catheter related blood stream infections

Antibiotic Lock therapy is indicated for patients with catheter related blood stream infections involving long-term catheters with no signs of exit site or tunnel infection, where catheter salvage is the goal. The paediatric patient group requiring antibiotic locks are likely to receive parenteral nutrition, haemodialysis or chemotherapy.

The optimal duration for antibiotic lock therapy is 7 to 14 days.<sup>1</sup> Antibiotic lock solutions contain antimicrobial (for example: vancomycin, cefazolin, ciprofloxacin, linezolid, teicoplanin, gentamicin or ampicillin) mixed with sodium chloride 0.9% or trisodium citrate, in sufficient volume to fill the catheter lumen (Table 1).<sup>2, 3, 15-20</sup>

Once the causative organism is identified, the decision to use antibiotic lock therapy, usually simultaneously with systemic antibiotic therapy, must always be made in consultation with the Infectious diseases team (IMPS).<sup>1-5</sup>



### ALERT

**Antibiotic Lock Therapy requires prior approval from Infection Management Consultant/Fellow**

Antimicrobials that are not listed on the [List of Approved Medicines \(LAM\)](#), require [Individual Patient Approval](#) signed off the IMPS consultant on service, prior to initiation of therapy.

**Table 1: Specific catheter lock volumes associated with each device**

Device	Approximate volume of lumen
Tunnelled Cuffed Central Venous Catheter	2 mL
Peripherally inserted central venous catheter (PICC)	1 mL
Totally implantable Venous Port Device	2 mL
Haemodialysis catheter	To the length of the individual lumen



### ALERT

**Contraindication: Previous serious allergic reaction to the antibiotic.**

Contact the Infectious Diseases unit or clinical microbiology for appropriate advice regarding alternative antimicrobial selection.

## Vancomycin Lock

Vancomycin antibiotic lock concentration of 5 mg/mL is recommended.<sup>2, 6, 14</sup> Compatibility and stability information for the vancomycin and heparin solution is brand specific. Vancomycin 5 mg/mL antibiotic locks that do not exceed the dwell time of 24 hours are now prepared in sodium chloride 0.9% only.

### Vancomycin 5 mg/mL and sodium chloride 0.9 % antibiotic locks:

#### Method for preparation and administration

- (1) Reconstitute 500 mg vial of Vancomycin with 10 mL water for injection (to give concentration of 50 mg/mL) – **draw up 1 mL (50 mg)**.
- (2) Add 1 mL (50 mg) of Vancomycin to 9 mL of sodium chloride 0.9% to give a final concentration of 5mg/mL Vancomycin and a total volume of 10 mL. Prepare fresh for each lumen.
- (3) Instil the required volume for size and type of central venous access device and allow to dwell for **up to 24 hours as prescribed by doctor (minimum dwell time of 6 hours required)**.
- (4) **\*\*Make sure that the line is not flushed during this time by labelling appropriately\*\***
- (5) Withdraw the volume added to each lumen after dwelling for up to maximum of 24 hours.
- (6) Document in patient's medical notes & contact Medical officer if unable to aspirate.

### Vancomycin 5 mg/mL and Citrate (4.67 %) antibiotic locks (for haemodialysis patients only)<sup>15-</sup>

<sup>18</sup>

#### Method for preparation and administration

- (1) Reconstitute 500 mg vial of Vancomycin with 10 mL water for injection (to give concentration of 50mg/mL) – **draw up 1 mL (50 mg)**.
- (2) Draw up **1 mL** of Trisodium Citrate 46.7 % and add to **1 mL** of Vancomycin 50 mg/mL and **8 mL** of Sodium Chloride 0.9% to give a total volume of 10 mL. **This gives a final concentration of 5 mg/mL Vancomycin and 4.67 % Citrate in a total volume of 10 mL.**
- (3) Prepare fresh for each lumen.
- (4) Instil the required volume for size and type of central venous access device and allow to dwell for **up to 48 hours as prescribed by doctor (minimum dwell time of 6 hours required)**.
- (5) **\*\*Make sure that the line is not flushed during this time by labelling appropriately\*\***
- (6) Withdraw the volume added to each lumen after dwelling for up to maximum of 48 hours.
- (7) Document in patient's medical notes & contact Medical officer if unable to aspirate.

## Gentamicin Lock

Gentamicin antibiotic lock concentration should be 1mg/mL for most gram negative organisms. Gentamicin in concentrations  $\geq 10$  mg/mL mixed with heparin results in immediate precipitation.<sup>8,9</sup> Heparin can potentially antagonise the bactericidal properties of gentamicin<sup>11, 12</sup>. As there is limited compatibility literature with heparin, it is recommended NOT to use heparin, in gentamicin locks<sup>13</sup>. Gentamicin 1 mg/mL antibiotic locks that do not exceed the dwell time of 24 hours are now prepared in sodium chloride 0.9% only.

### Gentamicin 1 mg/mL and sodium chloride 0.9 % antibiotic locks:

#### Method of preparation and administration

- (1) Add **0.25 mL** (10 mg) of 80 mg/2 mL Gentamicin to **9.75 mL** of Sodium Chloride 0.9 % to give a final concentration of Gentamicin 1 mg/1 mL and a total volume of 10 mL. Prepare fresh for each lumen.
- (2) Instil the required volume for size and type of central venous access device and allow to dwell for **up to 24 hours as prescribed by doctor (minimum dwell time of 6 hours required)**.<sup>13</sup>.
- (3) ***\*\*Make sure that the line is not flushed during this time by labelling appropriately\*\****
- (4) Withdraw the volume added to each lumen after dwelling for up to maximum of 24 hours.
- (5) Document in patient's medical notes & contact Medical officer if unable to aspirate.

### Gentamicin 1 mg/mL and Citrate (4.67 %) antibiotic locks (for haemodialysis patients only)<sup>15,16,17,19,20</sup>

#### Method of preparation and administration

- (1) Draw up **0.25 mL** (10 mg) of Gentamicin 40 mg/mL.
- (2) Draw up **1 mL** of Trisodium Citrate 46.7 % and add to **0.25 mL** Gentamicin 40 mg/mL and **8.75 mL** of Sodium Chloride 0.9% to give a total volume of 10 mL. **This gives a final concentration of Gentamicin 1 mg/mL and Citrate 4.67% in a total volume of 10 mL.**
- (3) Prepare fresh for each lumen.
- (4) Instil the required volume for size and type of central venous access device and allow to dwell **up to 48 hours as prescribed by doctor (minimum dwell time of 6 hours required)**.
- (5) ***\*\*Make sure that the line is not flushed during this time by labelling appropriately\*\****
- (6) Withdraw the volume added to each lumen after dwelling for up to maximum of 48 hours.
- (7) Document in patient's medical notes & contact Medical officer if unable to aspirate.

### 3. Amikacin Lock

Amikacin antibiotic lock concentration should be 2 mg/mL for most gram negative organisms. Heparin can potentially antagonise the bactericidal properties of amikacin<sup>11, 12</sup>. As there is limited compatibility literature with heparin, it is recommended NOT to use heparin, in amikacin locks<sup>13</sup>.

#### Amikacin 2 mg/mL and sodium chloride 0.9 % antibiotic locks:

##### Method of preparation and administration

- (1) Add **0.2 mL** (50 mg) of Amikacin (500 mg/ 2 mL vial) to **24.8 mL** of Sodium Chloride 0.9 % to give final concentration of 2mg/mL of Amikacin and a total volume of 25 mL. Prepare fresh for each lumen.
- (2) Instil the required volume for size and type of central venous access device and allow to dwell for **up to 24 hours as prescribed by doctor (minimum dwell time of 6 hours required)**.<sup>13</sup>
- (3) ***\*\*Make sure that the line is not flushed during this time by labelling appropriately\*\****
- (4) Withdraw the volume added to each lumen after dwelling for up to maximum of 24 hours.
- (5) Document in patient's medical notes & contact Medical officer if unable to aspirate.

### Ampicillin Lock

Ampicillin antibiotic lock concentration of 10 mg/mL is recommended.<sup>2,6,14</sup> Compatibility and stability information for the ampicillin and heparin solution is brand specific. Ampicillin 10 mg/mL antibiotic locks that do not exceed the dwell time of 24 hours are now prepared in sodium chloride 0.9% only.

#### Ampicillin 10 mg/mL and sodium chloride 0.9 % antibiotic locks:

##### Method for preparation and administration

- (1) Reconstitute 1000 mg vial of Ampicillin with 9.3 mL water for injection (powder volume 0.7 mL) (to give concentration of 100 mg/mL) – **draw up 1 mL (100 mg)**.
- (2) Add 1 mL (100 mg) of Ampicillin to 9 mL of sodium chloride 0.9 % to give a final concentration of 10 mg/mL Ampicillin and a total volume of 10 mL. Prepare fresh for each lumen.
- (3) Instil the required volume for size and type of central venous access device and allow to dwell for **up to 24 hours as prescribed by doctor (minimum dwell time of 6 hours required)**.
- (4) ***\*\*Make sure that the line is not flushed during this time by labelling appropriately\*\****
- (5) Withdraw the volume added to each lumen after dwelling for up to maximum of 24 hours.
- (6) Document in patient's medical notes & contact Medical officer if unable to aspirate.

### Ciprofloxacin Lock

Ciprofloxacin antibiotic lock concentration of 0.125 mg/mL is recommended<sup>2,6</sup>. Compatibility and stability information for the ciprofloxacin and heparin solution is brand specific. Ciprofloxacin 0.125 mg/mL antibiotic locks that do not exceed the dwell time of 24 hours are now prepared in sodium chloride 0.9 % only.

**Ciprofloxacin 0.125 mg/mL and sodium chloride 0.9 % antibiotic locks:****Method for preparation and administration**

- (1) Use Ciprofloxacin infusion bag (concentration of 2 mg/mL) – **draw up 0.5 mL (1 mg)**
- (2) Add 0.5 mL (1 mg) of Ciprofloxacin to 7.5 mL of sodium chloride 0.9 % to give a final concentration of 0.125 mg/mL Ciprofloxacin and a total volume of 8 mL. Prepare fresh for each lumen.
- (3) Instil the required volume for size and type of central venous access device and allow to dwell for **up to 24 hours as prescribed by doctor (minimum dwell time of 6 hours required)**.
- (4) ***\*\*Make sure that the line is not flushed during this time by labelling appropriately\*\****
- (5) Withdraw the volume added to each lumen after dwelling for up to maximum 24 hours.
- (6) Document in patient's medical notes & contact Medical officer if unable to aspirate.

**Linezolid lock**

Linezolid antibiotic lock concentration of 0.2 mg/mL to 1.92 mg/mL is recommended<sup>2,14</sup>. Compatibility and stability information for the linezolid and heparin solution is brand specific. Linezolid 2 mg/mL antibiotic locks that do not exceed the dwell time of 24 hours are now prepared in sodium chloride 0.9% only.

**Linezolid 2 mg/mL and sodium chloride 0.9 % antibiotic locks:****Method for preparation and administration**

- (1) Use Linezolid infusion bag (concentration of 2 mg/mL) – **draw up 4 mL (8 mg)**
- (2) Add 4 mL (8 mg) of Linezolid to 4 mL of sodium chloride 0.9% to give a final concentration of 1 mg/mL Linezolid and a total volume of 8 mL. Prepare fresh for each lumen.
- (3) Instil the required volume for size and type of central venous access device and allow to dwell for **up to 24 hours as prescribed by doctor (minimum dwell time of 6 hours required)**.
- (4) ***\*\*Make sure that the line is not flushed during this time by labelling appropriately\*\****
- (5) Withdraw the volume added to each lumen after dwelling for up to maximum of 24 hours.
- (6) Document in patient's medical notes & contact Medical officer if unable to aspirate.

**Teicoplanin Lock**

Teicoplanin antibiotic lock concentration of 2 mg/mL is recommended<sup>2,6,14</sup>. Compatibility and stability information for the teicoplanin and heparin solution is brand specific. Teicoplanin 2 mg/mL antibiotic locks that do not exceed the dwell time of 24 hours are now prepared in sodium chloride 0.9 % only.

**Teicoplanin 2 mg/mL and sodium chloride 0.9 % antibiotic locks:****Method for preparation and administration**

- (1) Reconstitute 400 mg vial of Teicoplanin with 3.14 mL water for injection (to give concentration of 400 mg/ 3 mL) – **draw up 0.3 mL (40 mg)**.
- (2) Add 0.3 mL (40 mg) of Teicoplanin to 19.7 mL of sodium chloride 0.9 % to give a final concentration of 2 mg/mL Teicoplanin and a total volume of 20 mL. Prepare fresh for each lumen.

- (3) Instil the required volume for size and type of central venous access device and allow to dwell for **up to 24 hours as prescribed by doctor (minimum dwell time of 6 hours required)**.
- (4) ***\*\*Make sure that the line is not flushed during this time by labelling appropriately\*\****
- (5) Withdraw the volume added to each lumen after dwelling for up to maximum of 24 hours.
- (6) Document in patient's medical notes & contact Medical officer if unable to aspirate.

## Cefazolin Lock

Cefazolin antibiotic lock concentration of 10 mg/mL is recommended. <sup>2,6,14</sup> Compatibility and stability information for the cefazolin and heparin solution is brand specific. Cefazolin 10 mg/mL antibiotic locks that do not exceed the dwell time of 24 hours are now prepared in sodium chloride 0.9 % only.

### Cefazolin 10mg/mL and sodium chloride 0.9% antibiotic locks:

#### Method for preparation and administration

- (1) Reconstitute 1000 mg vial of Cefazolin with 9.5 mL water for injection (to give concentration of 100 mg/mL) – **draw up 1 mL (100 mg)**
- (2) Add 1 mL (100 mg) of Cefazolin to 9 mL of sodium chloride 0.9 % to give a final concentration of 10 mg/mL Cefazolin and a total volume of 10 mL. Prepare fresh for each lumen
- (3) Instil the required volume for size and type of central venous access device and allow to dwell for **up to 24 hours as prescribed by doctor (minimum dwell time of 6 hours required)**.
- (4) ***\*\*Make sure that the line is not flushed during this time by labelling appropriately\*\****
- (5) Withdraw the volume added to each lumen after dwelling for up to maximum of 24 hours.
- (6) Document in patient's medical notes & contact Medical officer if unable to aspirate.

## Consultation

Key stakeholders who reviewed this version:

- Service Group Director (Infectious diseases, Immunology and Rheumatology)
- Nurse Practitioner, Paediatric Vascular Assessment and Management
- Clinical Pharmacist Lead - Antimicrobial Stewardship

## References and suggested reading

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## Guideline revision and approval history

Version No.	Modified by	Amendments authorised by	Approved by
1.0	Antibiotic Lock working group (CHQ) Antimicrobial Stewardship pharmacist	Medicines Advisory Committee (CHQ)	General Manager Operations
2.0	Pharmacist Antimicrobial (CHQ) Advanced Stewardship -	Medicines Advisory Committee (CHQ)	General Manager Operations
3.0	Pharmacist Antimicrobial (CHQ) Advanced Stewardship -	Medicines Advisory Committee (CHQ)	Executive director Hospital services
4.0	Pharmacist Antimicrobial (CHQ) Advanced Stewardship -	Medicines Advisory Committee (CHQ)	Executive director Hospital services
5.0 20/08/2019	Pharmacist Antimicrobial (CHQ) Advanced Stewardship -	Medicines Advisory Committee (CHQ)	Executive director Hospital services
6.0 (10/06/2021)	Infectious Diseases Consultant- Antimicrobial Stewardship (Infection Management and Prevention Service) Clinical Pharmacist Lead - Antimicrobial Stewardship	Director Infection Management and Prevention Service, Immunology and Rheumatology	Divisional Director, Division of Medicine

### Keywords

antibiotic lock therapy, gentamicin, vancomycin, amikacin, teicoplanin, ciprofloxacin, cefazolin, linezolid, ciprofloxacin, ampicillin, trisodium citrate, CRBSI, catheter related blood stream infection, CLABSI, central line associated blood stream infection, long line, haemodialysis catheter, antimicrobial stewardship, AMS, 01065

### Accreditation references

**NSQHS Standards (1-8): 3** Preventing and Controlling Healthcare-Associated Infection, **4** Medication Safety  
ISO 9001:2015 Quality Management Systems: (4-10)