



Initiating Aminoglycosides Safely



Last updated: July 2016, Version 5

Questions/Comments? Email Mark.McIntyre@uhn.ca

Click **orange** buttons to navigate protocol.

Index: Aminoglycoside Dosing Algorithms

Objective of the Aminoglycoside Algorithm:

This algorithm has been developed with an interdisciplinary approach combined with antimicrobial stewardship strategies to act as a guideline for clinicians to safely initiate aminoglycoside therapy when indicated

Indications, adverse effects

Preferred algorithm

Algorithm when ODD is contraindicated

Synergy dosing and monitoring

5.

Preferred algorithm for Amikacin use

6.

Algorithm when Amikacin ODD is contraindicated

7.

Use to inform patients about aminoglycosides

8.

Consult form for cranial nerve VIII monitoring



If possible, ALWAYS use an alternate agent for targeted therapy

[ASP Best Practices Link:](#)



1. Aminoglycoside Overview

SPECTRUM OF ACTIVITY

- Many Gram-negative bacteria including resistant *Enterobacteriaceae* and *Pseudomonas* spp.
- Synergistic activity with cell-wall agents against Gram-positive organisms including: staphylococci, streptococci and enterococci
- Not effective against: anaerobic organisms, most *Stenotrophomonas* and *Burkholderia* spp.

INDICATIONS

1

In addition to other appropriate agents for **febrile neutropenia** (High-risk and Solid Tumor/Lymphoma)

2

Undifferentiated sepsis with risk of multidrug resistant bacteria

- Previous resistant infection
- Recent broad-spectrum antibiotic use
- Recent hospital or ICU stay

3

True beta-lactam allergy & treatment for:

- Intra-abdominal infections
- Gynecologic infections
- Complicated UTI or pyelonephritis

4

Synergy for some Gram-positive infections (i.e. endocarditis)

1 CRANIAL NERVE VIII TOXICITY

- 2-14%
- Often NOT reversible
- **Cochlear:** hearing change, tinnitus, fullness in ears
- **Vestibular:** balance, ataxia, vertigo, nausea, oscillopsia (Gent > tobra)
- Can occur with normal drug levels

2 NEPHROTOXICITY

- 5-15%
- Single dose safe in sepsis
- Usually reversible
- Other risks: hypotension, IV contrast, NSAIDs

3 NEUROMUSCULAR BLOCKADE

- Rare
- Self-limiting
- Flaccid paralysis
- Respiratory muscle weakness
- Contraindicated in myasthenia gravis

ADVERSE EFFECTS

CN VIII & Nephrotoxicity RISK FACTORS

- > 3 days therapy
- older age
- prior exposure to AG
- renal disease
- hepatic impairment
- concomitant drugs ex: Vancomycin, loop diuretic

Risk factors

- Rapid injection, electrolyte abnormalities, NM blocking agents



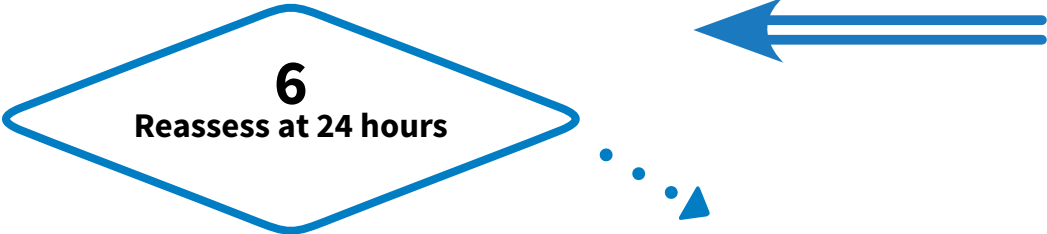
2. Once Daily Dosing (ODD)

If once daily contraindicated, use multiple daily dosing



CrCl mL/min	gentamicin/ tobramycin
≥ 60	5mg/kg q24hr
40-59	5mg/kg q36hr
< 40	Use MDD
HD	Use MDD

Round to nearest 20mg



No indication for aminoglycoside

- Clinical condition
- Microbiology results

DISCONTINUE AMINOGLYCOSIDE

Indication to Continue Aminoglycoside

Consult Clinical Pharmacist and obtain trough level before 2nd dose

CN VIII toxicity

- Daily assessment of hearing and balance
- If anticipate duration >72 hrs, consult Neurotology Clinic:

Monitoring

TROUGH

- 30min before 2nd dose
- Target < 1mg/L

CREATININE

- 3x/week





3. Multiple Daily Dosing (MDD)



Once daily preferred, only use MDD if ODD contraindicated



5 gentamicin/tobramycin
Loading dose: 2mg/kg x 1

Maintenance Dose: 1.7mg/kg

CrCl mL/min	Dosing interval
≥ 60	q8hr
40-59	q12hr
20-39	q24hr
< 20	based on levels
HD	after each HD
CRRT	q24-48hr

Round to nearest 20mg



No indication for aminoglycoside

- Clinical condition
- Microbiology results

DISCONTINUE AMINOGLYCOSIDE

Indication to Continue Aminoglycoside

Consult Clinical Pharmacist and obtain trough level before 3rd dose

CN VIII toxicity

- Daily assessment of hearing and balance
- If anticipate duration >72 hrs, consult Neurotology Clinic:

Monitoring

TROUGH

- 30min before 3rd dose
- Target < 2mg/L

CREATININE

- 3x/week





4. Synergy for Gram-positive infective endocarditis (IE)



5 Dose: 1mg/kg

CrCl mL/min	Dosing interval
≥ 60	q8hr
40-59	q12hr
20-39	q24hr
< 20	based on levels
HD	after each HD
CRRT	q24-48hr

Round to nearest 20mg



No indication for aminoglycoside

- Clinical condition
- Microbiology results

DISCONTINUE AMINOGLYCOSIDE

Indication to Continue Aminoglycoside

Consult Clinical Pharmacist and obtain trough level before 3rd dose

- +
- CN VIII toxicity**
- Daily assessment of hearing and balance
 - If anticipate duration >72 hrs, consult Neurotology Clinic:

- +
- Monitoring**
1. ID Consult
 2. CV surgery consult
 3. TROUGH levels
 - 30min before 3rd dose
 - Target < 1mg/L
 4. Creatinine: 3x/week





5. Amikacin Once Daily Dosing (ODD)

! If once daily contraindicated, use multiple daily dosing



CrCl mL/min	Amikacin
≥ 60	15mg/kg q24hr
40-59	15mg/kg q36hr
< 40	Use MDD
HD	Use MDD

Round to nearest 25mg



No indication for aminoglycoside

- Clinical condition
- Microbiology results

DISCONTINUE AMINOGLYCOSIDE

Indication to Continue Aminoglycoside

Consult Clinical Pharmacist and obtain trough level before 2nd dose

CN VIII toxicity

- Daily assessment of hearing and balance
- If anticipate duration >72 hrs, consult Neurotology Clinic:

Monitoring

TROUGH

- 30min before 2nd dose
- Target < 2 mg/L

CREATININE

- 3x/week





6. Amikacin Multiple Daily Dosing (MDD)



Once daily preferred, only use MDD if ODD contraindicated



5 Loading dose: 7.5mg/kg x 1

Maintenance Dose: 5mg/kg

CrCl mL/min	Dosing interval
≥ 40	q12hr
< 40	q24hr
HD	after each HD
CRRT	q24-48hr
Round to nearest 25mg	



No indication for aminoglycoside

- Clinical condition
- Microbiology results

DISCONTINUE AMINOGLYCOSIDE

Indication to Continue Aminoglycoside

Consult Clinical Pharmacist and obtain trough level before 3rd dose

+

CN VIII toxicity

- Daily assessment of hearing and balance
- If anticipate duration >72 hrs, consult Neurotology Clinic:

+

Monitoring

- TROUGH**
- 30min before 3rd dose
 - Target < 8mg/L
- CREATININE**
- 3x/week





Aminoglycosides: Patient Information

Disclaimer: this information sheet is meant to serve as a reference to guide informed consent discussion. It is not a stand-alone informed consent form.

- Aminoglycosides are a group of antibiotics that include **gentamicin, tobramycin, and amikacin.**
- These antibiotics have been in use for many years and are effective for many serious infections.
- These drugs are used when an alternative is not available because **there are significant side effects**
- A physician and/or pharmacist will review your medications to identify and manage any drugs that increase the risk for side effects.
- **Kidney injury: occurs in 5-15% of patients and is usually reversible**
- **Hearing and Balance Impairment : occurs in 2-14% of patients**
 - **Often NOT reversible**
 - **Duration dependent**
 - **Side effects can be severe and impair quality of life or ability to work**
- **These drugs should NOT be used in patients with myasthenia gravis**

- Monitoring for early drug side effects is important to limit damage
- If you notice the symptoms listed below, inform your doctor or nurse IMMEDIATELY:
- **Hearing change, ringing in ears, ear fullness, earache**
- **Balance changes, visual disturbance, dizziness, unsteady walking, nausea, vertigo**
- Often these changes occur weeks after starting therapy

- Your doctor will monitor your kidney function and antibiotic drug levels with regular blood tests
- Balance and hearing testing will be arranged if you remain on this antibiotic for more than 72 hours



UHN

Toronto General
Toronto Western
Princess Margaret
Toronto Rehab

Gentamicin Monitoring Proforma

TGH Multi-Disciplinary Neurotology Clinic

(Addressograph or fill out patient details)

Last Name _____

First Name: _____

MRN: _____

D.O.B.: _____

PMH / TWH / TGH (please circle)

Location (floor/unit) _____

For patients in the community:

Address: _____ Nurse Name: _____

Home #: (____) _____ Nurse Contact #: _____

Cellular #: (____) _____

Reason for treatment:

Condition requiring

Gentamicin treatment: _____

Gentamicin start date: ____ / ____ / ____
DD MM YY

Dosing details:

Gentamicin _____ mg _____ times a day, for _____ days

Other Aminoglycosides: _____

Necessary Criteria for Monitoring:

(Please select)

	Y	N
1. Fully conscious and interactive	<input type="checkbox"/>	<input type="checkbox"/>
2. Able to provide consent	<input type="checkbox"/>	<input type="checkbox"/>
3. Able to provide feedback with a remote control	<input type="checkbox"/>	<input type="checkbox"/>
4. No major visual impairment	<input type="checkbox"/>	<input type="checkbox"/>

Suitability for specific tests:

Head Shaking

Short Rapid Head Oscillations <20° (in bed or at bedside)

Posturography

Able to stand by bedside unaided

Comments on Dosing:

Additional Instructions/comments:

Signature _____

Name: _____

Date: ____ / ____ / ____

Staff Fellow Resident Nurse Pager _____ Ext. _____

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