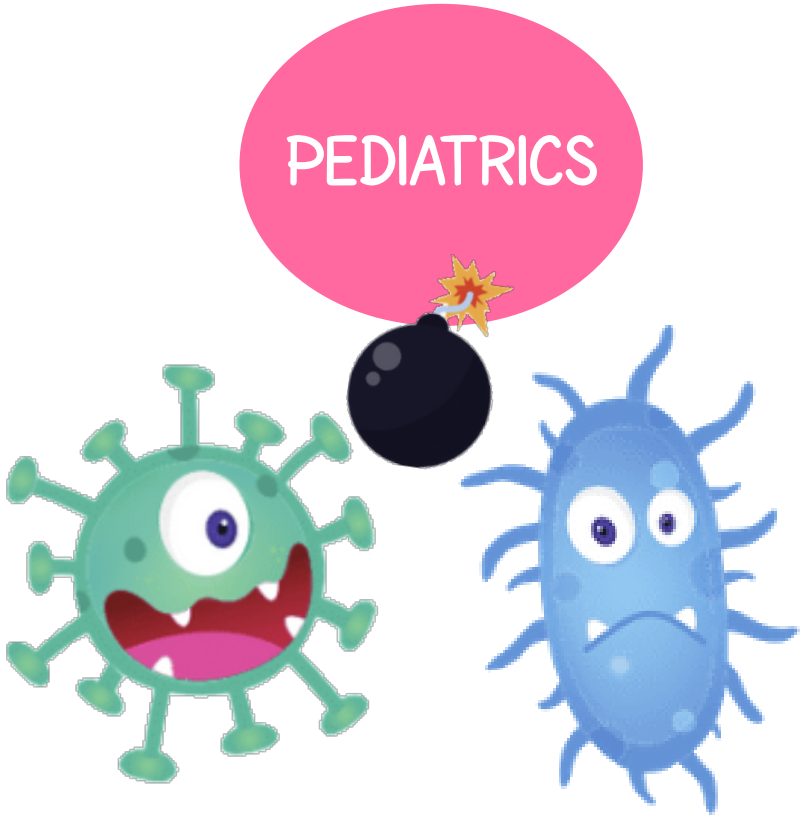
UCSF Benioff Children's Hospitals

Aminoglycoside Guideline Pediatrics UCSF

How To Use These Guidelines



CONTRIBUTORS

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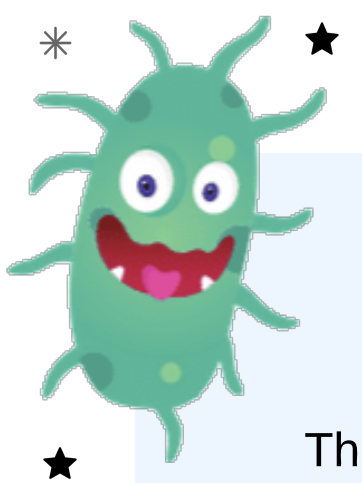
REFERENCES

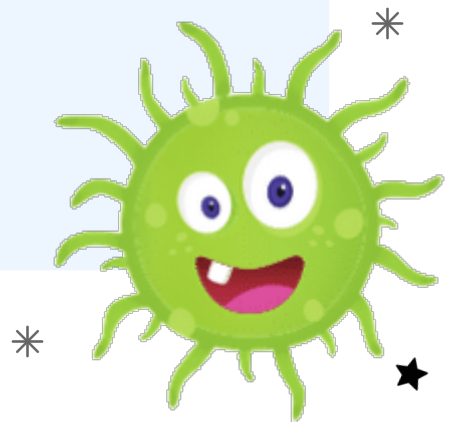


HOW TO USE THESE GUIDELINES

These guidelines serve as a reference for clinical pharmacists at UCSF caring for pediatric patients receiving aminoglycosides (amikacin, gentamicin, and tobramycin).

The document is designed to be interactive, with hyperlinks for quick navigation between sections. Each section links back to the main page, though the guidelines may also be read straight through as a PDF.
If text appears small, adjust the view by zooming in (Ctrl + mouse wheel or the “+” button in the PDF toolbar).

Disclaimer
These guidelines are intended to support, not replace, clinical judgment. Always verify your work carefully. Pharmacokinetic principles should be applied in patients for empiric dosing and when calculating regimens based on aminoglycoside levels.



Why Bayesian Modeling?

- Why We're Using Bayesian Modeling for Most Patient Groups

(Infants, children, adolescents, and special populations — **neonates remain on the UCSF Aminoglycoside Dosing Calculator for now)**

- Ease of use: Faster, simpler data entry
- Better documentation: Provides a complete record of each patient's pharmacokinetics.
- More consistent care: Standardizes approach across pharmacists, reducing variability.
- Flexibility: Accurately accounts for missed doses, dose changes, and renal fluctuations.
- Future-proof: Aligns with best practices in therapeutic drug monitoring (TDM).

Return to Main Page

SELECT THE PEDIATRIC POPULATION YOU ARE TREATING

PEDIATRICS

NEONATES

INFANTS/CHILDREN/ ADOLESCENTS

SPECIAL POPULATIONS

NONTUBERCULOSIS MYCOBACTERIA (NTM)

CYSTIC FIBROSIS (CF)

RETURN TO MAIN PAGE

NEONATES

1 Determine the initial dose using the Gentamicin/Tobramycin ICN Dosing Card

2 Determine the goal peak and trough

Gentamycin/Tobramycin		
	Goal Extrapolated Peak	Goal Extrapolated Trough
Gram-negative infections	8 to 12 mcg/mL	< 0.5 mcg/mL

3 Obtain serum concentrations

Patients on therapy for 48-hour rule out or with expected duration of therapy < 5 days **do not** routinely need therapeutic drug monitoring (TDM).

Situations where TDM **is** typically indicated:

- Expected duration of treatment is ≥ 5 days
- 24-hour urine output (UOP) is < 2 mLs/kg/hour
- A pathogen is identified (this helps ensure extrapolated peak is minimum of 8 to 10X MIC)

If a pathogen is identifed, peak and trough monitoring is recommended. If blood volume is an issue, may need to limit to troughs only on a case-by-case basis

Timing of TDM: Obtain a trough level 30 minutes prior to dose. Obtain a peak level 30 minutes after end of infusion.

- q24h & q36h – prior to 3rd dose
- q48h – prior to 2nd dose

If a pathogen is NOT identified, consider trough-based monitoring without peaks to ensure drug clearance.

4 Dose Adjustments

Use our UCSF Aminoglycoside Dosing Calculator to calculate an extrapolated peak and an extrapolated trough. Model a new aminoglycoside regimen as clinically indicated and recommend a new dosing regimen as needed.

Please refer to the Aminoglycoside Calculator Guide for further instructions on how to use.

5 Continued Monitoring

Clinical pharmacist will obtain serum concentrations as described in step 3 once to twice weekly to verify appropriateness of dosing and make recommendations as needed.

More frequent serum concentrations are indicated in patients with changing clinical status, changing renal status, or concern for toxicity.

6 Documentation

Please write a pharmacokinetic progress note in the patient's chart regardless of whether a dose adjustment was required or not.

Dotphrase = .RXAMINOGLYCOSIDEPEDS

RETURN TO MAIN PAGE

INFANTS / CHILDREN / ADOLESCENTS

1 Determine the initial dose

	Usual Dose	Dose Adjustment
Gentamicin	Treatment: 7 mg/kg/dose IV q24h Synergy: 3 mg/kg/dose IV q24h	Adjust for CrCl < 50 ml/min/1.73m2* *Consider ASP/ID pharmacist consult for dose adjustment/level assessment
Tobramycin	Treatment: 7 mg/kg/dose IV q24h	

2 Determine the goal peak and trough

Gentamycin/Tobramycin		
	Goal Extrapolated Peak	Goal Extrapolated Trough
Gram-negative infections	15 to 30 mcg/mL	< 1 mcg/mL
Gram-positive synergy (gentamicin only)	NA	< 1 mcg/mL

3 Obtain serum concentrations

Patients on therapy for 48-hour rule out or with expected duration of therapy < 5 days **do not** routinely need therapeutic drug monitoring (TDM).
For synergy: obtain trough 2 to 4 days into therapy to ensure clearance

Situations where TDM is indicated:

- Expected duration of treatment is ≥ 5 days
- CrCl < 50 ml/min/1.73m2
- Rapidly declining renal function
  - SCr > 50% increase from baseline **OR**
  - 24-hour urine output (UOP) is < 2 mLs/kg/hour (if available for younger patients)

If TDM is indicated:

Renal Function	When to obtain level	After which dose?
CrCl > 50 or CRRT	Post dose levels 2 and 6 hours after end of infusion	1st or 2nd dose
CrCl < 50	Post dose levels 2 and 12 hours after end of infusion	1st or 2nd dose
Intermittent hemodialysis (iHD), peritoneal dialysis (PD)	Level obtained prior to the hemodialysis treatment is recommended to guide dosing	1st dose

4 Dosing Adjustments

Use Bayesian software to estimate extrapolated peak and trough concentrations. Apply Bayesian modeling to evaluate the current regimen and adjust therapy as clinically indicated.

For step-by-step instructions on how to perform Bayesian modeling, please refer to the Aminoglycoside PrecisePK Job Aid.

5 Continued Monitoring

- Check serum concentrations weekly to confirm appropriate dosing.
- Monitor more often if clinical status, renal function, or toxicity risk changes.
- For synergy, obtain an initial trough and utilize weekly troughs thereafter to ensure clearance.

6 Documentation

Please write a pharmacokinetic progress note in the patient's chart regardless of whether a dose adjustment was required or not.

Dotphrase = .RXAMINOGLYCOSIDEPEDS

★ RETURN TO MAIN PAGE

PEDIATRIC SPECIAL POPULATIONS

Please see our Benioff Children's Hospital Cystic Fibrosis Guidelines for further details.

1 Determine the initial dose.

Prior to choosing a dosing regimen the clinical pharmacist should review the patient's previous aminoglycoside regimen(s) to determine if information from previous courses of therapy can aid in selecting dosing for a new course of treatment.

	Dose	Dose Adjustment
Amikacin	Cystic Fibrosis (CF): 30 mg/kg/dose IV every 24 hours Nontuberculosis Mycobacteria (NTM): 20 mg/kg/dose IV every 24 hours	Adjust for CrCl < 50 ml/min/1.73m2* *Consider ASP/ID pharmacist consult for dose adjustment/level assessment
Tobramycin	10 mg/kg/dose IV every 24 hours (max 15 mg/kg/dose)	

2 Determine therapeutic drug monitoring goals

CF & NTM - Extended Interval Dosing			
Tobramycin		**Amikacin**	
Goal Extrapolated Peak	Goal Extrapolated Trough	Goal Extrapolated Peak	Goal Extrapolated Trough
20 to 35 mcg/mL	< 1 mcg/mL	35 to 45 mcg/mL	< 5 mcg/mL

RETURN TO MAIN PAGE

3 Obtain post dose serum concentrations

With extended interval dosing, after the **first dose** if possible. No need to wait for steady-state as drug concentrations essentially go to 0 mcg/mL in between doses and drug is not expected to accumulate.

Renal Function	When to obtain level	After which dose?
CrCl > 50 or CRRT	Post dose levels 2 and 6 hours after end of infusion	1st dose
CrCl < 50	Post dose levels 2 and 12 hours after end of infusion	1st dose
Intermittent hemodialysis (iHD), peritoneal dialysis (PD)	Level obtained prior to the hemodialysis treatment is recommended to guide dosing	1st dose

4 Dose Adjustments

Use Bayesian software to estimate extrapolated peak and trough concentrations. Apply Bayesian modeling to evaluate the current regimen and adjust therapy as clinically indicated.

For step-by-step instructions on how to perform Bayesian modeling, please refer to the Aminoglycoside PrecisePK Job Aid.

5 Continued Monitoring

- For stable regimens, obtain a trough once weekly to confirm clearance.
- Consider two post-dose levels for extrapolated peak/trough analysis about once monthly, or less frequently if the patient remains stable.
- Increase monitoring if doses, clinical status, renal function, or toxicity risk change.

6 Documentation

Please write a pharmacokinetic progress note in the patient's chart regardless of whether a dose adjustment was required or not.

Dotphrase = .RXAMINOGLYCOSIDEPEDS

References

1. Smyth A, Tan KH, Hyman-Taylor P, et al. Once versus three-times daily regimens of tobramycin treatment for pulmonary exacerbations of cystic fibrosis--the TOPIC study: a randomized controlled trial. Lancet. 2005 Feb 12-18;365(9459):573-8.
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3. Whitehead A, Conway SP, Etherington C, et al. Once---daily tobramycin in the treatment of adult patients with cystic fibrosis. Eur Respir J. 2002 Feb;19(2):303---9.
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Return to Main Page

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