MICHIGAN MEDICINE
UNIVERSITY OF MICHIGAN

AMINOGLYCOSIDE DOSING AND MONITORING RECOMMENDATIONS IN PATIENTS ON PEDIATRIC SERVICE LINES

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Useful links:
Pharmacokinetics Webpage
Pharmacokinetic Review (Pediatric)

Gentamicin/Tobramycin		
Patient Population/Unit/Service	**Empiric Dosing Recommendations**	**Timing of Initial Serum Concentrations**
General dosing for children, EXCEPT in the following situations: • Cystic fibrosis • NICU patients • PICU patients • CHC patients	*Normal Renal Function:* Treatment: <18 years: ○ 7.5 mg/kg/dose IV q24h ≥18 years: ○ 5 mg/kg/dose IV q24h Synergy (for endocarditis): 1 mg/kg/dose IV q8h *Renal Dysfunction:* Acute renal insufficiency (CrCl <30 mL/min): 2.5 mg/kg/dose IV q12h Peritoneal dialysis: 2.5 mg/kg/dose IV q24h Hemodialysis: 2.5 mg/kg/dose IV x1 post dialysis	• Treatment: if continuing past 48 hours, 3-hour peak and 10-hour random concentrations after the 2nd dose • Synergy: peak and trough concentrations around the 3rd or 4th dose • Acute renal insufficiency: peak and trough concentrations around the 3rd or 4th dose • PD: check trough prior to the 2nd dose • HD: check random level 2 hours after completion of next dialysis session to guide further dosing
Cystic Fibrosis Patients *Tobramycin is the preferred aminoglycoside over gentamicin*	High dose, extended interval dosing: 10 mg/kg/dose IV q24h	• 3-hour peak and 10-hour random concentrations after the 2nd dose • If concern for renal dysfunction: check trough prior to the 2nd dose • Check doses from recent previous admissions; initiate most recent therapeutic dose; discuss with pharmacy if previous dose not available

Gentamicin/Tobramycin

<table>
<tr><th>Patient Population/Unit/Service</th><th>Empiric Dosing Recommendations</th><th>Timing of Initial Serum Concentrations</th></tr>
<tr><td>NICU</td><td>
<table>
<tr><th>Weight/PNA</th><th>0-14 days</th><th>15-28 days</th><th>>28 days</th></tr>
<tr><td>≤1,200 g</td><td>5 mg/kg q48h</td><td>4 mg/kg q36h</td><td>4 mg/kg q24h</td></tr>
<tr><td>1,200-2,000 g</td><td>5 mg/kg q36h</td><td>4 mg/kg q24h</td><td>4 mg/kg q24h</td></tr>
<tr><td>>2,000 g</td><td>5 mg/kg q24h</td><td>4 mg/kg q24h</td><td>4 mg/kg q24h</td></tr>
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<table>
<tr><th colspan="2">Therapeutic Hypothermia & ECMO – obtain trough prior to 2nd dose</th></tr>
<tr><td>≤2,000 g</td><td>5 mg/kg q48h</td></tr>
<tr><td>>2,000 g</td><td>5 mg/kg q36h</td></tr>
</table>
<table>
<tr><th colspan="2">Peritoneal Dialysis – dose by levels</th></tr>
<tr><td>All weight & PNA</td><td>2.5 mg/kg q24h</td></tr>
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<table>
<tr><th colspan="2">Transfer from OSH – redose based on OSH dosing</th></tr>
<tr><td>If dose ≥3.5 mg/kg:</td><td>Place patient in appropriate dosing interval as above</td></tr>
<tr><td>If dose <3.5 mg/kg:</td><td>Contact pharmacy for appropriate dosing recommendations</td></tr>
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Serum concentrations generally not necessary for 36-48 hour sepsis evaluations, unless at risk for/presence of renal insufficiency
Treatment: if continuing past 48 hours, peak and trough concentrations around the 2nd or 3rd dose
ECMO: trough prior to the 2nd dose
Cooling: consider trough prior to the 2nd dose if unstable renal function or pressor requirements
PD: dose by levels

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Gentamicin/Tobramycin		
Patient Population/Unit/Service	**Empiric Dosing Recommendations**	**Timing of Initial Serum Concentrations**
PICU (For patients <44 weeks CGA, please refer to NICU dosing)	Treatment, normal renal function: • <18 years: 7.5 mg/kg/dose IV q24h • ≥18 years: 5 mg/kg/dose IV q24h Synergy (for endocarditis): 1 mg/kg/dose IV q8h Acute renal insufficiency (CrCl <30 mL/min), ECMO, CRRT: 5 mg/kg/dose IV q24h Hemodialysis: 2.5 mg/kg/dose IV x1 post dialysis Peritoneal dialysis: 2.5 mg/kg/dose IV q24h	• Treatment: if anticipated duration >48h or confirmed Gram-negative infection, obtain 3-hour peak and 10-hour random concentrations after the 2nd dose • Synergy: peak and trough concentrations around the 3rd or 4th dose • Acute renal insufficiency, ECMO, CRRT, PD: obtain 3-hour peak and 10-hour random level after the 1st dose to guide further dosing • HD: check random level 2 hours after completion of next dialysis session to guide further dosing
CHC (PCTU and 11W)	Normal renal function • <28 days: Follow NICU dosing • >28 days to <18 years: 7.5 mg/kg/dose IV q24h • ≥18 years: 5 mg/kg/dose IV q24h Renal dysfunction, ECMO: 2.5 mg/kg/dose IV q12h Peritoneal dialysis: 2.5 mg/kg/dose IV q24h Synergy (for endocarditis): • Within 72 hours of cardiac surgery and/or in PCTU on inotropes/vasopressors: 1 mg/kg/dose IV q12h • ≥72 hours since last cardiac surgery and not on inotropes/vasopressors: 1 mg/kg/dose IV q8h	• Trough concentrations generally not necessary for 48-hour rule out sepsis evaluations, unless at risk for/presence of renal insufficiency • Treatment: if anticipated duration >48h or confirmed Gram-negative infection, obtain 3-hour peak and 10-hour random concentrations after the 2nd dose • Synergy: peak and trough concentrations around the 3rd or 4th dose • If concern for renal dysfunction: check trough prior to the 2nd dose

Amikacin		
Patient Population/ Unit/Service	**Dosing Recommendations**	**Timing of Initial Serum Concentrations**
General dosing for children with normal renal function, <u>EXCEPT</u> in the following situations: • **Cystic fibrosis** • **NICU** • **CHC patients** • **ECMO**	<u><18 years:</u> 20 mg/kg/dose IV q24h (normal dose range 15-30 mg/kg/dose IV q24h) <u>≥18 years:</u> 15 mg/kg/dose IV q24h (normal dose range 15-20 mg/kg/dose IV q24h)	• If continuing past 48 hours: 3-hour peak and 10-hour random concentrations after the 2nd dose • If concern for renal dysfunction: check trough prior to the 2nd dose
Cystic Fibrosis Patients	<u>High dose, extended interval dosing:</u> 30 mg/kg/dose IV q24h	• <u>High dose, extended interval:</u> 3-hour peak and 10-hour random concentrations after the 2nd dose • If concern for renal dysfunction: check trough prior to the 2nd dose • Check doses from recent previous admissions; initiate most recent therapeutic dose; discuss with pharmacy if previous dose not available
Dosing for Renal Replacement Therapy or ECMO	<u>ECMO:</u> 15 mg/kg/dose IV q24h <u>CRRT:</u> 15 mg/kg/dose IV q24h <u>Hemodialysis:</u> 5 mg/kg/dose IV x1 post dialysis	• <u>ECMO or CRRT:</u> obtain 3-hour peak and 10-hour random level after the 1st dose to guide further dosing • <u>HD:</u> check random level 2 hours after completion of next dialysis session to guide further dosing

Gentamicin/Tobramycin Goals (in mcg/mL)	Traditional Dosing		Extended-Interval Dosing		
	Goal peak	Goal Trough	Goal Peak	Goal Trough	18-hr Level
Gram positive synergy	3-5 (1 mg/kg) N/A (3 mg/kg)	<1	Do not use EIDA		
NICU	5-8	<2	8-12	<1	N/A
Non-CF Gram-negative infections	6-10	<1	20-30	Undetectable (<0.25)	<1
Cystic fibrosis	10-12	<1.5	20-40	Undetectable (<0.25)	<1

Amikacin Goals (in mcg/mL)	Traditional Dosing		Extended-Interval Dosing		
	Goal peak	Goal Trough	Goal Peak	Goal Trough	18-hr Level
Non-CF Gram-negative infections	25-35	<6	40-60	<1	<4
Cystic fibrosis	25-40 (q8h) 40-60 (q12h)	<6 <6	80-120	<1	<4

Baseline Monitoring	Ongoing Lab Monitoring	Ongoing Drug Levels

• Serum creatinine
• Urine output
	• **Serum creatinine**
	  ◦ ICU: every 1-3 days
	  ◦ Floor: every 3-5 days
	• **Urine output** - daily
		• **Extended-Interval Dosing**
		  ◦ Not needed for most 36-48 hour rule outs unless cultures turn positive
		  ◦ If GNR + culture, obtain 3-hour peak and 10-hour random levels around 2nd or 3rd dose
		  ◦ Obtain 18-hour levels every 5-7 days once therapeutic levels achieved
		• **Traditional Dosing**
		  ◦ Aminoglycoside peaks
		  ▪ Not needed for most 36-48 hour rule outs unless cultures turn positive
		  ▪ After 3rd-4th dose if GNR + culture
		  ◦ Aminoglycoside troughs
		  ▪ Not needed for most 36-48 hour rule outs, unless at risk for or presence of renal insufficiency or cultures turn positive
		  ▪ ICU: Every 3-5 days
		  ▪ Floor: Every 5-7 days
		  ▪ Heme/onc: Twice weekly

CW Decentralized Pharmacist Committee Approval:	09/2022	Originated:	02/2021
Antimicrobial Subcommittee Approval:	08/2022	Last Revised:	09/2022
P&T Approval:	10/2016, 11/2022		

Revision History:
07/2021: Updated PH/PBM dosing recommendations
09/2022: Updated dosing for all services to include extended interval recommendations, additional guidance included related to renal dysfunction and timing of initial serum concentrations