LUCILE PACKARD CHILDREN'S HOSPITAL @ STANFORD
DEPARTMENT OF PHARMACY
IV MEDICATION ADMINISTRATION GUIDELINES

Additional information may be found in the LPCH Housestaff Manuel

DRUG	DOSE*	Medline Compatibility#	IV BOLUS		IV INTERMITTENT		NURSING CONSIDERATIONS
			DILUTION **	RATE	DILUTION**	RATE	
Acetazolamide	1-5 mg/kg/dose	D5W, NS	100mg/ml	give over 3-5 min	n/a	n/a	
Acyclovir	5-20mg/kg/dose 250-500mg/m2/dose	D5W, NS	n/a	No IV push	5mg/ml; do not further dilute	over 60 min.	hydrate adequately
Adenosine	100mcg/kg/dose max 12mg/dose	n/a	Undiluted	Rapid IVP over 1-2 seconds	n/a	n/a	central line preferred
Albumin	0.25-1gm/kg/dose	NS	n/a	No IV push	5% or 25%	usual over 1-2 hr. rate depends on patient's condition	if 12.5% abumin is ordered; dilute 25% 1:1 with NS;
Allopurinol	per oncology protocol	D5W, NS	n/a	no IV push	6 mg/ml	15-20 minutes	short stability
Amikacin	5-7.5mg/kg/dose	D5W, NS	n/a	no IV push	max 5mg/ml	over 30 minutes	administer penicillins and cephalosporins 1 hour before or after amikacin
Aminocaproic Acid	Load; 100-mg/kg/dose	D5W, NS	20mg/ml	avoid rapid infusion	20mg/ml	33 mg/kg/hour	hypotension, bradycardia, arrhythmias with rapid infusion
Amiodarone	Bolus: 5 mg/kg/dose	D5W, NS	PIV: max 2 mg/ml; Central: 6mg/ml	over 10-15 minutes	n/a	5-15 mcg/kg./min	hypotension, bradycardia, phlebitis
Aminophylline	Load: 4-6mg/kg/dose 12-24mg/kg/day	D5W, NS	max 25mg/ml	over 15-30 min; max <25mg/min	1-4mg/ml	continuous	
Amphotericin B	1mg/kg/day	D5W	n/a	No IV push	do not further dilute	over 4-6 hours	Do not filter; not compatible with NaCl
Amphotericin Liposomal	3-5mg/kg/day	D5W	n/a	No IV push	do not further dilute	over 2 hours	Do not filter, not compatible with NaCl

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Ampicillin	25-100mg/kg/dose q6h	NS	100mg/ml	over 3-5 min; over 10-15 min for larger doses	n/a	n/a	administer within 1 hour of reconstitution; avoid dextrose solutions
Antithymocyte Globuline (Thymoglobulin)	1.5 mg/kg	NS	n/a	No IV push	prediluted by rx; do not further dilute	1st dose-over 6 hours, later doses may be over 4 hours	Give thru high-flow vein; central line preferred, use 0.2micron inline filter; watch for anaphylaxis
Arginine HCl	refer to Housestaff Manuel	n/a	undiluted	at least 30 min; max 1 gm/kg/h (4.75 meq/kg/h)	undiluted	1 gm/kg/h or 30 gm/h	rapid infusion may cause flushing, N/V, numbness, HA
Atropine	0.02 mg/kg/dose min 0.1mg/dose; peds max 1mg/dose, adult max 2mg/dose	n/a	undiluted	over 1 min	n/a	n/a	
Azathioprine	1-5 mg/kg/day		max 10mg/ml	5-60 min (usual 30-60 min)	10mg/ml	30-60 min	
Azithromycin	max 500mg/dose	D5W, NS	n/a	No IV push	2mg/ml	At least 1 hour	
Bumetanide	0.015-0.1mg/kg/dose	n/a	undiluted	over 1-2 min		n/a	
Caffeine (as citrate)	(dosing based on caffeine base) Load:10mg/kg/dose Maintenance: 2.5mg/kg	n/a	undiluted	No IV push	10mg/ml	over 30 min	
Calcitriol	0.01-0.05 mcg/kg	n/a	undiluted	as bolus dose	n/a	n/a	
Calcium Chloride	10-20mg/kg/dose; max 1gm/dose	D5W, NS	code: 100mg/ml; non code: 20mg/ml	may push for code max 50-100mg/min; or 45-90 mg/kg/hr	dilute as much as possible	over 1-4 hours depends on pt condition	preferred;incompatible with phosphates; extravasation may cause tissue necrosis
Calcium Gluconate	50-100mg/kg/dose max 1gm/dose	D5W, NS	50 mg/ml	<100 mg/min or 120-240 mg/kg/h	PIV: 3gm/l Central 8gm/l	over 1-4 hours depends on pt condition	preferred;incompatible with phosphates; extravasation maycause tissue necrosis

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			DILUTION **	RATE	DILUTION**	RATE	
Caspofungin	load 70mg/m2 x 1 maintenance 50mg/m2	n/a	n/a	n/a	diluted by pharmacy; do not further dilute	over 60 minutes	monitor for rash, flushing, pruritis, facial edema
Cefazolin	40-100mg/kg/day max 2gm/dose	D5W, NS	100mg/ml	over 3-5 min	20mg/ml	over 30-60 min	
Cefepime	50 mg/kg/dose; max 2 gm/dose	D5W, NS	n/a	n/a	40 mg/ml	over 20-30 min.	
Cefotaxime	50mg/kg/dose q6-8h max 2gm/dose	D5W, NS	60mg/ml	over 5 min	max 60mg/ml	over 10-30 min	
Cefoxitin	80-160mg/kg/day max 2gm/dose	D5W, NS	PIV: 50mg/ml; Central:180mg/ml	over 3-5 min	40mg/ml	over 15-40 min	
Ceftazidime	30-50mg/kg/dose q8-12h max 2 gm/dose	D5W, NS	200mg/ml	over 5 min	40mg/ml	over 10-30 min	
Ceftriaxone	50-100mg/kg/day max 2gm/dose	D5W, NS	max 40mg/ml	10-30 min (<10 min not recommended)	max 40mg/ml	over 15-30 min	
Cefuroxime	75-150 mg/kg/day	D5W, NS	100mg/ml	over 3-5 min	max 30mg/ml	over 15-60 min	
Chlorothiazide	1-4 mg/kg/dose		25 mg/ml	3-5 min or over 30 min	n/a	n/a	avoid extravasation
Ciprofloxacin	15-20 mg/kg/day max 400mg/dose	D5W, NS	n/a	No IV push	2mg/ml	over 60 min	may cause venous irritation
Clindamycin	10-40mg/kg/day	D5W, NS	n/a	No IV push	12mg/ml	over 30-60 min max 30mg/min	rapid IV administration may cause hypotension & cardiopulmonary arrest

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			DILUTION **	RATE	DILUTION**	RATE	
Cotrimoxazole (Septra)	4-20 mg/kg/day TMP	D5W	n/a	No IV push	5ml of drug with 75ml D5W	over 60-90 min	use within 2 hours of dilution; incompatible with NS
Cyclosporine	per transplant service	n/a	n/a	No IV push	diluted by pharmacy, do not further dilute	per transplant service	glass containers, use NTG tubing for high dose & continuous infusion
Daclizumab	1-2 mg/kg/dose	n/a	n/a	No IV push	Prediluted by RX in 25-50ml NS	over 15 minutes	
Dantrolene	1 mg/kg/dose	n/a	Dilute 20mg vial with 60ml SWFI	rapid IV injection	n/a	n/a	do not further dilute with NS or dextrose
Dexamethasone	0.02-4mg/kg/day	D5W, NS	Undiluted	over 1-3 min	undiluted	over 10-20 min	
Dextrose	0.5-1gm/kg/dose	n/a	diluted by pharmacy, do not further dilute	max: 0.5 gm/kg/min	diluted by pharmacy, do not further dilute	max 0.5mg/kg/hour	PIV: 12.5% max Central: 30% max
Diazepam	0.1-0.5 mg/kg/dose	n/a	undiluted	over 3-5 minute; max 1-2mg/min for peds; 5mg/min for adults	n/a	n/a	flush line before and after with NS; respiratory depression, hypotension with rapid injection
Digoxin	Maint.:5-12 mcg/kg/day; max 0.25mg/dose	D5W, NS	25mcg/ml	over 5 min	n/a	not recommended	dilutions >25 mcg/ml may precipitate
Diphenhydramine	0.5-1.25mg/kg/dose max 50mg/dose	D5W, NS	50mg/ml	over 3-5 min	n/a	n/a	
Doxycline	1-2mg/kg/dose; max 100mg	D5W, NS	n/a	n/a	1 mg/ml	over 1-4 hours	
Enalaprilat	5-10 mcg/kg/dose; max 1.25mg	n/a	undiluted	over 5 minutes	n/a	n/a	

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			DILUTION **	RATE	DILUTION**	RATE	
Epinephrine	Code: 0.01mg/kg/dose	n/a	undilute	rapid IV push	n/a	n/a	
Epoetin	50-100 units/kg/dose	NS	undiluted; may be diluted 1:1 with NS	over 1-3 min	n/a	n/a	
Erythromycin	20-40mg/kg/day max 1gm/dose	NS	n/a	No IV push	max 5mg/ml <1mg/ml dec. irritation	60 minutes	
Ethyacryinic Acid	0.5-1 mg/kg/dose	D5W, NS	n/a	n/a	1mg/ml	over 20-30 minutes	
Famotidine	1-2mg/kg/day max 20mg/dose	D5W, NS'	4mg/ml	over 5 min	4mg/ml	over 15-30 min	
Fat Emulsion	0.5-3gm/kg/day	n/a	n/a	No IV push	undiluted	over 8-24hours max 0.25gm/kg/hr	do not filter unless filter is >1.2 micron
Fentanyl	0.5-1 mcg/kg/dose	D5W, NS	undilute	No IV push; may give over 3-5 min	n/a	n/a	rapid IV administration may cause chest rigidity
Filgrastim	5-10 mcg/kg/dose	n/a	diluted by pharmacy, do not further dilute	15-30 min	diluted by pharmacy, do not further dilute	over 2 hours	Conc < 15mcg/ml need to have albumin added
Fluconazole	3-6 mg/kg/dose max 400mg/dose	n/a	n/a	No IV push	undiluted (2mg/ml)	over 1-2 hours max 200mg/h	
Flumazenil	0.01mg/kg/dose max 0.2mg /dose	n/a	undilute	over 15 seconds	n/a	not recommended	administer into freely flowing IV infusion into large vein
Fosphenytoin	(dose based on PE) Load: 15-20mg/kg/dose Maintenance: 4-6mg/kg/day	D5W, NS	25 PE mg/ml	3mg PEkg/min max 150 PE mg/min		not recommended	PE= phenytoin equivalent

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			DILUTION **	RATE	DILUTION**	RATE	
Furosemide	1-2 mg/kg/dose	D5W, NS	undilute	0.5 mg/kg/min max 4mg/min	5mg/ml	less than 4mg/min up to 0.5mg/kg/min	
Ganciclovir	5-10mg/kg/day	n/a	n/a	No IV push	diluted by pharmacy, do not further dilute	give over 1 hour	
Gentamicin	1.5-3 mg/kg/dose	D5W, NS	n/a	No IV push	max 10mg/ml	give over 30 min	administer penicillins and cephalosporins 1 hour before or after gentamicin
Glycopyrrolate	4-10 mcg/kg/dose	n/a	undiluted	over 5-10 sec (for reversal of neuromuscular blockade)	undiluted	15-30 min, max 20 mcg/min	
Granisetron	10mcg/kg/dose max 1mg/dose	D5W, NS	undiluted	over 5-15 minutes	50 mcg/ml	30-60 min	
Haloperidol	Depends on indication, refer to HouseStraff Manual	D5W	1mg/ml	Slow IV Push			
Heparin	50-100 units/kg	D5W, NS	n/a	n/a	undiluted	over 10-15 minutes	
Hydralazine	0.1-0.2mg/kg/dose max 20mg/dose	NS	undiluted; or dilute to 1mg/ml	over 3-5 min. Max 0.2mg/kg/min	n/a	n/a	
Hydrocortisone	0.2-8mg/kg/dose (dose varies according to disease and response)	D5W, NS	max 50mg/ml	over 3-5 min 10-30 min for doses>500mg	max 5mg/ml	over 20-30 min	
Hydromorphone	2-10 mcg/kg/dose	n/a	undiluted	over 2-3 min	undiluted	10-15 minutes	
Hydroxyzine	0.5-1mg/kg/dose max 50mg/dose	undilute	n/a	over 5-15 min	n/a	n/a	IM preferred,may give IV if necessary; do not give intra-arterial

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			DILUTION **	RATE	DILUTION**	RATE	
Indomethacin	0.1-025 mg/kg/dose	NS	n/a	n/a	prediluted by rx to 0.5 mg/ml; do not further dilute	over 20-30 minutes	Do not give through UAC, intra-artially.
Ketamine	0.025-2 mg/kg/dose	D5W, NS	10 mg/ml	over 1-10 minutes	n/a	n/a	
Ketorolac	0.5mg/kg/dose max 60mg/dose	n/a	undiluted	over at least 15 seconds	n/a	n/a	max 5 day therapy
Labetalol	Peds: 0.2-0.5mg/kg; Adults: 20mg/dose	n/a	undiluted	max 2 mg/min	n/a	n/a	
Leucovorin	refer to protocol	D5W, NS	10 mg/ml	160 mg/min	n/a	n/a	
Levocarnitine	10-50 mg/kg/dose	NS	undiluted	2-3 minutes	8mg/ml	variable	
Levothyroxine	1-8mcg/kg/dose (age dependent-refer to Housestaff Manuel)	NS	100 mcg/ml	2-3 minutes	n/a	n/a	reconstitute vial just prior to adminstration. Dilute 200 mcg vial with 2ml NS.
Linezolid	10 mg/kg/dose; max 600mg/dose	n/a	n/a	n/a	3 mg/ml (prediluted)	over 30-120 minutes	Yellow color may deepen over time- does not affect potency
Lorazepam	0.04-0.1mg/kg/dose max 4mg/dose	D5W, NS	2mg/ml	over 2-5 min max 2mg/min	n/a	n/a	do not give intra-arterially
Lymphocyte Immune Globulin (Atgam)	10-15 mg/kg/dose	n/a	n/a	No IV Push	prediluted by Rx do not further dilute	give over 4-8 hours	Give thru high-flow vein; central line preferred, use 0.2-1micron inline filter; watch for anaphylaxis
Magnesium sulfate	25-50 mg/kg/dose	D5W, NS	n/a	No IV push	max 60mg/ml	over 3-4 hours	

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			DILUTION **	RATE	DILUTION**	RATE	
Mannitol	0.25-0.5 gm/kg/dose	n/a	undiluted	for ICP: 5-15 min otherwise 30-60 min	undiluted	for ICP: 5-15 min otherwise 30-60 min	use inline filter
Meperidine	1-2 mg/kg/dose max 150mg/dose	D5W, NS	max 10mg/ml	over 3-5 min	n/a	n/a	
Meropenem	20 mg/kg/dose; max 2 gram/dose	n/a	n/a	n/a	prediluted by rx; donot further dilute	Over 15-30 minutes	
Methylprednisolone	0.1-30mg/kg/dose	D5W, NS	125mg/ml	<125mg 3-15 min; 125-250mg 15-30 min	2.5 mg/ml	250mg-1 gm: 20-60 min	give doses > 1gm or 15mg/kg over at least 60 min
Metoclopramide	0.1-1 mg/kg/dose	D5W, NS	undiluted	over 3-5 min (for doses <10mg)	1mg/ml	at least 15 min (for doses>10mg)	
Metronidazole	5-7.5 mg/kg/dose	n/a	n/a	No IV push	undiluted; not do further dilute	over 60 min	
Midazolam	0.05-0.1mg/kg/dose	n/a	undilute	min. 2 minutes; max 1mg/min	n/a	n/a	
Morphine	0.05-0.2mg/kg/dose (titrate to effect)	D5W, NS	max 5mg/ml	over 3-5 min	max: 15mg/ml	0.01-0.1 mg/kg/h titrate to effect	
Muromonab (OKT3)	refer to indvidual protocols	n/a	undiluted	over less than 1 minute	n/a	n/a	watch for fever, chills, chest tightness , wheezing
Mycophenolate	15-23mg/kg/dose max 1.5gm/dose	n/a	n/a	No IV push	prediluted by pharmacy; do not further dilute	minimum 2 hours	
Nafcillin	50-200mg/kg/day max 2gm/dose	D5W, NS	max 40mg/ml	over 5-10 min in running IV	max 40mg/ml	15-60 min	lower concentration may help with pain and phlebitis; central line preferred

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Nalbuphine	0.05-0.15mg/kg/dose max 20mg/dose	D5W, NS	undilute or 5mg/ml	over 10-15 min	n/a	n/a	
Naloxone	0.001-0.1mg/kg (max 2mg/dose)	D5W, NS	Undiluted or 0.01 mg/ml	over 15-30 seconds	n/a	n/a	
Octreotide	1-10 mcg/kg/dose	D5W, NS	max 100 mcg/ml	over 3 min	Add to 50ml	15-30 minutes	
Ondansetron	0.15-0.45mg/kg/dose	D5W, NS	undilute	2-5 min	dilute in 25ml	over 15 min	
Pancuronium	0.1 mg/kg	n/a	undilute	IV Push	n/a	n/a	
Pantoprazole	1 mg/kg/dose; max 40mg	D5W, NS	diluted by pharmacy	at least 2 minutes	0.8 mg/ml	15 minutes	
Penicillin Na+/K+	50,000 - 500,000 units/kg/day max 24 million units/day	D5W, NS	n/a	no iv push	100,000 units/ml	15-50 min	consider amount of K+ in Pen K during infusion (1.7meq K+ per million un. PCN)
Pentamidine	4mg/kg/dose	D5W	n/a	No IV push	max 6mg/ml	at least 1 hour	do not reconstitute vial with saline
Phenobarbital	load: 10-20mg/kg/dose maintenance 3-8mg/kg/day	n/a	n/a	n/a	max 130mg/ml	max 30mg/min for children 60mg/min for adult	no intra-arterial administration
Phenytoin	Load: 15-20mg/kg maintenance 5-10mg/kg/day	NS	undilute or <6mg/ml with NS	1-3mg/kg/min max 50mg/min	n/a	n/a	no intra-arterial administration
Phytondione	0.25-10mg/dose			max 1mg/min (adults)		30-45 min;may be given in continuous IV infusion	give IV only if no other route feasible; longer infusion time preferred to prevent hypotension

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			DILUTION **	RATE	DILUTION**	RATE	
Pipercillin/ Tazobactam (Zosyn)	150-400 mg/kg/day max 4gm/dose	D5W, NS	n/a	No IV push	<20mg/ml preferred; max200mg/ml	over 30 min	doses based on pipercillin component
Potassium Chloride	0.5-1 meq/kg/dose max 30 meq/dose	D5W, NS	n/a	No IV push	PIV: 0.05meq/ml Central:0.4 meq/ml	max 0.5 meq/kg/h NTE 30 meq/h	Rrefer to orderset or careset for administration times
Potassium Phosphate	0.08-0.24 mm/kg/dose max 15 mm/dose	D5W, NS	n/a	No IV push	PIV: 0.05 mM/ml Central: 0.12 mm/ml	6-12 hours; max 0.06 mm/kg/h	do not give with calcium containing fluids; do not exceed max K+ rate
Promethazine	0.25-1mg/kg/dose max 25mg/dose	n/a	undilute (25mg/ml)	over 5-15 min	n/a	n/a	do not give intra-arterial; extravasation may cause tissue necrosis
Propofol	0.5-3mg/kg	n/a	undilute	20-30 seconds	n/a	n/a	
Propranolol	0.01-0.02 mg/kg/dose	n/a	undilute	give over 10 minutes	n/a	n/a	
Ranitidine	2-6mg/kg/day max 50mg/dose	D5W, NS	2.5 mg/ml	min. 5 minutes max 10mg/min	2.5 mg/ml	over 15-20 min	administration < 5min may cause hypotension
Rifampin	10-20mg/kg/day max 600mg/day	D5W	n/a	No IV push	6mg/ml	30 min to 3 hours	
Rocuronium	0.6-1.2 mg/kg	D5W, NS	10mg/ml	5-10 seconds	n/a	n/a	
Sargramostim	250-500 mcg/m2/dose	NS	n/a	No IV push	10mcg/ml	30 min-6 hours	concentrations < 10mcg/ml need albumin
Sodium Bicarbonate	1 meq/kg/dose	D5W, NS	<10kg:max 0.5meq/ml >10kg: 1 meq/ml	IV Push for code situations only	PIV: 0.5 meq/ml Central 1meq/ml	15-20 min . max 10meq/min in infants)	Less concentrated soln preferred; extravasation may cause local ischemia and tissue necrosis

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Sodium Phosphate	0.08-0.36 mm/kg/dose max 15mm/dose	D5W, NS	n/a	No IV push	0.12 mm/ml	over 6-12 hours max 0.06mm/kg/h	do not give with calcium containing fluids
Tacrolimus	0.05-0.1 mg/kg/day	n/a	n/a	No IV push	diluted by rx; do not further dilute	per MD orders	glass bottle, use nitroglycerin (non-PVC) tubing
Tobramycin	2.5-3 mg/kg/dose	D5W, NS	n/a	No IV push	max 10mg/ml	over 30 min	administer penicillins and cephalosporins 1 hour before or after tobramycin
Valproic Acid	4-15 mg/kg	D5W, NS	n/a	No IV push	50 mg/ml	over 60 min max 20mg/min	May require futher dilution due to pain and irritation at infusion site
Vancomycin	10-24mg/kg/dose max 1gm/dose	D5W	n/a	No IV push	5mg/ml	over 60 min	may give over 2 hours if pt has redman's syndrome

* Doses are "usual ranges" and may vary according to patient's disease state and or condition

** Medications may require addition dilution to reduce irritation

Medline compatibility refers to the dilution of the medication as necessary for administration. Does not refer to vial reconsitution or flush

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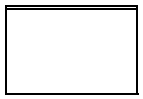

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