2016 Pediatric Medication Handbook

MD.Sun Bunlorn

Emergency Guide

INTUBATION

Estimated ETT SIZE = 4 + $\frac{\text{(pt's age in yrs)}}{4}$

Cuffed ETT tube = 3.5 + $\frac{\text{(pt's age in yrs)}}{4}$ (for age 2 or older)

ETT position at lip (in cm) estimated as 3 times ETT diameter (in mm).
For example, 3.5 mm ETT should be 11.5 cm at the lip.

INITIAL VENTILATOR SETTINGS (volume mode; TV = tidal volume)

TV = 6 - 10 mL/kg
PEEP = 5 cm H_2O
FiO_2 = 0.4 Or 40% (Adjust to keep O_2 sat > 90%
IMV = 15/min for child and 20 - 30/min for infants
PIP less than 35 cm H_2O
Inspiratory time = 0.5 - 0.6 sec infant; 0.7 - 0.8 sec child;
0.8 - 1 sec adolescent

HYPOVOLEMIC/SEPTIC SHOCK:

20 mL/kg as rapid bolus of an isotonic, non-glucose containing solution (i.e., lactated ringers or normal saline). Repeat bolus PRN based on distal pulses, blood pressure, and capillary refill. There is no maximum; the amount given is determined by the needs of the patient.

Consider colloid (e.g., 5% albumin) after 40 - 60 mL/kg of crystalloid if shock persists.

MINIMAL BLOOD PRESSURE VALUES

0 to 1 month	Systolic pressure > 60 mmHg
1 month to 1 year	Systolic pressure > 70 mmHg
Greater than 1 year	Systolic pressure > 70 mmHg + 2x (age in years)
≥ 10 years	Systolic pressure > 90 mmHg

CHKD Emergency Medicine / Critical Care Medications and Dosing Guidelines

Emergency Medicine Clinical Pharmacists phone: 8-5456
PICU Clinical Pharmacist phone: 8-8034

CARDIOVERSION/DEFIBRILLATION	
(use lower energy dose initially and increase if needed)	
Atrial Arrhythmias	0.5 - 1 joules/kg; synchronized
Ventricular Tachycardia with Pulse	0.5 - 2 joules/kg; synchronized
Ventricular Fibrillation or Pulseless Ventricular Tachycardia	2 - 4 joules/kg

RESUSCITATION MEDICATIONS	
Amiodarone	5 mg/kg IV/IO (Max dose 300 mg) bolus for VF / pulseless VT or infuse over 20 - 60 min for a perfusing tachycardia
Atropine	0.02 mg/kg IV; use 0.04 mg/kg IM/ET IV, Max: 1 mg IV
Bicarbonate	1 mEq/kg IV
Calcium	**Ca Chloride** 20 mg/kg = 0.2 mL/kg of 10% solution Max:1000 mg/dose **Ca Gluconate** 60 - 100 mg/kg = 0.6 - 1 mL/kg of 10% solution via slow IV push Max: 2000 mg
Dextrose	0.5 - 1 gm/kg IV (2 - 4 mL/kg D25%)
Epinephrine	0.01 mg/kg IV/IO (0.1 mL/kg 1:10,000) Max: 1 mg/dose (10 mL 1:10,000) Max ET: 2.5 mg/dose
Lidocaine	1 mg/kg bolus IV/IO
Vasopressin	0.5 - 1 unit/kg bolus IV/IO in epinephrine-refractory cardiac arrest (not routinely recommended) Adult (> 40 kg): 40 units

CARDIOVASCULAR INFUSIONS	
Alprostadil (Prostaglandin E1)	0.01 - 0.1 mcg/kg/min
Dopamine	2 - 20 mcg/kg/min
Dobutamine	2 - 20 mcg/kg/min
Epinephrine	0.02 - 1 mcg/kg/min
Esmolol	Load: 300 - 500 mcg/kg over 15 min; Infusion: 50 - 250 mcg/kg/min
Labetalol	0.4 - 1 mg/kg/hr; max = 3 mg/kg/hr
Milrinone	May load with 25 - 50 mcg/kg over 30 - 60 min (check with attending) Infusion: 0.25 - 1 mcg/kg/min
Nicardipine	0.25 - 5 mcg/kg/min; Prefer CVL administration to reduce volume administered
Norepinephrine	0.05 - 2 mcg/kg/min
Nitroprusside (Nipride®)	0.5 - 5 mcg/kg/min; Adult (≥ 40 kg) initial infusion: 0.1 mcg/kg/min
Nitroglycerin	0.25 - 3 mcg/kg/min; Adult (≥ 40 kg) initial infusion:10 mcg/min (Note that dose is not weight-based in adults). Commonly used maximum dose of 200 mcg/min
Vasopressin	SHOCK DOSING Initial: 0.018 - 0.12 units/kg/hr; titrate based on BP. Adult (≥ 40 kg): 0.01 - 0.04 units/min (Note that dose is not weight-based in adults)

ACUTE ALLERGIC REACTIONS

Epinephrine (1:1000)	0.01 mg/kg/dose IM (Max: 0.5 mg/dose)
Diphenhydramine (Benadryl®)	1 mg/kg/dose IV (Max: 50 mg/dose)
Methylprednisolone (Solumedrol®)	2 mg/kg/dose IV (Max: 60 mg/dose)

ANTIARRHYTHMICS

Adenosine	0.1 mg/kg (Max first dose = 6 mg) rapid IVP; may double dose up to 12 mg/dose and repeat in 1 - 2 min ***Contraindicated in heart failure patients
Amiodarone	Load: 5 mg/kg IV over 25 min, may repeat x 2 Infusion: 3.5 - 15 mcg/kg/min (usual initial goal 5,000 mcg/kg/**day**) Adult initial infusion: 1050 mg over 24 hours then 0.5 mg/minute

INTUBATED PATIENT SEDATION/PAIN PROTOCOL

For sedation start with lorazepam or midazolam; for pain start with fentanyl or morphine

Dexmedetomidine (Precedex®)	Initial: 0.2 - 0.5 mcg/kg/hr Max: 2 mcg/kg/hr
Fentanyl	Initial: 1 - 2 mcg/kg/hr Max: 10 mcg/kg/hr (if in the PICU setting)
Lorazepam (Ativan®)	Initial: 0.1 mg/kg/dose IV/PO every 6 hrs. If transitioning to lorazepam to wean off other benzodiazepines, larger doses may be needed - discuss with pharmacists.
Methadone	Initial: 0.1 mg/kg/dose IV/PO every 6 hrs. If transitioning to methadone to wean off other opioids, larger doses may be needed - discuss with pharmacists.
Midazolam (Versed®)	Initial: 0.1 mg/kg/hr. May consider loading dose of 0.05 - 0.1 mg/kg. In Adults (≥ 50 kg) an initial infusion of 0.02 - 0.05 mg/kg/hr is recommended. Max: 0.5 mg/kg/hr
Morphine	Initial: 10 - 20 mcg/kg/hr Max: 150 mcg/kg/hr
Ketamine	Initial: 0.3 - 0.5 mg/kg/hr Max: 2 mg/kg/hr
Propofol	50 - 200 mcg/kg/min Use in PICU limited to 48 hours by continuous infusion

HEPARIN DOSING AND DOSE ADJUSTMENTS

Heparin
IV as a Continuous infusion

Loading dose:
75 units/kg IV bolus over 10 minutes

Maintenance dose heparin (100units/mL)
< 1yo: 28 units/kg/hr
> 1yo: 20 units/kg/hr
Adult: 18 units/kg/hr

For obese patients (BMI> 30) use ideal body weight + 40% of (actual body weight-ideal
body weight).

Dosing weight= IBW + 0.4 (ABW - IBW)
Example: For a 140 kg patient with an ideal body weight of 70 kg.
Dosing weight= 70 + 0.4 (140 - 70) →Calculated dosing weight= 98 kg

Heparin Dose Adjustments for Patients < 18 years of age

Dose adjustments and repeat assessments based on PTT for patients < 18 years on heparin therapy: **PTT**	**Bolus units/kg**	**Hold (min)**	**Rate change, %**	**Repeat PTT**
< 50	50	0	+10	4h
50 - 59	0	0	+10	4h
60 - 85	0	0	0	Next day if in this range 2 consecutive times
86 - 95	0	0	- 10	4h
96 - 120	0	30	- 10	4h
> 120	0	60	- 15	4h

Heparin Dose Adjustments for Patients ≥ 18 years of age

Dose adjustments and repeat assessments based on PTT for patients ≥ 18 years on heparin therapy: **PTT**	**Bolus units/kg**	**Hold (min)**	**Rate change, %**	**Repeat PTT**
< 50	80	0	+15	4h
50 - 59	0	0	+15	4h
60 - 85	0	0	0	Next day if in this range 2 consecutive times
86 - 95	0	0	- 10	4h
96 - 120	0	30	- 10	4h
> 120	0	60	- 20	4h

MISCELLANEOUS MEDICATIONS

Albumin	4 mL/kg (1 gm/kg) of 25% solution; round to vial size if possible. For fluid resuscitation, infuse 10 - 20 mL/kg of 5% albumin IV/IO rapid infusion.
Acetylcysteine (Mucomyst®)	Mucolytic: 2 - 4 mL of 10% or 1 - 2 mL of 20% along with albuterol, given with each episode of CPT for 24 hours
Dexamethasone (Decadron®)	Extubation or upper airway swelling: 0.25 - 0.5 mg/kg/dose IV every 6 hrs Max:8 mg/dose
Mannitol (20% or 25%)	Herniation/emergent ICP management: 1 gm/kg/dose IV over 20 - 30 minutes ICP management: 0.25 - 0.5 gm/kg/dose every 6 hours for serum osmolarity < 320
Sodium chloride 3% (Hypertonic soln = 513 mEq Na/L)	**Use in the ICU or ED setting only** Bolus: Infuse 4 - 6 mL/kg over 15 - 30 mins (delivers ~2 - 3 mEq/kg of Na) Continuous infusion: 0.1 - 1 mL/kg/hour
THAM (Tromethamine)	3 - 4 mL/kg/dose IV (~1 mmol/kg/dose)
Vasopressin	Diabetes Insipidus: Begin infusion at 0.001 units/kg/hr - double infusion rate every 5 - 10 min until UOP< 2 mL/kg/hr

PARALYTICS

Rocuronium	0.5 - 1 mg/kg/dose IV; lasts 15 - 45 min; fastest onset of nondepolarizing agents Initial infusion: 7 - 10 mcg/kg/min
Vecuronium	0.1 - 0.2 mg/kg/dose IV; lasts 20 - 40 min Initial infusion: 0.1 mg/kg/hr

SEDATIVES

Clonidine	1.5 - 5 mcg/kg/dose PO every 8 hrs in addition to opioid and/or benzodiazepine
Dexmedetomidine (Precedex®)	ED sedation protocol: a loading dose of 2 mcg/ kg IV over 10 minutes, then 2 mcg/kg/hour. May repeat load up to 2 more times if needed.
Diazepam (Valium®)	Oral dosing: 0.12 - 0.8 mg/kg/**day** PO divided every 6 hrs (Long half- life with chronic dosing; may dose BID or TID) IV dosing: 0.04 - 0.3 mg/kg/dose IV every 2 to 6 hrs Max: 1.8 mg/kg/day
Etomidate	Intubation: 0.5 mg/kg/dose (Max dose 20 mg) IV once
Fentanyl	1 - 2 mcg/kg/dose IV every 1 hr PRN
Ketamine	1 - 2 mg/kg/dose IV every 2 hrs PRN 2 - 4 mg/kg **IM** for procedural sedation
Lorazepam (Ativan®)	0.05 - 0.1 mg/kg/dose IV/PO every 6 hrs Max: 6 mg/dose (PICU, ED), 2 mg/dose (Floor)
Midazolam (Versed®)	IV dosing: 0.1 mg/kg/dose IV every 1 hr PRN Max: 5 mg/dose Oral dosing: 0.25 - 0.5 mg/kg/dose PO Max: 20 mg/dose Intranasal dosing: 0.2 - 0.3 mg/kg/dose INTRANASAL Max: 10 mg/dose
Pentobarbital	2 - 3 mg/kg/dose IV/IM (Max: 100 mg/dose)

STATUS EPILEPTICUS

Start with lorazepam or midazolam 0.1 mg/kg (up to 4 mg/dose) IV, may repeat dose every 5 - 10 mins as needed to stop seizures.

If IV access is unable to be obtained, intramuscular or intranasal midazolam may administered (IM dosing: 0.1 - 0.3 mg/kg/dose [max: 6 mg]; Intranasal dosing: 0.2 mg/kg/dose [max: 10 mg]).

If IV access is unable to be obtained, IM or intranasal midazolam may administered (IM dosing: 0.1 - 0.3 mg/kg/dose [max: 6 mg]; Intranasal dosing: 0.2 mg/kg/dose [max: 10 mg]).

Load with phenytoin (CVL only) or fosphenytoin 20 mg/kg IV over 30 min (Max of 1 mg/kg/min up to 50 mg/min for phenytoin). Check level 2 hours after loading dose to assure therapeutic concentration. (Usual therapeutic concentration: 10 - 20 mcg/mL)

If still seizing after phenytoin load and concentration in upper end of range, consider phenobarbital load 20 mg/kg IV over 10 - 15 min (Max 30 mg/min). (Usual therapeutic concentration: 20 - 40 mcg/mL)

Phenytoin and phenobarbital dosing guide to increase concentration - Blood concentration will rise approx. 1 mcg/mL for every 1 mg/kg mini-load that is given.

Also consider loading with levetiracetam 20 - 30 mg/kg IV over 15 minutes and starting 10 mg/kg/dose IV every 12 hours as the maintenance dose.

Midazolam infusion may also be used for refractory status epilepticus - load with 0.1 mg/kg IV then begin infusion of 0.1 mg/kg/hr; increase by 0.05 mg/kg/hr every 15 min until seizures are controlled.

CHKD Pediatric Medications and Dosing Guidelines

Pediatric Medicine Clinical Pharmacists Phones: 8-5492 or 8-5256

TOXICOLOGY/REVERSAL AGENTS

Acetylcysteine	Acetaminophen poisoning - use in conjunction with Rumack-Matthew nomogram NG dosing: 140 mg/kg loading dose followed by 70 mg/kg every 4 hrs x 17 doses IV dosing (Acetadote®): Loading dose = 150 mg/kg over 1 hour, maintenance dose = 50 mg/kg over 4 hours, then 100 mg/kg over 16 hours as a continuous infusion
Activated Charcoal	1 - 2 gm/kg NG/PO (avoid repeat doses of charcoal with sorbitol) Max dose: 50 gm
Albuterol	**Hyperkalemia:** 5 mg nebulized
Flumazenil	**Benzodiazepine reversal** (contraindicated in patients with history of seizures) 0.01 mg/kg/dose IV; lasts less < 1 hr Max: 0.2 mg/dose, may repeat every 1 min, up to 1 mg PRN
Glucagon	**Hypoglycemia secondary to insulin excess** 0.02 mg/kg IV/IM/Subq Max: 1 mg; may repeat every 20 min **Beta-blocker overdose** Child: 0.025 - 0.05 mg/kg IV bolus followed by 0.07 mg/kg/hr infusion Adolescent: 2 - 3 mg IV followed by 5 mg/hr infusion
Insulin (Regular) + Glucose	**Hyperkalemia**: 0.5 gm/kg glucose + 0.1 unit/kg insulin; infuse over 30 - 60 min
Naloxone (Narcan®)	**Respiratory depression:** 0.001 - 0.01 mg/kg/dose IV (1 - 10 mcg/kg/dose), may repeat every 2 - 3 min PRN Max: 0.4 mg/dose Titration of small (1 - 2 mcg/kg) doses limits risk of acute pain/stress **Rapid, full reversal of narcotic overdose:** 0.1 mg/kg/dose IV, may repeat every 2 - 3 min PRN Max: 2 mg/dose
Sodium Polystyrene Sulfonate (Kayexalate®)	**Hyperkalemia**: 1 gm/kg/dose PO; 1.5 - 2 gm/kg/dose PR mixed with 20% Sorbitol

ANALGESICS

See pain card page 52 for dosing recommendations

ANTICONVULSANTS

Carbamazepine (Tegretol®)	Initial: 10 - 20 mg/kg/**day** PO divided every 6 - 12 hrs depending on dosage form; titrate to response Max dose: 1000 mg/**day** Trough: 4 - 12 mcg/mL
Clobazam (Onfi®)	≤ 2 years: 0.25 - 0.5 mg/kg/dose PO BID Max dose: 10 mg/**day** ≥ 2 years: Initial: 5 mg/**day** PO once daily Maintenance: 0.3 - 1 mg/kg/**day** PO in 2 divided doses Max dose: 40 mg/**day**
Diazepam (Diastat®)	Children 2 - 5 years: 0.5 mg/kg PR Children 6 - 11 years: 0.3 mg/kg PR Children ≥ 12 and adults: 0.2 mg/kg PR Round to nearest 2.5 mg increment, max dose: 20 mg
Ethosuximide (Zarontin®)	< 6 years: Initial: 7.5 mg/kg/dose PO every 12 hrs Maintenance: 7.5 - 20 mg/kg/dose every 12 hrs Max: 250 mg/dose ≥ 6 years: Initial: 250 mg PO every 12 hrs Maintenance: 10 - 20 mg/kg/dose every 12 hrs Max: 750 mg/dose
Lacosamide (Vimpat®)	Initial: 0.5 mg/kg/dose PO BID (Max: 50 mg/dose) Maintenance: May titrate weekly up to 5 mg/kg/dose PO BID Max dose: 400 mg/**day**
Levetiracetam (Keppra®)	Loading: 20 - 30 mg/kg/dose IV once Initial: 10 mg/kg/dose IV/PO every 12 hrs (begin 12 hours post-load) Max initial dose: 1000 mg/**day** Maintenance: 10 - 30 mg/kg/dose IV/PO every 12 hrs Max dose: 3000 mg/**day**
Lorazepam (Ativan®)	0.1 mg/kg/dose IV (for seizures > 5 minutes) Max dose: 4 mg/dose Repeat as needed every 10 - 15 min
Midazolam (Versed®)	0.1 - 0.3 mg/kg **IM** for status epilepticus when no IV access Max dose: 6 mg/dose

Oxcarbazepine (Trileptal®)	Initial: 4 - 5 mg/kg/dose PO every 12 hrs (Max: 600 mg/dose) Lower doses may be used when given in combination with other anticonvulsants Maintenance: 20 - 29 kg: 450 mg PO BID 30 - 39 kg: 600 mg PO BID ≥ 40 kg: 900 mg PO BID
Phenobarbital	Loading dose: 20 mg/kg/dose IV Maintenance: 2.5 - 5 mg/kg/dose IV/PO every 12 hrs, begin 12 hrs post-load Trough: 15 - 40 mcg/mL
Phenytoin and Fosphenytoin PE	Loading dose: 20 mg/kg/dose IV Maintenance: 2.5 - 5 mg/kg/dose IV/PO every 12 hrs **Fosphenytoin is not available orally** Trough: 10 - 20 mcg/mL; Free phenytoin trough: 1 - 2 mcg/mL
Rufinamide (Banzel®)	Initial dose: 5 mg/kg/dose PO BID May titrate every other day up to 45 mg/kg/day PO BID Max dose: 3200 mg/**day**
Topiramate (Topamax®)	Initial: 1 - 3 mg/kg/day PO QHS (Max: 25 mg) Maintenance: 2.5 - 4.5 mg/kg/dose PO BID Max dose: 400 mg/**day**
Valproic Acid (Depacon®, Depakene®, Depakote®)	Initial: 10 - 15 mg/kg/**day** PO divided every 8 - 24 hrs Maintenance: 30 - 60 mg/kg/**day** divided every 8 - 12 hrs depending on dosage form (IV dose = PO total daily dose divided every 6 hrs) Trough: 50 - 100 mcg/mL

ANTIMICROBIALS

Acyclovir (Zovirax®)	HSV (infants ≤ 3 months): 20 mg/kg/dose IV every 8 hrs HSV encephalitis (non-neonates): 10 mg/kg/dose IV every 8 hrs HSV gingivostomatitis: 20 mg/kg/dose PO four times daily x 5 - 7 days (Max: 200 - 400 mg/dose) Non-CNS HSV infections: 5 - 10 mg/kg/dose IV every 8 hours Varicella Zoster: 10 mg/kg/dose IV every 8 hrs
Amoxicillin	Standard dose: 8 - 16 mg/kg/dose PO TID (Max: 500 mg/dose) High dose (AOM, Pneumonia): 45 mg/kg/dose PO BID (Max: 2000 mg/dose)
Amoxicillin/ Clavulanic Acid (Augmentin®)	Standard dose: 15 - 20 mg/kg/dose (amoxicillin component) PO BID (Max: 875 mg/dose) High dose: 45 mg/kg/dose (amoxicillin component) PO BID (Max: 2000 mg/dose)
Ampicillin	50 mg/kg/dose IV every 6 hrs Meningitis: 100 mg/kg/dose IV every 6 hrs Max: 2000 mg/dose
Ampicillin/sulbactam (Unasyn®)	Restricted to ID / Use for animal bites 50 mg/kg/dose IV every 6 hrs (Max < 40 kg: 2000 mg/dose, max ≥ 40 kg: 3000 mg/dose)
Azithromycin (Zithromax®)	Standard dosing: 10 mg/kg IV/PO on Day 1, followed by 5 mg/kg IV/PO every 24 hrs on Days 2 - 5 Adults: 500 mg on Day 1, then 250 mg on Days 2 - 5 Pertussis: < 6 mos: 10 mg/kg IV/PO every 24 hrs x 5 days ≥ 6 mos: Use standard dosing Group A Strep, rheumatic fever: 12 mg/kg PO every 24 hrs x 5 days (Max dose: 500 mg)
Cefazolin (Ancef®)	25 - 50 mg/kg/dose IV every 8 hours Severe infections: 30 - 50 mg/kg/dose IV every 8 hours Max: 2000 mg/dose
Cefdinir (Omnicef®)	> 6 mos: 14 mg/kg/day once daily or divided BID Max: 600 mg/**day**
Cefotaxime (Claforan®)	50 mg/kg/dose IV every 8 hrs Meningitis: 50 mg/kg/dose IV every 6 hrs Max: 2000 mg/dose
Cefoxitin (Mefoxin®)	Standard dosing: 30 mg/kg/dose IV every 8 hrs Max: 1000 mg/dose Serious infections/peritonitis: 40 mg/kg/dose IV every 6 hrs Max: 2000 mg/dose
Cefprozil (Cefzil®)	15 mg/kg/dose PO every 12 hours Max: 500 mg/dose
Ceftazidime (Fortaz®)	**Restricted to ID / Hem-Onc / CF** 50 mg/kg/dose IV every 8 hrs (Max: 2000 mg/dose)
Ceftriaxone (Rocephin®)	50 mg/kg/dose IV/IM every 24 hrs Meningitis: 50 mg/kg/dose IV every 12 hrs Max: 2000 mg/dose IM ceftriaxone may be mixed with lidocaine in patients > 6 months of age
Cefuroxime (Ceftin®)	IV dosing: 50 mg/kg/dose IV every 8 hrs Max: 1500 mg/dose Oral dosing: 10 - 15 mg/kg/dose PO every 12 hrs Max: 500 mg/dose
Cephalexin (Keflex®)	Standard dosing: 10 mg/kg/dose PO every 6 - 8 hrs Severe infections: 20 - 25 mg/kg/dose PO every 6 - 8 hrs Max: 4000 mg/**day**

Ciprofloxacin (Cipro®)	Oral: 10 - 15 mg/kg/dose every 12 hrs (Max: 750 mg/dose) IV: 10 mg/kg/dose IV every 8 - 12 hrs (Max: 400 mg/dose)
Clindamycin (Cleocin®)	10 mg/kg/dose IV/PO every 8 hrs Osteomyelitis or complicated pneumonia: 15 mg/kg/dose IV every 8 hours Adult dose: 600 mg IV/PO every 8 hrs
Doxycycline	Use with caution in children < 8 years of age 2 mg/kg/dose IV/PO every 12 hrs Max: 100 mg/dose
Fluconazole (Diflucan®)	Standard dosing: 6 - 12 mg/kg x1 dose, followed by 3 - 12 mg/kg/dose IV/PO every 24 hrs Thrush: 6 mg/kg x1 PO, then 3 mg/kg PO once daily x 14 days Max dose: 400 mg/dose (standard); 600 mg/dose (invasive disease)
Gentamicin	Neonates: see page 41 Traditional dosing: 2.5 mg/kg/dose IV every 8 hrs Extended interval dosing: Term infants > 1 mo: 4 - 7.5 mg/kg/day IV every 24 hrs Max: 500 mg/day (except cystic fibrosis patients) Synergy dosing: 1 mg/kg/dose IV every 8 hrs **MED Service to follow and order levels**
Linezolid (Zyvox®)	< 12 years: 10 mg/kg/dose IV/PO every 8 hrs (Max: 600 mg/dose) ≥ 12 years: 600 mg IV/PO every 12 hours
Meropenem (Merrem®)	20 mg/kg/dose IV every 8 hrs Max: 2000 mg/dose
Metronidazole (Flagyl®)	Standard dosing: 10 - 15 mg/kg/dose PO TID (Max: 750 mg/dose) 10 mg/kg/dose IV q8h (Max: 500 mg/dose) *C. difficile* diarrhea: 7.5 mg/kg/dose PO every 6 hrs (Max: 500 mg/dose)
Nystatin	Infants: 1 - 2 mL to each side of mouth 4 times/day Children and Adults: 5 mL swish and spit or swallow 4 times/day
Oseltamivir (Tamiflu®)	****ID consult required for patients < 6 months of age**** PMA < 38 weeks: 1 mg/kg/dose PO BID for 5 days PMA 38 - 40 weeks: 1.5 mg/kg/dose PO BID for 5 days PMA > 40 weeks - 3 mos: 3 mg/kg/dose PO BID for 5 days (Max dose 12 mg) 3 - 5 mos: 20 mg PO BID for 5 days 6 - 11 mos: 25 mg PO BID for 5 days > 12 mos and < 15 kg: 30 mg PO BID for 5 days 15 - 23 kg: 45 mg PO BID for 5 days 23 - 40 kg: 60 mg PO BID for 5 days > 40 kg: 75 mg PO BID for 5 days
Oxacillin	25 mg/kg/dose IV every 6 hrs Serious infections: 50 mg/kg/dose IV every 6 hrs Max: 2000 mg/dose
Penicillin G Benzathine (Bicillin®)	Group A streptococcal upper respiratory infection ≤ 27 kg: 600,000 units **IM** as a single dose > 27 kg: 1.2 million units **IM** as a single dose
Penicillin G Potassium	Standard dosing: 100,000 - 300,000 units/kg/**day** IV divided every 6 hrs Meningitis / Severe Infection: 300,000 - 500,000 units/kg/**day** IV divided every 6 hrs Max dose: 24 million units/**day**
Piperacillin/ Tazobactam (Zosyn®)	Dosing based on piperacillin component. 100 mg/kg/dose IV every 8 hrs Max: 3000 mg/dose
Rifampin (Rifadin®)	S. aureus synergy: 10 mg/kg/dose IV/PO every 12 hrs Max: 300 mg/dose
Trimethoprim/ Sulfamethoxazole (TMP/SMX) (Bactrim®, Septra®, Cotrimoxazole)	**Not for routine use in patients < 2 mos of age** 3 - 6 mg TMP/kg/dose PO every 12 hrs Max dose: TMP 160 mg/ SMX 800 mg PO every 12 hrs
Tobramycin	Same dosing as gentamicin
Valacyclovir (Valtrex®)	HSV treatment: 20 mg/kg/dose PO twice daily (Max: 1000 mg/dose) Varicella zoster treatment: 20 mg/kg/dose PO 3 times daily for 5 days (Max: 1000 mg/dose)
Vancomycin	15 mg/kg/dose every 8 hrs CNS infections/Osteomyelitis: 15 mg/kg/dose every 6 hrs Max: 2000 mg/dose **MED Service to follow and order levels**

CYSTIC FIBROSIS

Amikacin	Initial: 30 mg/kg/dose IV every 24 hrs (no max dose) **MED Service to follow and order levels**
Aztreonam	50 mg/kg/dose IV every 6 hours Max: 3000 mg/dose
Ceftazidime (Fortaz®)	100 mg/kg/dose IV every 8 hours Max: 3000 mg/dose
Ciprofloxacin (Cipro®)	20 mg/kg/dose PO BID (Max: 1000 mg/dose) 15 mg/kg/dose IV every 12 hours (Max: 600 mg/dose)
Clindamycin	10 - 15 mg/kg/dose IV every 8 hours Max: 900 mg/dose
Gentamicin	Initial: 10 mg/kg/dose IV every 24 hours (no max dose) **MED Service to follow and order levels**

Levofloxacin (Levaquin®)	> 5 years: 10 mg/kg/dose IV/PO every 24 hours Max: 750 mg dose
Meropenem (Merrem®)	40 mg/kg/dose IV every 8 hours Max: 2000 mg/dose
Tobramycin	Same dosing as gentamicin

PID/CERVICITIS

PID - Inpatients	Cefoxitin 2 grams IV every 6 hrs + Doxycycline 100 mg IV/PO every 12 hrs for 14 days
PID - Outpatients	Ceftriaxone 250 mg IM once + Doxycycline 100 mg PO every12 hrs for 14 days ± Metronidazole 500 mg PO every 12 hrs for 14 days
Cervicitis	Azithromycin 1000 mg PO once + Ceftriaxone 250 mg IM once

ASTHMA/RESPIRATORY

Albuterol	Continuous aerosolized: 5, 10, 15 or 20 mg/hour; titrate as needed Intermittent nebulization: ≤ 20 kg: 2.5 mg, > 20 kg: 5 mg
Dexamethasone (Decadron®)	0.6 mg/kg/dose IV/PO for two doses given 24 - 36 hrs apart Max: 16 mg/dose
Ipratropium (Atrovent®)	0.5 mg nebulized every 6 - 8hrs x 24hrs (0.5 mg nebulized every 20 min x 3 doses in ED)
Magnesium Sulfate	25 - 75 mg/kg/dose IV over 20 minutes Max: 2000 mg/dose
Methylprednisolone (Solumedrol®)	Load with 2 mg/kg IV, then give 0.5 - 1 mg/kg/dose IV every 6 hrs Max: 60 mg/dose
Oxymetazoline (Afrin®)	Children ≥ 6 years: Instill 2 - 3 sprays into each nostril twice daily for ≤ 3 days
Phenylephrine (Afrin Children's®, Little Noses®)	2 - 6 years: 0.125% solution: Instill 1 drop in each nostril every 2 - 4 hours as needed for ≤ 3 days Little Noses® Decongestant: Instill 2 - 3 drops in each nostril every 4 hours as needed for ≤ 3 days 6 - 12 years: 0.25% solution: Instill 2 - 3 sprays in each nostril every 4 hours as needed for ≤ 3 days > 12 years: 0.25% to 0.5% solution: Instill 2 - 3 sprays or 2 - 3 drops in each nostril every 4 hours as needed for ≤ 3 days
Prednisone/ Prednisolone	1 - 2 mg/kg/**day** PO divided every 12 - 24 hrs Max for asthma: 60 mg/**day**
Racemic Epinephrine	0.5 mL (of 2.25% in 2.5 mL saline nebulized every 20 minutes PRN (3 mL 1:1000 epinephrine ~ 0.25 mL of racemic epi)
Terbutaline	10 mcg/kg slow IV bolus (10 min); then 0.2 mcg/kg/min; may titrate by 0.1 mcg/kg/min every 30 min to 2 mcg/kg/min
Theophylline	Load with 5 mg/kg IV over 30 min; then begin continuous infusion (< 1 yr = 0.6 mg/kg/hr; 1 - 9 yr = 1 - 1.2 mg/kg/hr; 9 - 12 yr = 0.9 mg/kg/hr; > 12 yr = 0.7 mg/kg/hr); Theophylline level 4 hrs after infusion started (goal 10 - 18 mcg/mL); 1 mg/kg bolus increases level ~2 mcg/mL

Inhaled Corticosteroid Dosing Conversion Chart

Inhaled Corticosteroid	Low Dose	Medium Dose	High Dose
Beclomethasone HFA (QVAR®)	80 - 240 mcg	> 240 - 480 mcg	> 480 mcg
Budesonide DPI (Pulmicort® Flexhaler)	200 - 600 mcg	> 600 - 1200 mcg	> 1200 mcg
Budesonide nebulization (Pulmicort®)	0.5 mg	1 mg	2 mg
Fluticasone HFA (Flovent®)	88 - 264 mcg	> 264 - 440 mcg	> 440 mcg
Mometasone (Asmanex®)	200 mcg	400 mcg	> 400 mcg

CARDIOVASCULAR/ANTIHYPERTENSIVE

AmLodipine (Norvasc®)	Initial: 0.05 mg/kg/dose PO once daily Adults: 2.5 - 5 mg/dose PO once or twice daily
Captopril	Neonates: 0.05 - 0.1 mg/kg/dose PO every 6 - 12 hours Infants & Children: Initial Dose: 0.1 mg/kg - monitor for hypotension; then 0.2 - 0.5 mg/kg/dose PO every 6 - 12 hrs Adults: 6.25 - 25 mg/dose PO BID-TID; Max: 6 mg/kg/**day**
Carvedilol (Coreg®)	Initial: 0.05 mg/kg/**day** PO divided every 12 hrs
Clonidine	5 - 25 mcg/kg/**day** PO divided every 8 hrs for hypertension
Digoxin	Total digitalizing dose varies based on patient's age. **Please refer to Lexicomp for dosing information.** Maintenance: 5 - 10 mcg/kg/**day** PO/IV divided BID
Enalapril (Vasotec®)	Initial: 0.1 mg/kg/**day** PO divided every 12 - 24 hrs; Max 0.5 mg/kg/**day** up to 40 mg/**day** Adult: 10 - 40 mg/**day** PO daily or divided BID
Enalaprilat	Initial: 5 - 10 mcg/kg/dose IV every 6 - 24 hrs Adult dose: 0.625 - 1.25 mg IV every 6 hrs
Enoxaparin (Lovenox®)	Initial therapeutic dosing: < 2 months: 1.5 mg/kg/dose subq every 12 hrs > 2 months: 1 mg/kg/dose subq every 12 hrs Initial prophylactic dosing: < 2 months: 0.75 mg/kg/dose subq every 12 hrs > 2 months: 0.5 mg/kg/dose subq every 12 hrs **See enoxaparin order set for monitoring and dose adjustment.**
Hydralazine	0.1 - 0.2 mg/kg/dose every 1 - 2 hrs IV PRN hypertensive urgency (Renal consult required in non-ICU patients) Max: 20 mg/dose IV
Labetalol	0.2 mg/kg/dose IV every 1 - 2 hrs PRN hypertensive urgency Max: 20 mg/dose IV

Propranolol	PO: 0.5 - 1 mg/kg/**day** divided every 6 - 12 hrs Max: 8 mg/kg/**day** IV: 0.01 - 0.1 mg/kg/dose every 6 - 12 hrs Max: Infants - 1 mg/dose Children - 3 mg/dose
Sildenafil (Revatio®)	Initial dosing: < 20 kg: 0.25 mg/kg/dose PO every 8 hrs Maximum: 10 mg/dose > 20 kg: 10 mg PO every 8 hrs Maximum: 20 mg/dose **IV form available. Contact Pulmonary Hypertension Team before ordering**

DIURETICS

Acetazolamide (Diamox®)	5 mg/kg/dose IV/PO every 6 - 12 hrs for 24 hrs
Bumetanide (Bumex®)	0.01 - 0.05 mg/kg/dose IV/PO every 6 - 24 hrs (0.025 mg/kg equivalent to 1 mg/kg Lasix) Continuous infusion: 0.05 mg/kg/hr titrated to effect
Chlorothiazide (Diuril®)	5 - 20 mg/kg/**day** IV in divided doses once or twice daily Max dose: 500 mg
Furosemide (Lasix®)	1 mg/kg/dose IV/PO every 6 - 24 hrs (PO bioavailability ~60% of IV) Initial Adult dose: 20 mg Continuous infusion: 0.05 - 0.4 mg/kg/hr titrated to effect
Hydrochlorothiazide	Edema: < 6 months: 1 - 3 mg/kg/**day** in 1 - 2 divided doses Max dose: 37.5 mg daily 6 mos - 2 years: 1 - 2 mg/kg/**day** in 1 - 2 divided doses Max dose: 37.5 mg daily 2 - 12 years: 1 - 2 mg/kg/**day** in 1 - 2 divided doses Max dose: 100 mg/**day** > 12 years: 1 - 2 mg/kg/**day** in 1 - 2 divided doses Max dose: 200 mg/**day** Adult: 25 - 100 mg/**day** in 1 - 2 divided doses Hypertension: Children: 1 mg/kg/**day** initially, increase up to 3 mg/kg/**day**, with a maximum of 50 mg/**day** Adults: Initial: 12.5 - 25 mg PO daily; maximum 100 mg daily
Hydrochlorothiazide/ Spironolactone (Aldactazide®)	Infants: 1 - 3 mg/kd/**day** in 1 - 2 divided doses Children/Adolescents: Initial: 1 mg/kg/**day** in 1 - 2 divided doses May titrate up to max dose 3 mg/kg/day (or 100 mg) Adults: 25 - 100 mg/**day** in 1 - 2 divided doses (Contains equal mg proportions of each component; doses represent mg of each component)
Lasix/Diuril Infusion	Lasix 1 mg/mL and Diuril 5 mg/mL; begin continuous infusion at 0.1 mg/kg/hr of Lasix component and titrate to effect; max 0.4 mg/kg/hr of Lasix
Metolazone (Zaroxolyn®)	0.1 - 0.2 mg/kg/dose PO every 12 hrs Adults (> 40 kg): 5 - 10 mg PO every 24 hrs
Spironolactone (Aldactone®)	1 - 3 mg/kg/**day** PO divided every 12 hrs Max: 100 mg/**day**

ELECTROLYTE REPLACEMENTS - IV

Calcium Chloride	10 - 20 mg/kg/dose IV over 30 - 60 min Max: 2000 mg/dose given via central IV (1 gram calcium chloride = 13.6 mEq calcium)
Calcium Gluconate	60 - 100 mg/kg/dose IV over 30 - 60 min Max: 4000 mg/dose - may be given via peripheral IV (1 gram calcium gluconate = 4.65 mEq calcium)
Magnesium Sulfate	25 - 50 mg/kg/dose IV over 2 hours Max: 2000 mg/dose (1 gram magnesium sulfate = 8.12 mEq magnesium)
Potassium Chloride / Potassium Acetate	**Restricted to PICU, NICU, ED** 0.5 - 1 mEq/kg/dose IV (infused at a rate of 0.5 mEq/kg/hr) Max: 20 mEq/dose Potassium usually given as chloride salt but can use acetate salt depending on goal. (75 mg KCl = 1 mEq K^+)
Potassium Phosphate	0.2 - 0.5 mmol/kg/dose IV over 4 - 8 hours Max: 15 mmol/dose (1 mmol KPhos = 1.47 mEq K^+)
Sodium Phosphate	0.1 - 0.5 mmol/kg/dose IV over 4 - 8 hours Max: 15 mmol/dose (1 mmol NaPhos = 1.33 mEq Na^+)

ORAL ELECTROLYTE REPLACEMENT CHART - ORAL

This serves only as a reference for initiating therapy.
Close monitoring and ongoing adjustment is warranted based upon patient's clinical status, and changes in nutrition and/or medication therapy.

Electrolyte	Starting PO Dose Range (mEq/kg/day)	mEq = mg equivalence	Bioavailability	Commonly Used Oral Product(s)
Sodium (Na)	1 - 2	1 mEq = 58 mg (NaCl)	~100%	NaCl tabs: 1 gram (~17 meq Na) *(NaCl injection for oral use: *2.5 mEq/mL)*
Potassium (K)	1 - 2	1 mEq = 75 mg (KCl)	~100%	KCL solns: 20 mEq/15 mL & 40 mEq/15 mL KCL **ER** tabs: 8, 10, 15, 20 mEq KCL **ER** caps: 8 mEq,10 mEq KCL powder (per packet): 20 mEq, 25 mEq
Calcium (Ca)	0.5	1 mEq = 20 mg (elemental Ca) 100 mg Ca Carbonate = 40 mg elemental Ca = 2 mEq	25 - 35% (up to 60% in infants)	Calcium Carbonate Chewtabs: 400 mg, 420 mg, 500 mg **[10 mEq]**, 600 mg, 650 mg, 750 mg, 850 mg, 1000 mg, 1250 mg, 1500 mg Calcium Carbonate Softchew(Rolaids®): 1177 mg [471 mg] Calcium Carbonate tab: 364 mg, 1250 mg **[25 mEq]**, 1500 mg Calcium Carbonate susp: 250 mg/mL [100 mg/mL; **5 mEq/mL**] Calcium glubionate syrup: 360 mg/mL [23 mg/mL; **1.15 mEq/mL**] Calcium gluconate tab: 500 mg [45 mg], 650 mg [58.5 mg], 975 mg [87.75 mg]
Magnesium (Mg)	0.25 - 0.5	1 mEq=12 mg (elemental Mg)	Up to 30%	Mg Oxide tabs: 400 mg **[20 mEq]**, 500 mg Mg Oxide caps: 140 mg, 600 mg Mg Gluconate tabs: 500 mg **[2.4 mEq]** Mg Gluconate soln: 200 mg/mL **[0.96 mEq/mL]**
Phosphate (PO4)	0.5 - 1.5 **mmol**/kg/day	1 mmol = 31 mg (elemental PO4)	1 - 20%	Phos-Na K powder: **250 mg phos [8 mmol]** & 7.1 mEq K/Na each per packet KPhos Neutral or Phospha 250 Neutral tabs: **250 mg phos [8 mmol]** & 13 mEq Na & 1.1 mEq K per tab Fleet Phospho-soda: **128.5 mg phos [4.1 mmol]** & 1.9 mEq Na per mL
Bicarbonate (HCO_3)	1 - 3	1 mEq = 84 mg ($NaHCO_3$)	~100%	Na Bicarb tabs: 325 mg **[3.8 mEq]** & 650 mg **[7.6 mEq]** *(Na Bicarb injection for oral use: 1 mEq/mL)*

ER = Extended release
[amount in unit] represents the amount of the elemental form of the ion
Underlined items represent the different strengths of Calcium Carbonate available under the Brand name of Tums®

Examples:
A) Magnesium Oxide Oral Replacement in a 25 -kg patient:
0.25 mEq/kg/day elemental Magnesium x 25 kg = 6.25 mEq elemental magnesium/day
Account for only 30% oral absorption: 6.25 mEq/0.3 = 20.8 mEq elemental magnesium/day PO
Patient should receive Magnesium Oxide 400 mg tab (=20 mEq elemental magnesium) PO daily

B) Potassium Chloride Oral Replacement in a 10 -kg patient:
2 mEq/kg/day Potassium x 10 kg = 20 mEq Potassium/day (100% bioavailable)
Patient should receive Potassium Chloride 10 mEq cap PO bid or 10 mEq/7.5 mL liquid PO bid

ORAL ELECTROLYTE REPLACEMENT CHART - ORAL

This serves only as a reference for initiating therapy.
Close monitoring and ongoing adjustment is warranted based upon patient's clinical status, and changes in nutrition and/or medication therapy.

Electrolyte	Starting PO Dose Range (mEq/kg/day)	mEq = mg equivalence	Bioavailability	Commonly Used Oral Product(s)
Sodium (Na)	1 - 2	1 mEq = 58 mg (NaCl)	~100%	NaCl tabs: 1 gram (~17 meq Na) *(NaCl injection for oral use: *2.5 mEq/mL)*
Potassium (K)	1 - 2	1 mEq = 75 mg (KCl)	~100%	KCL solns: 20 mEq/15 mL & 40 mEq/15 mL KCL **ER** tabs: 8, 10, 15, 20 mEq KCL **ER** caps: 8 mEq,10 mEq KCL powder (per packet): 20 mEq, 25 mEq
Calcium (Ca)	0.5	1 mEq = 20 mg (elemental Ca) 100 mg Ca Carbonate = 40 mg elemental Ca = 2 mEq	25 - 35% (up to 60% in infants)	Calcium Carbonate Chewtabs: 400 mg, 420 mg, 500 mg **[10 mEq]**, 600 mg, 650 mg, 750 mg, 850 mg, 1000 mg, 1250 mg, 1500 mg Calcium Carbonate Softchew(Rolaids®): 1177 mg [471 mg] Calcium Carbonate tab: 364 mg, 1250 mg **[25 mEq]**, 1500 mg Calcium Carbonate susp: 250 mg/mL [100 mg/mL; **5 mEq/mL**] Calcium glubionate syrup: 360 mg/mL [23 mg/mL; **1.15 mEq/mL**] Calcium gluconate tab: 500 mg [45 mg], 650 mg [58.5 mg], 975 mg [87.75 mg]
Magnesium (Mg)	0.25 - 0.5	1 mEq=12 mg (elemental Mg)	Up to 30%	Mg Oxide tabs: 400 mg **[20 mEq]**, 500 mg Mg Oxide caps: 140 mg, 600 mg Mg Gluconate tabs: 500 mg **[2.4 mEq]** Mg Gluconate soln: 200 mg/mL **[0.96 mEq/mL]**
Phosphate (PO4)	0.5 - 1.5 **mmol**/kg/day	1 mmol = 31 mg (elemental PO4)	1 - 20%	Phos-Na K powder: **250 mg phos [8 mmol]** & 7.1 mEq K/Na each per packet KPhos Neutral or Phospha 250 Neutral tabs: **250 mg phos [8 mmol]** & 13 mEq Na & 1.1 mEq K per tab Fleet Phospho-soda: **128.5 mg phos [4.1 mmol]** & 1.9 mEq Na per mL
Bicarbonate (HCO_3)	1 - 3	1 mEq = 84 mg ($NaHCO_3$)	~100%	Na Bicarb tabs: 325 mg **[3.8 mEq]** & 650 mg **[7.6 mEq]** *(Na Bicarb injection for oral use: 1 mEq/mL)*

ER = Extended release
[amount in unit] represents the amount of the elemental form of the ion
Underlined items represent the different strengths of Calcium Carbonate available under the Brand name of Tums®

Examples:
A) Magnesium Oxide Oral Replacement in a 25 -kg patient:
0.25 mEq/kg/day elemental Magnesium x 25 kg = 6.25 mEq elemental magnesium/day
Account for only 30% oral absorption: 6.25 mEq/0.3 = 20.8 mEq elemental magnesium/day PO
Patient should receive Magnesium Oxide 400 mg tab (=20 mEq elemental magnesium) PO daily

B) Potassium Chloride Oral Replacement in a 10 -kg patient:
2 mEq/kg/day Potassium x 10 kg = 20 mEq Potassium/day (100% bioavailable)
Patient should receive Potassium Chloride 10 mEq cap PO bid or 10 mEq/7.5 mL liquid PO bid

GASTROINTESTINAL	
Bisacodyl (Dulcolax®)	**PO:** 3 - 12 years: 5 - 10 mg at bedtime or before breakfast > 12 years: 5 - 15 mg as a single dose **PR:** < 2 years: 5 mg as a single dose > 2 years: 10 mg as a single dose
Calcium Carbonate (Maalox®)	Children < 12 years: 2.5 - 5 mL PO 4 - 6 times/day between meals and at bedtime ≥ 12 years: 10 - 20 mL PO 4 - 6 times/day between meals and at bedtime
Dicyclomine (Bentyl®)	Infants > 6 months: 5 mg/dose PO TID - QID Children: 10 mg/dose PO TID - QID Adults: 20 mg QID, max dose: 40 mg QID
Docusate (Colace®)	5 mg/kg/**day** PO divided every 12 - 24 hrs Max dose: 400 mg/day
Erythromycin (E.E.S.®)	For GI Motility: 3 - 5 mg/kg/dose PO every 6 - 8 hrs
Esomeprazole (Nexium®)	< 10 kg: 0.5 - 2 mg/kg/**day** IV/PO, may increase dosing to twice a day 10 - 20 kg: 10 mg/**day**, may increase dosing to twice a day up to 10 mg/dose > 20 kg: 1 - 2 mg/kg/**day** IV/PO Max: 80 mg/**day** divided BID Continuous infusion: 0.1 mg/kg/hr
Famotidine (Pepcid®)	Pediatrics: 0.5 mg/kg/dose IV every 12 hrs Adult dose: 20 mg/dose every 12 hours **Use Ranitidine as oral agent at CHKD**
Gastrografin/Normal Saline/Mineral oil (PoleyBomb)	15 mL/kg rectally, Max: 1000 mL Must order as follows: Gastrografin/NS/Mineral oil 1:1:1 # of mL
Hyoscyamine (Levsin®)	≤ 2 years: See Lexicomp for dosing table 2 - 12 years: 0.0625 - 0.125 PO/SL every 4 hrs PRN Max dose: 0.75 mg/**day** > 12 years: 0.125 - 0.25 mg every 4 hrs PRN Max dose: 1.5 mg/**day**
Lactulose	For constipation, 1 - 3 mL/kg/**day** divided every 8 - 12 hrs Max dose: 60 mL/day
Magic Mouthwash	Infants > 6 mos: Benadryl/Maalox 1:1 (no lidocaine) 1 - 2 mL to each affected area of mouth every 6 hrs PRN Children: Benadryl/Maalox/Viscous Lidocaine 1:1:1 3 - 5 mL swish and spit or swallow every 6 hrs PRN
Magnesium citrate	< 6 years: 2 - 4 mL/kg PO q6h until stooling 6 - 12 years: 100 - 150 mL PO q6h until stooling > 12 years: 150 - 300 mL PO q6h until stooling
Magnesium Hydroxide (Milk of Magnesia®)	2 to < 6 years: 5 - 15 mL/**day** in single or divided doses Max: 1,200 mg/**day** 6 to < 12 years: 15 - 30 mL/**day** in single or divided doses Max: 2,400 mg/day ≥ 12 years: 30 - 60 mL/**day**) in single or divided doses Max: 4,800 mg/**day**
Metoclopramide (Reglan®)	0.1 mg/kg/dose IV/PO every 6 hrs Max: 10 mg/dose
Omeprazole (Prilosec®)	**Restricted to children < 10 kg at CHKD** 0.5 - 1 mg/kg/dose PO, daily or every 12 hrs
Ondansetron (Zofran®)	0.15 mg/kg/dose IV/PO every 8 hrs PRN Max: 4 mg/dose
Pantoprazole (Protonix®)	Same dosing as esomeprazole **Only IV PPI at CHKD**
Polyethylene Glycol (MiraLax®)	1 gm/kg/**day** PO, may increase to twice a day
Promethazine (Phenergan®)	**Contraindicated in children < 2 years** 0.25 - 0.5 mg/kg/dose IV/IM/PO every 6 hrs PRN (Do not exceed 6.25 mg/dose IV if given peripherally)
Ranitidine (Zantac®)	4 - 10 mg/kg/day PO divided every 8 - 12 hrs Adult dose: 150 mg BID **Use famotidine as IV agent at CHKD**
Rifaximin (Xifaxan®)	Small intestine bacterial overgrowth (> 3 years and adolescents): 200 mg three times daily Inflammatory bowel disease (> 8 years and adolescents): 10 - 30 mg/kg/**day** divided three times daily Maximum daily dose: 1200 mg/**day**
Senna	< 2 years: 1.25 mL PO BID 2 - 6 years: 2.5 mL PO BID 6 - 12 years: 5 mL PO BID > 12 years: 10 mL PO BID
Senna+Docusate (Peri-Colace®)	2 to < 6 yrs: 0.5 tablet PO daily at bedtime Max dose: 1 tablet twice daily 6 to < 12 yrs: 1 tablet daily at bedtime Max dose: 2 tablets twice daily 12 yrs: 2 tablets daily at bedtime Max dose: 4 tablets twice daily
Sodium Phosphate-Sodium Bisphosphonate (Fleet® Enema)	Children 2 - 4 years: 33 mL PR once Children 5 - 11 years: 66 mL PR once Children ≥ 12 years: 133 mL PR once
Sucralfate (Carafate®)	10 - 20 mg/kg/dose PO every 6 hrs (Max: 1000 mg/dose)
Ursodiol (Actigall®)	30 mg/kg/**day** PO divided every 8 - 12 hrs Adult dose: 300 mg PO BID

INSULIN

Insulin (Regular)	0.05 - 0.1 unit/kg SQ Begin IV infusion at 0.1 unit/kg/hr See insulin chart for comparison

Insulin Comparison Chart

Formulation	Onset	Peak	Duration	When to Inject
Rapid-acting Insulins				
Humalog insulin lispro	15 - 30 min	30 min-2.5 hrs	3 - 6.5 hrs	Within 15 min AC or immediately PC
NovoLog insulin aspart	10 - 20 min	40 - 50 min	3 - 5 hrs	5 - 10 minutes AC
Apidra insulin glulisine	25 min	45 - 48 min	3 - 5.3 hrs	Within 15 min AC or 20 min PC
Short-acting Insulins				
Humulin R regular human insulin	30 - 60 min	1 - 5 hrs	6 - 10 hrs	Within 30 min AC
Novolin R regular human insulin	30 min	2 - 4 hrs	4 - 8 hrs	Within 30 min AC
Intermediate-acting Insulins				
Humulin N NPH human insulin	1 - 2 hrs	6 - 14 hrs	4 - 12 hrs	*Timing may vary*
Novolin N NPH human insulin	90 min	Up to 24 hrs	Up to 24 hrs	*Timing may vary*
Long-acting Insulins				
Lantus insulin glargine	1 - 2 hrs	n/a	10.8 to > 24 hrs	Once daily (same time each day)
Levemir insulin detemir	1 - 2 hrs	n/a	7.6 to > 24 hrs	Once or twice daily
Mixed Insulins				
Humalog 75/25 75% insulin lispro protamine, 25% insulin lispro	15 - 30 min	1 - 6.5 hrs	Up to 24 hrs	Within 15 min AC
Humalog 50/50 50% insulin lispro protamine, 50% insulin lispro	15 - 30 min	0.8 - 4.8 hrs	22 hrs or more	Within 15 min AC
NovoLog 70/30 70% insulin aspart protamine, 30% insulin aspart	10 - 20 min	1 - 4 hrs	Up to 24 hrs	Within 15 min AC
Humulin 70/30 70% NPH human insulin, 30% regular human insulin	Within 30 min	1.5 - 16 hrs	Up to 24 hrs	30 - 60 min AC
Novolin 70/30 70% NPH human insulin, 30% regular human insulin	Within 30 min	2 - 12 hrs	Up to 24 hrs	30 - 60 min AC

MIGRAINE MEDICATIONS

Caffeine	100 - 200 mg PO every 3 - 4 hrs PRN
Dihydroergotamine (D.H.E.®)	**Give antiemetic prior to administration** Initial dose: 0.5 mg in 100 mL NS IV over 1 hr If 1st dose well tolerated, 2nd dose (8 hrs later): 0.75 mg in 250 mL NS IV over 1 hr 3rd & subsequent doses: 1 mg in 250 mL NS IV over 1 hr every 8 hrs for 10 doses total
Rizatriptan (Maxalt MLT®)	< 40 kg: 5 mg PO once ≥ 40 kg: 10 mg PO once May repeat in 2 hrs, max dose= 30 mg/**day**
Sumatriptan (Imitrex®)	**Caution use in children ≤ 6 years** **PO:** 25 - 100 mg PO once, may repeat in 2 hours Max dose = 200 mg/**day** **SubQ:** 3 - 6 mg subq once, may repeat ≥ 1 hr after 1st dose Max dose = 12 mg/**day**
Valproic Acid	20 mg/kg/dose IV once, may schedule q8h Max: 1000 mg/dose

MISCELLANEOUS MEDICATIONS

Aspirin	Antiplatelet dosing: 5 - 10 mg/kg/dose PO/PR every 24 hours (round to ¼, ½, or whole tablet size) Usual initial adult dose: 81 mg/dose PO every 24 hours
Belladonna & Opium Suppository	< 1 year: not recommended 1 - 7 years: 1/2 of a suppository BID-QID ≥ 8 years: 1 suppository BID-QID
Bromocriptine	Autonomic dysfunction initial dosing: 0.025 mg/kg/dose PO every 12 hours Usual initial adult dose: 2.5 mg/dose PO every 12 hours
Glucagon	Hypoglycemia: < 25 kg: 0.5 mg IM ≥ 25 kg: 1 mg IM
Glycopyrrolate (Robinul®)	IV dosing: 4 - 10 mcg/kg/dose IV q6h Oral dosing: 40 - 100 mcg/kg/dose PO q6h
Haloperidol (Haldol®)	0.05 - 0.15 mg/kg/day IV/IM/PO divided q6 - 8 hr (see algorithm for acute behavior management, page 36 - 37)
Hydroxyzine (Vistaril®)	Standard dosing: < 6 years: 12.5 mg PO four times daily > 6 years: 12.5 - 25 mg PO four times daily Pruritus associated with opioid use: 0.5 - 1 mg/kg/dose PO/IM* every 4 - 6 hrs PRN Max: 50 mg/dose *Has been administered slow IV push*
Iron supplementation	3 - 6 mg/kg/day PO **elemental** iron divided every 8 - 24 hrs Note: ferrous sulfate contains ~20% elemental iron (multiply desired amount of elemental iron by 5 to obtain dose)

Risperidone (Risperdal®)	Initial dose (> 5 years, 15 - 20 kg): 0.25 mg PO once daily > 20 kg: 0.5 mg PO once daily Usual max: 2 - 3 mg/**day** based on indication Delirium Initial dose (< 5 years): 0.1 - 0.2 mg PO once daily Initial dose (> 5 years, 15 - 20 kg): 0.25 mg PO once daily > 20 kg: 0.5 mg PO once daily Usual max: 2 - 3 mg/**day**

Steroid Conversion Chart

Glucocorticoid	Approximate Equivalent (mg)	Route	Anti-inflammatory Potency	Mineralocorticoid Potency
Short-acting Steroids				
Cortisone	25	PO, IM	0.8	2
Hydrocortisone	20	IM, IV	1	2
Intermediate-acting Steroids				
Methylprednisolone	4	PO, IM, IV	5	0
Prednisolone	5	PO	4	1
Prednisone	5	PO	4	1
Triamcinolone	4	IM	5	0
Long-acting Steroids				
Dexamethasone	0.75	PO, IM, IV	25 - 30	0
Betamethasone	0.6 - 0.75	PO, IM	25	0
Mineralocorticoids				
Fludrocortisone	–	PO	10	125

STEROIDS

Dexamethasone (Decadron®)	Croup: 0.6 mg/kg/dose IV/PO x1 dose Extubation: 0.25 - 0.5 mg/kg/dose IV every 6 hrs (not to exceed 24 hours unless per attending) Max: 8 mg/dose Airway edema: 0.25 - 0.5 mg/kg/dose IV every 6 hours Max: 8 mg/dose Neurosurgical initial dose: 0.25 - 0.5 mg/kg/dose IV every 6 hours Max: 8 mg/dose
Hydrocortisone (Solu-Cortef®)	Stress dosing: 1 mg/kg/dose IV every 6 hrs (May also use 2 - 4 times home dose) Adult stress dose: 100 mg every 8 hrs
Methylprednisolone (Solumedrol®)	Standard dosing: 2 mg/kg/day IV divided every 6 - 12 hrs Max: 60 mg/dose Spinal cord injury: 30 mg/kg IV over 15 min followed by 5.4 mg/kg/hr infusion x 23 hours
Prednisone/ Prednisolone	1 - 2 mg/kg/day PO divided every 12 - 24 hrs Max: 60 mg/day

BLOOD PRODUCTS **Blood Bank phone number: (757) 668 - 7255**

Cryoprecipitate 1 unit = 15 mL	Usual dose: 0.2 units/kg, maximum: 10 units Calculated dose = (desired increase in fibrinogen level (mg/dL) X patient's plasma volume)/250 mg/unit for fibrinogen
FFP 1 PediFFP unit = 50 mL	10 mL/kg (do not infuse rapidly - may decrease ionized calcium level)
PRBCs 1 PediSplit unit = 80 mL	10 - 15 mL/kg (in infants & children 10 mL/kg raises Hgb by ~ 3 g% and Hct by ~ 9%)
Platelets < 10 kg one-half pheresis unit > 10 kg one pheresis unit One pheresis unit = 6 - 10 single donor units	Patients less than 2 yo: 10 mL/kg body weight Patients greater than 2 yo: 1 unit/ 10 kg body weight (1 random donor unit/ 5 kg raises platelets by ~ 50,000/mm^3)

CONVERTING WEIGHT (POUNDS) TO BODY SURFACE AREA (M^2)

[assumes normal proportion of length to weight]

Weight (pounds)	BSA (m^2)
3	0.1
6	0.2
12	0.3
18	0.4
24	0.5
30	0.6
36	0.7
42	0.8
48	0.9
60	1.0
70	1.1
80	1.2
90	1.3
100	1.4

CHKD Hematology-Oncology Medications and Dosing Guidelines

HemeOnc Clinical Pharmacist phone: 8-8058 Simon 2861

ANTI-INFECTIVES

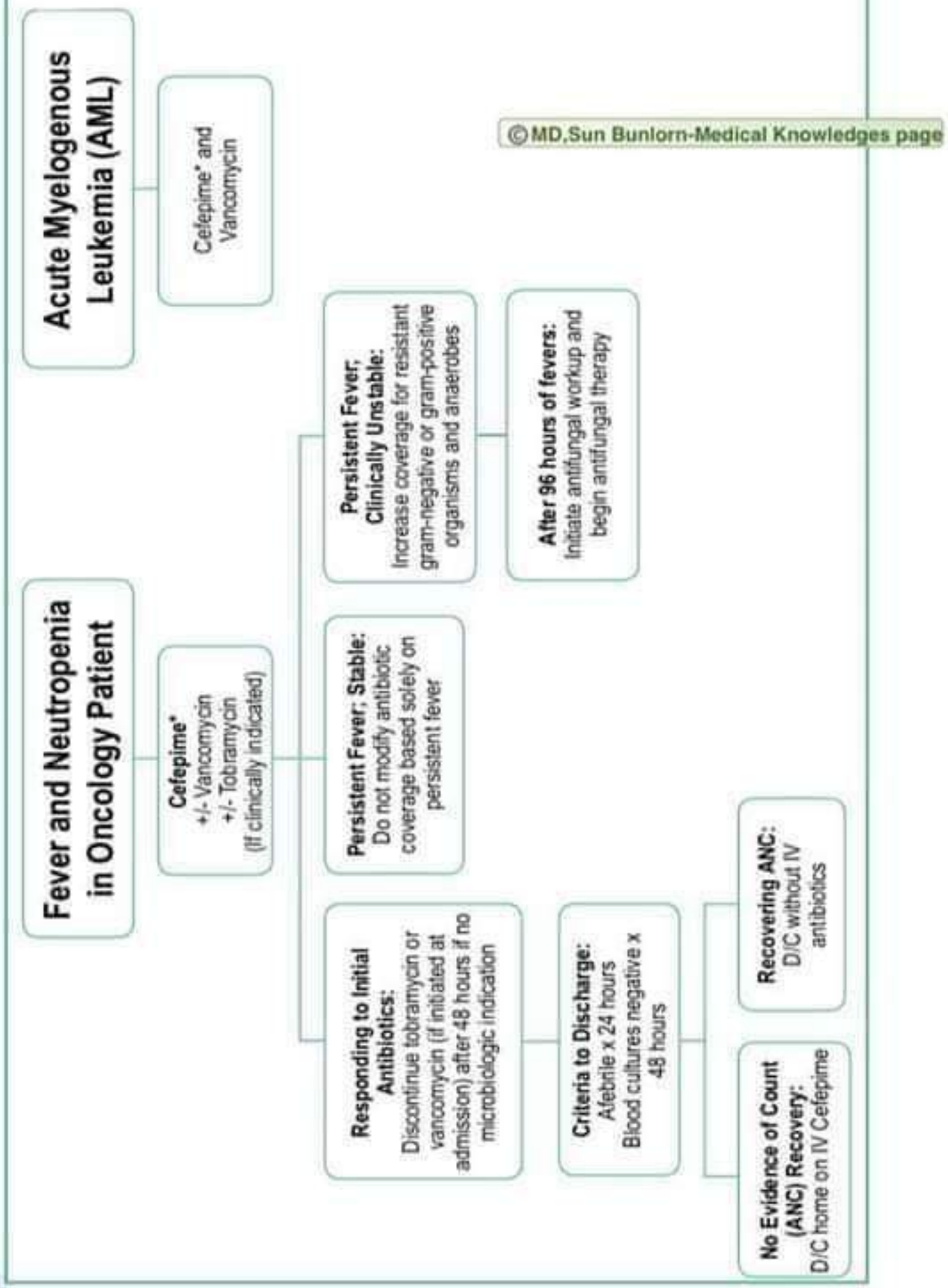
Acyclovir	250 mg/m²/dose IV q8h (HSV in immunocompromised host) 500 mg/m²/dose IV q8h (VZV in immunocompromised host) 250 mg/m²/dose IV q12h for prophylaxis post-BMT
Liposomal Amphotericin B (Ambisome®)	3 mg/kg/dose IV q24h (empiric therapy) 5 mg/kg/dose IV q24h (documented infection) round to nearest 50 mg vial size
Azithromycin (Zithromax®)	PO route preferred: 10 mg/kg/dose PO/IV x1 on day 1 then 5 mg/kg/dose PO/IV daily on days 2 - 5 (adult dose: 500 mg PO x 1 on day 1 then 250 mg PO daily on days 2 - 5)
Trimethoprim/ Sulfamethoxazole (TMP/SMX) (Bactrim/Septra®) (Cotrimoxazole)	PCP prophylaxis -->see page 29 Infections -->Refer to page 10
Cefdinir (Omnicef®)	14 mg/kg/dose PO daily or 7 mg/kg/dose PO q12h (Max: 600 mg/day)
Cefepime (Maxipime®)	50 mg/kg/dose IV q8h (adult dose: 2 gm/dose)
Cefixime (Suprax®)	8 mg/kg/dose PO daily or 4 mg/kg/dose PO q12h (Max: 400 mg/day)
Cefotaxime (Claforan®)	50 mg/kg/dose IV q8h (adult dose: 2 gm/dose)
Cefprozil (Cefzil®)	15 mg/kg/dose PO q12h (adult dose: 250 - 500 mg PO q12h)
Ceftriaxone (Rocephin®)	50 mg/kg/dose IV q24h (adult dose: 2 grams/dose)
Cefuroxime (Ceftin®)	50 mg/kg dose IV q8h (adult dose 1.5 gm/dose)
Ciprofloxacin (Cipro®)	Oral: 10 - 15 mg/kg/dose (Max 750 mg) BID IV: 10 mg/kgdose (Max 400 mg/dose) Q8h
Clindamycin (Cleocin®)	10 mg/kg/dose IV q8h (adult dose: 600 mg/dose) Use same IV dose for PO - round to 150 mg cap size if possible
Fluconazole (Diflucan®)	6 mg/kg/dose (Max: 200 mg/dose) PO/IV qday for prophylaxis; 6 - 12 mg/kg/dose IV/PO qday for systemic candidiasis
Foscarnet (acyclovir-resistant HSV)	40 mg/kg/dose IV every 8 hours. Consider NS bolus prior to each dose.
Gentamicin	Same dosing as tobramycin
Levofloxacin (Levaquin®)	6 months - 5 years: 10 mg/kg/dose IV/PO q12h; > 5 years: 10 mg/kg/dose (Max 750 mg) IV/PO every 24 hours
Linezolid (Zyvox®)	10 mg/kg/dose IV/PO q8h (pt ≥ 12yo: 600 mg IV/PO q12h)
Meropenem (Merrem®)	20 mg/kg/dose IV q8h (adult 1 gram IV q8h) Severe infection: 2 g IV q8h
Metronidazole (Flagyl®)	7.5 mg/kg/dose IV/PO q6h (adult dose: 500 mg/dose)
Micafungin (Mycamin®)	4 mg/kg IV Daily. Max 100 mg/day (Candida) Max 150 mg/day (*Aspergillus*) Prophylaxis 1 mg/kg Max 50 mg/day
Oxacillin	50 mg/kg/dose IV q6h (adult dose: 2 grams/dose)
Penicillin VK	For pneumococcal prophylaxis < 2 months: 62.5 mg PO BID; 2 months - 3 yo: 125 mg PO BID; > 3 yo: 250 mg PO BID; pt> 50 kg: 500 mg PO BID
Pentamidine	Inhaled: pre-medicate with albuterol 2.5 mg inhaled < 5 years: 8 mg/kg via HHN q 30 days > 5 years: 300 mg via HHN q 30 days IV: 4 mg/kg over 60 minutes q 30 days
Piperacillin/ Tazobactam (Zosyn®)	100 mg/kg IV q8h (adult dose: 3 grams/dose)
Tobramycin	10 mg/kg/dose IV q24h. NO MAX. (Dose based on dosing body weight if patient is obese) **MED Service to follow and order levels.**
Vancomycin	15 mg/kg/dose IV q6h (Max 2000 mg/dose) **MED Service to follow and order levels.**
Voriconazole (Vfend®)	8 mg/kg/dose (adult dose 200 mg) IV/PO q12h. Avoid IV formulation in patients with renal insufficiency

FEVER AND NEUTROPENIA ALGORITHM

Fever: 38.0°- 38.2° x 2 in a 24 hour period OR 38.3° x 1
Neutropenia: ANC < 500/mm3

Fever and neutropenia in an oncology patient is an **oncologic emergency**. Administration of antibiotics within 1 hour of presentation with fever is our goal and has been associated with a decrease in morbidity and mortality.

*Use alternate antibiotic if patient has cephalosporin allergy



BACTRIM® DOSING CHART FOR PCP PROPHYLAXIS

Bactrim® prophylaxis to be given BID on Saturday and Sunday weekly

BSA (m^2)	Suspension (200/40 mg)/5 mL	SS tabs (400/80 mg) tabs	DS tabs (400/80 mg) tabs
< 0.4	2.5 mL		
0.4 - 0.79	5 mL	0.5 tab	
0.8 - 1.39	10 mL	1 tab	
1.4 - 1.89	15 mL	1.5 tabs	
> 1.89	20 mL	2 tabs	1 tab

ANTI-EMETICS

Aprepitant (Emend®)	125 mg PO 1 hr prior to chemo on day 1, 80 mg PO once prior to chemo on days 2 and 3 combined w/ scheduled 5HT- 3 antagonist (eg, ondansetron) & dexamethasone (Decadron®) in pts ≥ 11 yo & ≥ 40 kg
Diphenhydramine (Benadryl®)	1 mg/kg/dose PO/IV q6h prn (Max: 50 mg/dose) not a preferred agent for use as antiemetic
Dronabinol (Marinol®)	5 mg/m^2/dose PO q4h or q6h prn (dose in 2.5 mg increments)
Granisetron (Kytril®)	10 - 20 mcg/kg/dose IV BID (adult dose: 1 mg IV BID)
Lorazepam (Ativan®)	0.02 - 0.04 mg/kg/dose IV q6h prn for nausea/vomiting (Max: 2 mg/dose)
Metoclopramide	1 mg/kg/dose IV/PO Q6h prn (Max: 50 mg/dose)
Ondansetron (Zofran®)	0.15 mg/kg/dose IV q8h scheduled/prn (Max: 8 mg/dose)
Palonosetron (Aloxi®)	20 mcg/kg/dose IV prior to chemo (Max 1.5 mg) Do not co-administer with ondansetron or granisetron.
Prochlorperazine (Compazine®)	0.1 - 0.15 mg/kg/dose slow IV q8h prn (Max: 10 mg/dose; 40 mg/day)
Promethazine (Phenergan®)	0.25 - 1 mg/kg/dose IV/PR/PO q4h or q6h prn (Max: 25 mg/dose) (avoid in children< 2 yo; max dose: 6.25 mg if given via peripheral IV)
Scopolamine Transdermal	> 12years: Apply 1 patch behind ear every 72 hours

GI AGENTS

Bisacodyl (Dulcolax®)	3 - 12 yo: 5 mg PO BID; > 12yo: 10 mg PO BID
Docusate (Colace®)	2.5 mg/kg/dose PO BID (Max: 400 mg/day); round to nearest 50 -mg cap size or use liquid
Famotidine (Pepcid®)	0.5 mg/kg/dose IV q12h (adult: 20 mg/dose)
Lactulose (Chronulac®)	For constipation, 1 - 3 mL/kg/day divided every 8 - 12 hrs. Max 60 mL/day.
Magnesium Citrate	< 6yo: 2 - 4 mL/kg; 6 - 12 yo: 100 - 150 mL > 12yo: 150 - 300 mL PO q6h until stooling
Methylnaltrexone (Relistor®)	< 38 kg: 0.15 mg/kg 38 - 62 kg: 8 mg > 62 kg: 12 mg May administer every other day. Do not administer more than once every 24 hours.
Omeprazole (Prilosec®)	Restricted to kids < 10 kg at CHKD: 0.5 - 1 mg/kg/dose PO daily or BID
Pantoprazole (Protonix®)	< 10 kg: 0.5 - 1 mg/kg/dose IV daily or BID; 10 - 20 kg: 10 mg PO/IV daily or BID; > 20 - 30 kg: 20 mg PO/IV daily or BID; ≥ 30 kg: 40 mg PO/IV daily or BID
Polyethylene glycol (Miralax®)	8.5 - 17 gm PO daily or BID
Ranitidine (Zantac®)	2 - 3 mg/kg/dose PO BID (adult: 150 mg/dose)
Senna/Docusate (Peri-Colace®)	< 6yo: 0.5 tab PO BID; 6 - 12 yo: 1 tab PO BID; > 12yo: 2 tabs PO BID
Senna	< 2yo: 1.25 mL PO BID; 2 - 6yo: 2.5 mL BID; 6 - 12yo: 5 mL PO BID; > 12yo: 10 mL BID

ELECTROLYTE SUPPLEMENTS

IV dosing supplementation: see page 17

Magnesium dosing: [IV daily requirement (mEq) x 3.3] / 20 mEq = # Magnesium Oxide tabs per day (in 2 - 3 divided doses)

- **Magnesium Oxide tablet:** 20 mEq Mg/400 mg tab
- **Magnesium Gluconate solution:** 0.96 mEq Mg/mL

Phosphorous dosing: [IV daily requirement (mmol) x 5]/ 8 mmol=# of powder packets per day (in 2 - 3 divided doses)

- **Phos-Na K powder:** 250 mg Phos (8 mmol), 7.1 mEq K, 7.1 mEq Na per packet
- **KPhos Neutral or Phospha 250 Neutral tablet:** 250 mg Phos (8 mmol), 7.1 mEq K, 7.1 mEq Na per tablet

ENOXAPARIN DOSING, MONITORING AND DOSE ADJUSTMENTS

Enoxaparin (Lovenox®) to be administered subcutaneously

Therapeutic dosing:
< 2 months old: 1.5 mg/kg/dose subq q12 hr
> 2 months old: 1 mg/kg/dose subq q12 hr

Prophylactic dosing:
< 2 months old: 0.75 mg/kg/dose subq q12 hr
> 2 months old: 0.5 mg/kg/dose subq q12 hr

Monitoring:

Anti-Xa level	Hold next dose?	Dose change	When to repeat Anti-Xa
< 0.35	No	Increase by 25%	4h after next morning dose
0.35 - 0.49	No	Increase by 10%	4h after next morning dose
0.5 - 1	No	No	Next day, then once a week 4h after morning dose
1.01 - 1.5	No	Decrease by 20%	Before next morning dose; administer decreased dose if level < 0.5 units/mL and recheck 4 hours post administration
1.51 - 2	3hr	Decrease by 30%	Before next morning dose and recheck 4 hours post administration
> 2	Until anti- Xa factor < 0.5units/mL	Decrease by 40%	q12h until < 0.5units/mL Then administer decreased dose and recheck 4 hours post administration

PROPHYLACTIC dosing: Goal anti-Xa for low molecular weight heparin = 0.1 - 0.3. No dose adjustment nomogram is available.

Modified from Albisetti and Andrew: Eur J. Pediatr: 2002; 161;71 - 77.
Reference: *Monagle, Chalmers, Chan et al. Antithrombotic therapy in neonates and children. Chest 2008:133:887S- 968S

PAIN MANAGEMENT

See pain card page 52 for more dosing recommendations
See PCA power plan for PCA dosing recommendations

Equianalgesic Dosing Chart

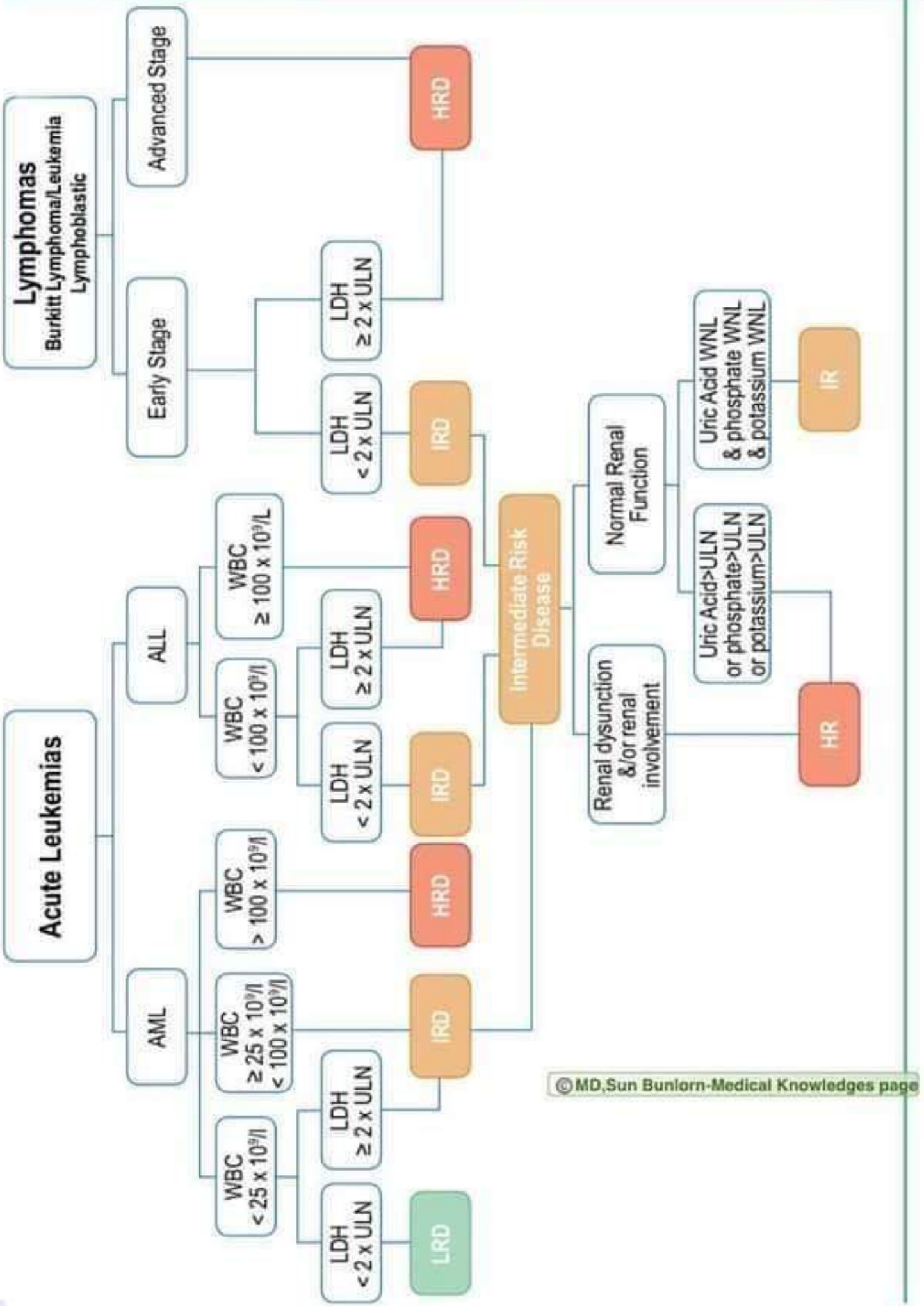
Drug	Oral	Parenteral (mg)
Morphine	30	10
Fentanyl		0.1
Hydromorphone	7.5	1.5
Oxycodone	20	
Hydrocodone	30	

Acetaminophen	10 - 15 mg/kg/dose PO q4h or q6h prn (adult: 650 mg/dose; Max: 4 g/day)
Fentanyl	0.5 - 1 mcg/kg/dose IV q1h prn
Hydromorphone	0.015 mg/kg/dose IV q4h prn (adult: 0.2 - 0.6 mg IV q4h prn) 0.03 - 0.08 mg/kg/dose PO q4h prn
Ibuprofen (Motrin®/Advil®)	10 mg/kg/dose PO q6h scheduled/prn (Max: 800 mg/dose; 3200 mg/day) Avoid in patients with thrombocytopenia
Ketorolac (Toradol®)	0.5 mg/kg/dose IV q6h scheduled/prn (Max: 30 mg/dose); do not exceed 5 days
Morphine	0.05 - 0.1 mg/kg/dose IV q2h or q4h prn (adult: 2.5 - 10 mg/dose)
Morphine IR (Immediate Release)	0.2 - 0.5 mg/kg/dose PO q4h prn (adult: 10 - 30 mg PO q4h prn)
Morphine sulfate ER (Extended Release) MS Contin®	24 -h PCA total morphine x 3 divided in 2 - 3 doses scheduled (dose in 15-mg increments)
Oxycodone/APAP (Percocet®)	0.05 - 0.15 mg/kg/dose oxycodone PO q4h prn/scheduled (Max: 10 mg/dose)

MISCELLANEOUS

Allopurinol (Zyloprim®)	≤ 10 yo: 10 mg/kg/day or 200 - 300 mg/m²/day PO in 2 - 3 divided doses > 10 yo: 600 - 800 mg/day PO in 2 - 3 divided doses (Max: 800 mg/day)
Aminocaproic acid (Amicar®)	75 mg/kg/dose (50 - 100 mg/kg) by mouth every 6 hours for 5 days
Caphosol®	30 mL PO QID Mix blue and white ampules together. Give 15 mL (1/2 dose) swish x 1 minute then spit. Repeat with remaining 15 mL
Cyproheptadine (Periactin®)	0.25 mg/kg/day divided twice daily Age dependent max doses: ≤ 6 years: 12 mg/day 7 - 14 years: 16 mg/day ≥ 15 years: 32 mg/day
Ferrous Sulfate	3 - 6 mg/kg **elemental** iron PO in 1 - 3 divided doses (325 mg tablet contains 65 mg elemental iron)
Folic Acid	1 mg PO daily
Magic Mouthwash	(Benadryl: Maalox: Viscous lidocaine 1:1:1) 3 - 5 mL swish/spit q6h prn
Naloxone drip (Narcan®)	Pruritus from PCA: **0.25** - 2 mcg/kg/hr IV as continuous infusion
Neulasta	10 - 20 kg: 1.5 mg/ 0.15 mL 21 - 30 kg: 2.5 mg/ 0.25 mL 31 - 44 kg: 4 mg/0.4 mL > 45 kg: 6 mg/0.6 mL
Rasburicase (Elitek®)	0.15 mg/kg IV once (Max: 6 mg/dose) may repeat after 18 - 24 hours if necessary

TUMOR LYSIS SYNDROME



Low Risk

- Ensure patient has adequate line access.
- Remove all potassium and phosphorus from IV fluids.
- Initate IV fluids: D5W 0.45%NS to run at 1.5 - 2 times maintenance.
- ± Allopurinol 10 mg/kg po divided BID
- Draw labs: BMP, Phos, Uric Acid every 8 - 12 hours.
- Observe patients carefully. If electrolytes, serum creatinine, uric acid or LDH studies worsen, then manage patient as a "high risk" patient. See algorithm.

Intermediate Risk

- Ensure patient has adequate line access.
- Remove all potassium and phosphorus from IV fluids.
- Initiate IV fluids: D5W 0.45%NS to run at twice maintenance.
- Consider Allopurinol 10 mg/kg po divided BID
- Draw labs: BMP, Phos, Uric Acid every 8 hours.
- Observe patients carefully. If electrolytes, serum creatinine, uric acid or LDH studies worsen, then manage patient as a "high risk" patient. See algorithm.

High Risk

- Ensure patient has adequate line access.
- Remove all potassium and phosporus from IV fluids.
- Initiate IV fluids: D5W 0.45%NS to run at twice maintenance. Monitor Ins and Outs.
- Follow hyperkalemia pathway if K+ ≥ 6 mg/L.
- Calcium levels will appear low because it binds to phosphorus. Only give calcium if patient is symptomatic or is necessary due to cardiac instablity because of hyperkalemia.
- Consider rasburicase (0.15 mg/kg-Max dose: 6 mg) if uric acid level is > 8 mg/dL or if clinically indicated. Dose may need to be repeated in 18 - 24 hours if necessary.
- Draw labs: BMP, Phos, Uric Acid every 6 hours. Frequency of lab draws may be decreased once team decides risk of TLS is low.
- Observe patients carefully. If electrolytes, serum creatinine, or uric acid studies worsen, contact Attending Physician. Consider Renal Consult.

Cairo MS, Coiffier B et al. Br Jnl Hematol 2010;149:578 - 86

CHKD Neonatal Medications and Dosing Guidelines

NICU Clinical Pharmacists phones: Red Team: 8-5491, Blue Team: 8-8002
MEDS Call Service (NICU)-nights and weekends: Simon #6428

*****Post menstrual age (PMA) = Gestational age + Postnatal age*****

ADMISSION MEDICATIONS

Vitamin K
Prophylaxis: IM
Treatment: IV

Prophylaxis upon admission/birth: INTRAMUSCULAR Dose (regardless of GA)

Preterm: ≤ 1 kg	0.3 mg/kg IM x 1
> 1 kg	0.5 mg IM x 1
Term (ALL ≥ 37 weeks GA)	1 mg IM x 1

Treatment of coagulopathy: IntraVENOUS Dose
1 mg IV x 1 for All patients
Infuse over 20 mins on IV pump

Erythromycin Eye Ointment

Apply thin ribbon to both eyes upon admission.

ANTIBIOTICS/ANTIVIRALS/ANTIFUNGALS/IMMUNE GLOBULIN

Acyclovir IV

Gestational Age < 33 weeks:
20 mg/kg/dose IV every 12 hrs
Gestational Age ≥ 33 weeks:
20 mg/kg/dose IV every 8 hrs

**Dose Adjustment in Renal Impairment:
Scr = 0.8 - 1.1: 20 mg/kg/dose IV every 12 hrs
Scr = 1.2 - 1.5: 20 mg/kg/dose IV every 24 hrs
Scr > 1.5 or urine output < 1 mL/kg/hour (oliguria): 10 mg/kg/dose IV every 24 hrs

Amikacin IV

PMA (weeks)	Postnatal (days)	Dose (mg/kg)	Interval (hours)
≤ 29*	0 to 7	18	48
	8 to 28	15	36
	> 28	15	24
30 to 34	0 to 7	18	36
	> 7	15	24
> 34	ALL	15	24

**Consider using the ≤ 29 week PMA dosing also for significant asphyxia, PDA, or treatment with indomethacin

Amoxicillin PO

For UTI prophylaxis
5 mg/kg/dose every evening (per Urology).
If NPO, use Ampicillin 50 mg/kg/dose IV every 24 hrs

Amphotericin B Conventional IV

1 mg/kg/dose IV every 24 hrs
**Extend interval to every 48 hours with renal dysfunction.

**Needs separate line/port if infusing with TPN/lipids.
With 1 line: Run TPN over 20 hours, check blood glucoses while off TPN during Ampho infusion.

Ampicillin IV, IM

Postnatal Age ≤ 7 days: 100 mg/kg/dose IV every 8 hrs
Postnatal Age > 7 days: 75 mg/kg/dose IV every 6 hrs
PMA > 44 and > 28 days: 100 mg/kg/dose IV every 6 hrs
UTI prophylaxis while NPO: 50 mg/kg/dose IV every 24 hrs

Bactrim® Sulfamethoxazole/ Trimethoprim (TMP) IV, PO

Restricted to patients > 2 months of age.
Dosing based on TMP component

Active Infection/Tracheitis:
3 - 6 mg/kg/dose IV/PO q12hr

UTI prophylaxis:
2 mg/kg/dose daily

Cefazolin (Ancef®) IV, IM

25 mg/kg/dose

Dosing Interval Chart

PMA (weeks)	Postnatal (days)	Interval (hours)
≤ 29	0 to 28	12
	> 28	8
30 to 36	0 to 14	12
	> 14	8
37 to 44	0 to 7	12
	> 7	8
> 44	ALL	8

Cefotaxime (Claforan®) IV, IM

50 mg/kg/dose

Dosing Interval Chart

PMA (weeks)	Postnatal (days)	Interval (hours)
≤ 29	0 to 28	12
	> 28	8
30 to 36	0 to 14	12
	> 14	8
37 to 44	0 to 7	12
	> 7	8
> 44	ALL	6

Cefoxitin (Mefoxin®) IV

30 mg/kg/dose IV every 8 hrs

Cefuroxime
IV, IM

Postnatal Age ≤ 7 days OR ≤ 2 kg:
50 mg/kg/dose every 12 hrs
Postnatal Age > 7 days AND > 2 kg:
50 mg/kg/dose every 8 hrs

Clindamycin
IV, IM, PO

5 mg/kg/dose

Dosing Interval Chart

PMA (weeks)	Postnatal (days)	Interval (hours)
≤ 29	0 to 28	12
	> 28	8
30 to 36	0 to 14	12
	> 14	8
37 to 44	0 to 7	12
	> 7	8
> 44	0 - 28 days	6

PMA > 44 and > 28 days: 10 mg/kg/dose every 8 hrs

Fluconazole
IV, PO

Invasive Candidiasis: 12 mg/kg/dose

Invasive Candidiasis Dosing Interval Chart

Gest. Age (weeks)	Postnatal (days)	Interval (hours)
≤ 29	0 to 14	48
	> 14	24
≥ 30	0 to 7	48
	> 7	24

**Dose reduction may be needed with renal dysfunction.
Thrush: 6 mg/kg PO X 1 then 3 mg/kg/dose PO every 24 hrs

Gentamicin/
Tobramycin
IV, IM

PMA (weeks)	Postnatal (days)	Dose (mg/kg)	Interval (hours)
≤ 29*	0 to 7	5	48
	8 to 28	4	36
	> 28	4	24
30 to 34	0 to 7	4.5	36
	> 7	4	24
> 34 to 44	ALL	4	24
> 44	> 28	5	24

**Consider using the ≤ 29 week PMA dosing also for significant asphyxia, PDA, or treatment with indomethacin

Granulocyte
Colony
Stimulating Factor
(GCSF)/
(Filgrastim®)
IV

Neutropenia/Sepsis: 10 mcg/kg IV x 1 dose
may repeat every 24hrs until ANC > 1000
order 1 dose at a time based on evaluation of ANC prior to redosing.

IVIG

DAT positive hemolytic anemia:
1 gram/kg/dose IV over 2 - 4 hrs
May repeat in 12 hours if needed

Meropenem
IV

Non-CNS infections
< 32 weeks gestational age AND < 14 days postnatal age:
20 mg/kg/dose IV every 12 hrs
< 32 weeks gestational age AND ≥ 14 days postnatal age:
20 mg/kg/dose IV every 8 hrs
≥ 32 weeks gestational age AND < 14 days postnatal age:
20 mg/kg/dose IV every 8 hours
≥ 32 weeks gestational age AND ≥ 14 postnatal age:
30 mg/kg/dose IV every 8 hours

Bacterial Meningitis
< 32 weeks gestational age AND < 14 days postnatal age:
40 mg/kg/dose IV every 12 hrs
< 32 weeks gestational age AND ≥ 14 days postnatal age:
40 mg/kg/dose IV every 8 hrs
ALL ≥ 32 weeks gestational age: 40 mg/kg/dose IV every 8 hrs

Metronidazole
(Flagyl)
IV, PO

Loading dose: 15 mg/kg/dose
Maintenance dose: 7.5 mg/kg/dose
****Begin Maintenance dose at next interval time**

Dosing Interval Chart

PMA (weeks)	Postnatal (days)	Interval (hours)
≤ 29	0 to 28	48
	> 28	24
30 to 36	0 to 14	24
	> 14	12
37 to 44	0 to 7	24
	> 7	12
> 44	ALL	8

PMA > 44 and > 28: 10 mg/kg/dose every 8 hours

Nystatin

PO: Suspension=100,000 units/mL

Preterm infants: 0.5 mL to each side of mouth every 6 hrs
Term infant: 1 mL to each side of mouth every 6 hrs

Topical: Cream/Ointment: Apply to area topically QID

Oxacillin
IV, IM

50 mg/kg/dose

Dosing Interval Chart

PMA (weeks)	Postnatal (days)	Interval (hours)
≤ 29	0 to 28	12
	> 28	8
30 to 36	0 to 14	12
	> 14	8
37 to 44	0 to 7	12
	> 7	8
> 44	ALL	6

Penicillin G IV, IM

Bacteremia: 50,000 units/kg/dose
**Use table below for bacteremia dosing only

Dosing Interval Chart		
PMA (weeks)	**Postnatal (days)**	**Interval (hours)**
≤ 29	0 to 28	12
	> 28	8
30 to 36	0 to 14	12
	> 14	8
37 to 44	0 to 7	12
	> 7	8
> 44	ALL	6

GBS Meningitis:
Postnatal Age ≤ 7 days:
150,000 units/kg/dose **every 8 hrs**

Postnatal Age > 7 days:
125,000 units/kg/dose **every 6 hrs**

Penicillin G Benzathine IM only

Congenital syphilis:
50,000 units/kg/dose x 1 dose IM

Rifampin IV, PO

Synergy for MRSA in combination with other ABX:
5 - 10 mg/kg/dose IV/PO every 12 hrs

Piperacillin-Tazobactam (Zosyn®) IV

100 mg/kg/dose

Dosing Interval Chart		
PMA (weeks)	**Postnatal (days)**	**Interval (hours)**
≤ 29	0 to 28	12
	> 28	8
30 to 36	0 to 14	12
	> 14	8
37 to 44	0 to 7	12
	> 7	8
> 44	ALL	8

Vancomycin IV

15 mg/kg/dose

Dosing Interval Chart		
PMA (weeks)	**Postnatal (days)**	**Interval (hours)**
≤ 29	0 to 14	18
	> 14	12
30 to 36	0 to 14	12
	> 14	8
37 to 44	0 to 7	12
	> 7	8
> 44	ALL	8

Meningitis dosing if PMA > 44 weeks and > 28 days:
15 mg/kg/dose IV every 6 hrs

PREVENTION OF PERINATAL HIV TRANSMISSION AND INFECTION

Zidovudine (AZT®) IV, PO

AZT alone is appropriate for infants born to women who received antepartum/intrapartum antiretroviral therapy with effective viral suppression.

	IV dosing	PO dosing
< 30 weeks gestational age	1.5 mg/kg/dose IV every 12 hrs Increase to 2.3 mg/kg/dose IV every 12 hrs after 4 weeks postnatal age	2 mg/kg/dose PO BID Increase to 3 mg/kg/dose PO BID after 4 weeks postnatal age
30 weeks to 34 weeks gestational age	1.5 mg/kg/dose IV every 12 hrs Increase to 2.3 mg/kg/dose IV every 12 hrs at 15 days postnatal age	2 mg/kg/dose PO BID Increase to 3 mg/kg/dose PO BID at 15 days postnatal age
> 34 weeks gestational age	3 mg/kg/dose IV every 12 hrs	4 mg/kg/dose PO BID

Nevirapine (Viramune®) PO Only

AZT plus 3 doses of nevirapine is recommended for infants at higher risk of HIV acquisition whose HIV-infected mothers have not received combined antiretroviral therapy prior to or during labor, suboptimal viral suppression despite being on antepartum antiretroviral therapy or having only received intrapartum antiretroviral therapy.

Fixed Dose based on Birth Weight (BW)		
BW 1.5 - 2 kg: 8 mg/dose x 3 doses in the first week of life		
BW > 2 kg: 12 mg/dose x 3 doses in the first week of life		
Dose #1	**Dose #2**	**Dose #3**
within 48 hr of birth	48 hr after 1st dose	96 hr after 2nd dose

ANTICONVULSANTS

Fosphenytoin IV

Load: 20 mg PE/kg/dose IV x 1 over at least 10 mins
Maintenance: 4 - 8 mg PE/kg/dose IV every 24 hrs
(Fosphenytoin 1 mg PE = Phenytoin 1 mg)

Levetiracetam (Keppra®) IV, PO

Load: 30 - 50 mg/kg/dose IV X 1
Maintenance: 15 mg/kg/dose IV/PO every 12 hrs
Max dose: 25 mg/kg/dose IV/PO every 12 hrs
Dosing per Neurology

Phenobarbital IV, PO

Load: 20 mg/kg/dose IV x 1 over at least 20 mins
Maintenance: 3 - 5 mg/kg/dose IV/PO every 24 hrs

Phenytoin (Dilantin®) IV, PO

Load: 15 - 20 mg/kg/dose IV x 1 over at least 20 mins
Maintenance: 4 - 8 mg/kg/dose IV/PO every 24 hrs

CARDIAC

Alprostadil (Prostaglandin E)	**Standard Drip Concentration** Continuous IV infusion: 0.02 to 0.1 mcg/kg/min
Dopamine	**Standard Drip Concentration** Continuous IV infusion: 2 to 20 mcg/kg/min
Enalapril PO only	0.05 - 0.1 mg/kg PO daily to BID Nephrology to guide dosing; IV Enalaprilat not recommended per Nephrology. See Hydralazine dosing for IV option when NPO.
Epinephrine	**Standard Drip Concentration** Continuous IV infusion: 0.1 to 1 mcg/kg/min
Hydralazine IV, PO	**Specify BP parameters when ordering IV: 0.1 - 0.5 mg/kg/dose every 6 - 8 hrs prn (Max: 2 mg/kg/dose) *PO dose is approximately 2 times the IV dose PO: 0.25 - 1 mg/kg/dose every 6 - 8 hrs prn
Hydrocortisone IV, PO	Stress dosing: 1 mg/kg/dose every 8 hrs Maintenance: 0.5 mg/kg/dose every 6-8 hrs **Consult attending prior to starting, dose/frequency adjustments may be needed.
Propranolol (Inderal®) PO only	PO only (per Cardiology) PO: 0.25 - 0.5 mg/kg/dose PO every 6 - 8 hrs Maximum 3.5 mg/kg/dose q6hr or Attending approval

PDA Closure

Acetaminophen IV, PO	15 mg/kg/dose IV/PO every 6 hours standing x 3 - 7 days. Duration determined by Neonatologist and ECHO results
Indomethacin (Indocin®) IV only	**PDA Closure Dose (mg/kg)** **Age at 1st dose** / **1st** / **2nd** / **3rd** < 48 hours: 0.2 / 0.1 / 0.1 2 to 7 days: 0.2 / 0.2 / 0.2 > 7 days: 0.2 / 0.25 / 0.25 IV doses x 3 = 1 course, maximum 2 courses
Ibuprofen Lysine (Neoprofen®) IV only	Load: 10 mg/kg/dose IV x 1 dose then 5 mg/kg/dose IV every 24hrs x 2 doses starting 24 hrs after load IV doses x 3 = 1 course, maximum 2 courses

GASTROINTESTINAL

Erythromycin (for GI Motility) IV, PO	IV / PO: 3 - 5 mg/kg/dose every 6hrs (PO preferred) Salts: PO = EES; IV= Erythromycin Lactobionate change from IV to PO as soon as possible
Famotidine (Pepcid®) IV only	CHKD's only IV H_2 Antagonist 0.5 mg/kg/day IV every day If PMA > 37 weeks and lower dose not adequate, may increase to 1 mg/kg/dose IV daily *** Use Daily dose in TPN*** **Dosing Adjustment in Renal Impairment:** CrCl < 10 mL/min/m²: 0.5 mg/kg/dose every 48hrs
Ranitidine (Zantac®) PO only	CHKD's only PO H_2 Antagonist 2 mg/kg/dose PO every 8hrs (not recommended in < 1.5 kg, increase in sepsis risk)
Hyoscyamine (Levsin®) PO only	**Weight** / **Drops** / **Interval (hours)** 2.3 - 3.3 kg: 3 drops: 4 3.4 - 4.9 kg: 4 drops: 4 5 - 6.9 kg: 5 drops: 4
Omeprazole (Prilosec®) PO only	0.5 - 1 mg/kg every day. May increase to BID if needed. (not recommended in < 1.5 kg, increase in sepsis risk)
Pantoprazole (Protonix ®) IV only	CHKD's only IV PPI 0.5 - 1 mg/kg IV daily. May increase to BID if needed. (not recommended in < 1.5 kg, increase in sepsis risk)
Simethicone (Mylicon®) PO only	20 mg/dose every 6hrs PRN
Ursodiol (Actigall®) PO only	TPN Induced Cholestasis: 10 mg/kg/dose every 8hrs
3% Saline (Hypertonic Saline) "Hot Salt" IV Only	To be ordered only after Attending Approval IV: 5 mL/kg x 1 over 2hrs Infuse via Central line
Calcium Gluconate IV only	Acute Treatment: 100 - 200 mg/kg/dose every 6hrs infuse over 1 hour
Calcium Carbonate PO only	125 - 375 mg/kg/day PO divided every 6hrs (equivalent to 50 - 150 mg/kg/day ELEMENTAL Calcium) Each mL (=250 mg) provides 100 mg elemental calcium
Cholecalciferol (Baby-D Drops®) PO only	400 units PO daily Baby-D Drops = 400 units/drop Dosing based on type of fortification, age, and weight
Ferrous Sulfate (Fer-in-Sol®) PO only	3 - 6 mg ELEMENTAL Iron/kg/day Divided 2 - 3 times/day Ferrous Sulfate 75 mg/mL (= Elemental Iron 15 mg/mL)

Hyaluronidase Subq only	only up to 24 hours after extravasation injury. Draw up 0.1 mL (150 units/mL conc.) and mix w/0.9 mL NS to make 15 units/mL conc. Administer 0.2 mL SubQ in a circular pattern around injured site.
Insulin (Regular Only)	**Standard Drip Concentration** Continuous IV Infusion 0.01 to 0.1 units/kg/hr; titrate to blood glucose goal
Levothyroxine (Synthroid®) IV, PO	IV: 7 - 12 mcg/kg daily PO: 10 - 15 mcg/kg daily (IV= 75% of oral dose)
Poly-Vi-Sol with Iron PO only	0.5 - 1 mL PO daily Dosing based on type of fortification, age, and weight
Potassium Chloride (Chloride Supplementation) PO	1 mEq/kg/dose; frequency dependent upon level of deficiency, start @ every 12hrs
Sodium Chloride Supplementation PO	1 mEq/kg/dose; frequency dependent upon level of deficiency, start @ every 12hrs

RESPIRATORY

Albuterol	1.25 - 2.5 mg nebulized every 4 - 6hrs PRN
Aldactazide® (Spironolactone/ HCTZ) PO only	1 mg/kg/dose (each component) BID; may increase to 1.5 - 2 mg/kg/dose BID for chronic patients
Budesonide (Pulmicort®)	0.25 mg nebulized Daily to BID. May increase to 0.5 mg BID in older, chronic patients. Max dose: 1 mg per day
Bumetanide (Bumex®)	0.1 mg/kg/dose IV/PO Daily to q8hr
Caffeine Citrate (Cafcit®) IV or PO	IV: Infuse Load over 30mins, daily IV dose over 10 mins **Load:** 40 mg/kg x 1 **Initial Maintenance dose:** 8 mg/kg every morning *(may see up to 10 mg/kg/day maintenance dose based on caffeine level or clinical symptoms)* IV dosing = PO dosing
Curosurf® (Portactant) ETT only	**Load:** 2.5 mL/kg x 1 dose **Subsequent doses:** 1.25 mL/kg/dose every 12hrs - up to 2 additional doses. Max. total dose 5 mL/kg.
Dexamethasone (Decadron®) IV, PO	Days 1 - 3: 0.25 mg/kg/dose every 12hrs; THEN WEAN Days 4 - 6: 0.15 mg/kg/dose every 12hrs IV dosing = PO dosing *(Not recommended to be used in the first 2 weeks of life due to increased risk of neurodevelopment issues)*
Furosemide (Lasix) IV, PO	1 mg/kg/dose IV or 2 mg/kg/dose PO; Frequency from daily - every 12hrs, (Max every 6hrs) ***If Cardiac or Pulmonary Hypertension patient: consider 1 mg/kg/dose (PO) and use more frequent interval based on need.***
Atrovent® (Ipratropium)	0.25 mg nebulized every 8hrs
Oxymetazoline (Afrin®)	Instill 1 drop into each nostril twice daily for ≤ 3 days (Dosing typically guided by ENT)
Phenylephrine (Little Noses®) 0.125% solution	Instill 1 drop in each nostril every 8 - 12 hours as needed for ≤ 3 days
Racemic Epinephrine	0.13 mL of 2.25% solution QS up to 3 mL with NS; give via nebulizer
Sodium Bicarbonate IV only	Calculation: HCO_3 (mEq) = 0.3 x weight (kg) x base deficit OR 2 mEq/kg/dose. Mix 1:1 w/sterile H20. Infuse over 30 mins To be ordered only after Attending Approval **Sodium Bicarbonate Continuous Infusion (standard concentration of 1 mEq/mL):** 0.5 - 1 mEq/kg/hr

SEDATION/ANALGESIA/PARALYTICS

Acetaminophen (Tylenol®) PO, PR and IV	PO	10 - 15 mg/kg/dose every 6 - 12 hrs PRN
	PR	10 - 15 mg/kg/dose every 6 - 12 hrs PRN
	IV	***MUST be 32 weeks at birth or PMA:*** 10 mg/kg/dose IV every 6 hours standing x 48hrs ***CPOE order under Post-op Pain Powerorder
Clonidine PO only		5 - 15 mcg/kg/day divided BID - TID **Caution with order entry b/c it is entered as milligrams**
Dexmedetomidine (Precedex®) IV only		**Standard Drip Concentration** Continuous IV infusion: 0.1 mcg/kg/hr: titrate to effect Max: 2 mcg/kg/hr
Diazepam (Valium®) IV, PO		**Consult your NICU Pharmacist on dosing for agitation/sedation.** *reserved for older/TERM infants due to decreased metabolism* **For Tone:** 0.1 mg/kg/dose IV/PO every 8hrs IV dosing = PO dosing
Fentanyl IV only		**Standard Drip Concentration** Continuous IV infusion: 1 to 5 mcg/kg/hr: titrate to effect IV bolus: 1 - 2 mcg/kg/dose IV every 2 - 4hrs PRN **Administer by slow IV push to avoid chest wall rigidity
Lorazepam (Ativan®) IV, PO		0.05 to 0.1 mg/kg/dose IV/PO every 4 - 6 hrs PRN; titrate to effect IV dosing = PO dosing
Methadone IV, PO		(equal analgesia to Morphine but > sedating) 0.05 - 0.1 mg/kg/dose every 6 - 12 hrs, titrate to effect **Neonatal Narcotic Withdrawal:** 0.05 - 0.1 mg/kg/dose every 6 - 8hrs. After 24 - 48hrs, extend interval to every 12 - 24 hrs To taper, wean by 0.05 mg/kg/day. Follow WAT/NAS scores as cues to wean. IV dosing = PO dosing
Midazolam (Versed®) IV		**Standard Drip Concentration** Continuous IV infusion: 0.05 - 0.2 mg/kg/hr: titrate to effect IV intermittent bolus: 0.05 - 0.15 mg/kg/dose IV every 2 - 4hrs PRN
Morphine IV, PO		**Standard Drip Concentration** Continuous IV infusion: 10 - 20 mcg/kg/hr: titrate to effect IV bolus: 0.05 - 0.2 mg/kg/dose IV every 4 - 6hrs PRN PO: 0.1 - 0.2 mg/kg/dose PO every 4 - 6hrs PRN
Vecuronium IV only		**Standard Drip Concentration** Continuous IV infusion: 0.05 to 0.2 mg/kg/hr IV intermittent bolus: 0.1 mg/kg/dose IV every 1hr PRN movement ***For multiple doses per day or if on a drip, also order Lacri-lube OU PRN*** *prolonged duration with poor renal function* *NO analgesic effect therefore use with sedation & analgesia*

VACCINES

*No live vaccines to be administerd in the NICU. Catch-up will be done at PCP office.

Hepatitis B IM	Hepatitis B Vaccine: 0.5 mL IM x 1 Hepatitis B Immune Globulin (HBIG): 0.5 mL IM x 1 *Term and preterm: If HbsAg-positive mother: Give Hep B vaccine and HBIG within 12 hrs of birth. *Preterm Infants < 2 kg and HbsAg-unknown mother: Give Hep B vaccine. Give HBIG if mom tests positive or if results are unknown within 12 hrs of birth. *Term and preterm infants ≥ 2 kg and HbsAg-unknown mother: Give Hep B vaccine and obtain HbsAg on mother. Give HBIG within 7 days of birth only if mother tests positive.
	4 week vaccine Hepatitis B *Combination vaccines should not be used for the "birth" dose but may be used as part of the immunization series after 6 weeks of age * OK for patient to receive up to 4 doses of Hepatitis B within series if using combination product for repeat doses
	2, 4, 6 month vaccines Pediarix® 0.5 mL IM (Inactivated Polio, dTaP & Hep B) Prevnar 13 0.5 mL IM Haemophilus B 0.5 mL IM **OR** Pentacel® 0.5 mL IM (Inactivated Polio, dTaP & HIB) Prevnar 13 0.5 mL IM Hepatitis B 0.5 mL IM
	Additional 6 month vaccine during flu season Influenza virus vaccine 0.25 mL IM *Two doses are required 4 weeks apart for first influenza vaccine
	12 month vaccines Haemophilus B 0.5 mL IM Prevnar 13 0.5 mL IM Hepatitis A 0.5 mL IM

PREMEDICATIONS FOR ELECTIVE INTUBATION

Analgesia (defaulted on powerorder)	Fentanyl	1 - 2 mcg/kg IV x 1 STAT
	**Administer by slow IV push **Use higher doses in patients previously on opioids	
Sedation/ Anxiolytic (optional selection on powerorder)	***only prescribe if giving in conjunction with Fentanyl***	
	Ativan/Lorazepam	0.05 mg/kg IV x 1 STAT
	Versed/Midazolam	0.05 mg/kg IV x 1 STAT
Vagolytic (optional selection on powerorder)	***Administer over 1 minute immediately prior to other premedications***	
	Atropine	0.02 mg/kg IV x 1 STAT (no minimal volume)
Paralytic (optional selection on powerorder)	Vecuronium	0.1 mg/kg IV X 1 STAT
	Rocuronium	0.3 mg/kg IV x 1 STAT

COMPOUNDED IV FLUID EQUIVALENCY

	Per 250 mL	Per 500 mL	Per 1000 mL (1 liter)
Normal Saline (NS)	38.5 mEq	77 mEq	154 mEq
½ NS	19.25 mEq	38.5 mEq	77 mEq
¼ NS	9.6 mEq	19.25 mEq	38.5 mEq
	Per 250 mL	**Per 500 mL**	**Per 1000 mL (1 liter)**
Normal Sodium Acetate	38.5 mEq	77 mEq	154 mEq
½ Normal Sodium Acetate	19.25 mEq	38.5 mEq	77 mEq
¼ Normal Sodium Acetate	9.6 mEq	19.25 mEq	38.5 mEq
Using D70% and Sterile Water to compound:	**Per 250 mL**	**Per 500 mL**	**Per 1000 mL (1 liter)**
D12.5	31.25 gm	62.5 gm	125 gm
D15	37.5 gm	75 gm	150 gm
D17.5	43.75 gm	87.5 gm	175 gm
D20		Commercially prepared in 500 mL bags only	

Most common fluid used in NICU	**D10 ¼ NS + 5 mEq KCl/250 mL**	Appropriate heparin to be added for specific line type
Glucose Infusion Rate (GIR) Calculation	**GIR= % dextrose X rate (mL/hr) X 0.165 / wt (kg)**	

NICU HEPARIN PROTOCOL FOR LINE PATENCY

	Heparin for continuous IVFs	Heparin Flushes for specific line
UAL	Clear Fluids: 0.5 units/mL Heparin We do not infuse TPN via UAL.	Order 10 mL UAL FLUSH syringe: same IVF as continuous UAL fluid including 0.5 units/mL heparin
UVL	Clear Fluids: 0.5 units/mL Heparin TPN: 0.5 unit/mL Heparin per protocol	Heparin 10 units/mL, flush q8hr and prn
PIV	Clear fluids: No heparin added TPN: 1 unit/mL Heparin per protocol	Saline lock and Flush q8h and prn
PICC (NICU placed)	Clear fluids: 1 unit/mL Heparin TPN: 1 unit/mL Heparin per protocol	NICU placed PICCs cannot be HEP Locked. Must have a continuous fluid infusing. Minimum KVO rate (in general) is 1 mL/hr per port.
PICC (VAT placed)	Clear fluids: 1 unit/mL Heparin TPN: 1 unit/mL Heparin per protocol	VAT placed PICCs can be Hep Locked using 10 unit/mL Heparin flush syringe.

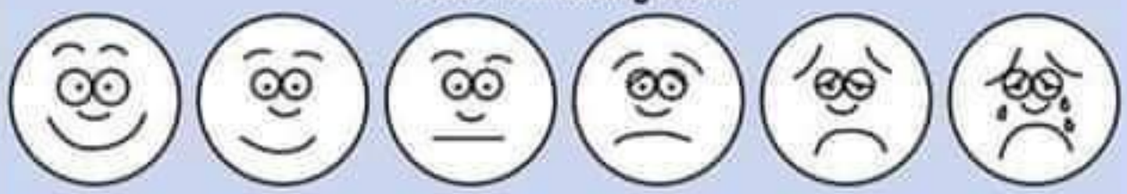
CHKD Pediatric Pain Management Reference Card

This document is intended as reference material only, and is not a substitute for clinical judgment. Decisions about patient management should be made considering patient allergies, history, underlying condition, response to previous treatment, and concurrent therapies.

MULTIDIMENSIONAL PAIN ASSESSMENT

- **Intensity** - How much does it hurt? *Pain Score, (mild, moderate, severe)*
- **Location** - Where is the pain?
- **Duration** - Is the pain always there? Does the pain come and go (breakthrough pain)?
- **Quality** - How does the patient describe his/her pain? *(sharp, burning, throbbing, etc.)*
- **Aggravating/Alleviating Factors** - *What makes the pain better? Worse?*
- **Previous Pain Experiences** - *e.g., stitches, surgeries, fractures, procedures*
- **Impact of Pain** - on Sleep? Activity? Appetite? Energy? Mood?
- **Patient goals and expectations**
- **Parent expectations, anxiety, involvement**

Faces Pain Rating Scale



(Revised) FLACC Pain Scoring

Category	0	1	2
Face	No expression	Occas. grimace, frown,withdrawn, disinterested sad, appears worried	Clenched jaw quivering chin, distressed or frightened expression
Legs	Normal or relaxed Usual tone/ motion	Restless, uneasy, tense, occas. tremors	Kicking, legs drawn up, marked incr. in spasticity, constant jerk/tremor
Activity	Lying quiet, normal position, moves easily, regular, rhythmic resp.	Squirming, shifting back and forth, tense, guarded movements, mildly agitated, shallow splinting resp. intermittent sighs	Arched, rigid, or jerking, severe agitation, head banging, shivering, breath holding, gasping, severe splinting
Cry	No cry	Moans or whimpers, occasional complaint, occsaional verbal outbursts, grunting	Crying steadily, screams or sobs, frequent complaints, repeated outbursts, constant grunting
Consolability	Content, relaxed	Resassured by occas. touching, hugging or being talked to; distractile	Difficult to console or comfort, pushing caregiver away, resisting care or comfort measures.

Merkel, et al (1997) & Malviya et al (2006)
Revisions validated for use in severe neurological impairment

PCA GUIDELINES (SEE PCA ORDER SETS FOR GUIDELINES)

Selecting a PCA opioid:

Most patients will achieve adequate analgesia with Morphine PCA.

Fentanyl has a short duration of action with single doses and may require more frequent titration until pain control is achieved. Tolerance and tachyphylaxis are more likely with this agent, which has a long terminal half-life when used as an infusion.

Hydromorphone (~5X potency of morphine) is reserved for patients with intolerance to morphine/ fentanyl OR those who have developed tachyphylaxis with prolonged use of morphine/fentanyl

Opioid	Equianalgesic IV Dose
Morphine	1 mg (1,000 mcg)
Fentanyl	0.01 mg (10 mcg)
Hydromorphone	0.2 mg (200 mcg)

Loading doses are highly recommended when starting OR increasing a continuous infusion.

Chronic Pain Patients should be started on higher doses. Consider preexisting dosing requirements.

Weaning: Typically the continuous infusion is tapered or discontinued first, allowing for rescue/PCA doses during the transition to oral analgesics. Patients on opioids for longer than 7 days or receiving large doses may need a taper regimen. Consult a clinical pharmacist for assistance.
See also Nursing Policy for PCA: ME.32

For inadequate Pain Management for PCA patients

Think about other sources of pain and consider:
-Rebolus
-Decrease Lock out interval
-Titrate up the continuous infusion AND/OR PCA dose--
Add an adjuvant drug around the clock
-Consult Clinical Pharmacist

ANALGESICS
***For severe persistent acute pain: Schedule analgesics & adjuvants**

Drug	Dosing
Acetaminophen	IV: 10 mg /kg q6hr. (order set) PO: 15 mg/kg q4hr PR: 20 mg/kg q4hr Do not exceed 4gm/day in adults or 5 doses daily in children
Ibuprofen	10 mg/kg PO q6 - 8hr
Ketorolac	0.5 mg/kg IV q6hr (Max 5 days) 30 mg maximum dose. IV only. *not for use in pts < 2 mo. of age*
Oxycodone	0.05 - 0.15 mg/kg/dose PO Q4 - 6hr Adult dose(> 50 kg): 5 mg PO q4 - 6hr Available as: 5 mg/5 mL elixir OR 5 mg immediate release capsule 10 mg **extended release** tablet
Oxycodone / Acetaminophen (5 mg/325 mg tab)	Same as oxycodone. Max: 10 mg/dose; 12 tabs/day. ***caution with daily max dose of acetaminophen**
Tramadol	1 - 2 mg/kg/dose PO q4 - 6hr. Adolescents & Adults: 50 - 100 mg q4 - 6hr.(Max dose 400 mg) ***Check for drug interactions***
Hydrocodone / Acetaminophen Hycet®: 2.5 mg /108 mg per 5 mL; Norco®: 5, 7.5 or 10 mg/325 mg tablets)	Dosed on hydrocodone component: 0.1 - 0.2 mg/kg po Q4h Equivalent to 0.2 - 0.4 mL/kg Adult dosing: 5 - 10 mg/dose (10 - 20 mL) Max: 10 mg/dose (20 mL/dose) ***caution with daily max dose of acetaminophen**
Morphine	0.05 - 0.1 mg/kg IV q2 - 4 hrs **Immediate Release** (IR): 0.2 - 0.5 mg/kg PO q4 - 6hr. Available as: 10 mg/5 mL solution IR: 15, 30 mg tab **Extended Release** (ER): 15, 30, or 60 mg tab
Fentanyl	1 - 2 mcg/kg/dose IV q1hr **Fentanyl TD patches** Availability:12, 25, 50,100 mcg See Clinical Pharmacist for recs.
Hydromorphone	IV: 0.015 mg/kg q4hr PO: 0.03 - 0.08 mg/kg q4hr **Adult doses:** IV: 0.2 - 0.6 mg q4hr PO: 1 - 2 mg q4hr 2, 4, or 8 mg tab
Methadone	Initial: 0.1 mg/kg IV or PO Q6hrs. Methadone conversion is highly variable. Please consult a clinical pharmacist for dosing recommendations.

ADJUVANTS

Neuropathic Pain	Amitriptyline	0.1 mg/kg PO qHS Titrate up to 0.5 - 2 mg/kg as needed over 2 - 3 weeks. Max dose: 50 mg /dose
	Gabapentin	Children: Initial:5 mg/kg PO @HS Day2: 5 mg/kg/dose PO BID Day 3: 5 mg/kg/dose PO TID Maintenance range: 8 - 35 mg/kg/day divided in 3 PO doses Adults: 100 mg PO TID initial Max daily dose 3600 mg
Muscle Spasm Agitation OR Anxiety	Diazepam	0.05 - 0.15 mg/kg IV q6hr; Max 10 mg/dose 0.1 - 0.3 mg/kg/dose PO q6 - 8hr; Max 10 mg/dose
	Lorazepam	0.05 - 0.1 mg/kg/dose IV /PO q6hr Max: 2 mg dose
	Baclofen	2 - 7 yr olds: 20 - 30 mg/**day** PO divided every 8 hrs. Titrate up every 3 days by 5 - 15 mg/**day** to a max of 60 mg per day.
Nausea/ Vomiting	Promethazine (**Residents**: consider adding Diphenhydramine to prevent dystonia)	0.25 mg/kg/dose IV/PR q4hr PRN. Max PIV dose: 6.25 mg Max Central line Dose: 25 mg Max PR dose: 25 mg Contraindicated in children < 2 yrs.
	Ondansetron	0.15 mg/kg/dose IV/PO q8 hrs PRN Max: 8 mg/dose
	Scopolamine	> 12 years: Apply 1 patch behind ear Q3 days as needed

OPIOID SIDE EFFECT MANAGEMENT

Pruritis (consider changing opioid agents)	Naloxone Infusion (PCA/EA patients)	0.25 mcg/kg/hr IV
	Hydroxyzine	PO: 0.5 mg/kg q6hr PRN Max dose: 25 mg
	Ondansetron May also be helpful	0.15 mg/kg/dose IV/PO q8 hrs PRN Max: 8 mg/dose
Constipation	Polyethylene Glycol	< 10 kg : 8.5 gm PO daily or BID > 10 kg: 17 gm PO daily or BID
	Pericolace TAB **OR**	2 - 6 yr: ½ tab PO 6 - 12 yr: 1 tab PO Over 12 yr: 2 tabs PO BID
	Docusate **AND** Senna	Elixir 2.5 mg/kg/dose PO BID (Max 400 mg/day) PO Capsule: round to nearest 50 mg cap size 1 mo - < 2y: 1.25 mL PO BID 2 y - < 6y: 2.5 mL PO BID 6y - < 12y: 5 mL PO BID 12 and up: 10 mL PO BID
	Methylnaltrexone	< 38 kg: 0.15 mg/kg SC 38 - 62 kg: 8 mg; > 62 kg: 12 mg

NON-PHARMACOLOGICAL INTERVENTIONS FOR MANAGING PROCEDURAL PAIN

Method	Developmental Stage				
	Infants	Toddler	Preschool	School Age	Adolescent
Art, Play & Music	x	x	x	x	x
Breastfeeding	x				
Choices/Control		x	x	x	x
Deep Breathing			x	x	x
Massage			x	x	x
Distraction	x	x	x	x	x
Guided Imagery				x	x
Medical Play		x	x	x	x
Pacifier	x				
Positioning	x	x	x	x	x
Post Procedural Comforting	x	x	x	x	x
Parent Involvement	x	x	x	x	x*
Preparation	Parent	x**	x	x	x
Relaxation	Parent	x**	x	x	x
Skin to Skin Contact	x				
Swaddling	x	x			
Warm Packs	x	x	x	x	x

*Involve parent with permission from the child.
**Provide information for the parent(s) and age-appropriate interventions for the child.

RECOMMENDATIONS FOR PAIN MANAGEMENT FOR COMMON PEDIATRIC PROCEDURES *Procedural Sedation - See policy H2214 for monitoring guidelines

Procedure	Vapo-cool-ant Spray	Lidocaine Jelly	LMX4	Buffered Lidocaine	Buzzy®	Sucrose ≤ 12mo	Breastfeed swaddle kangaroo	Short Acting Anxiolytic	Short Acting Opioid	Procedural Sedation may be indicated*
Abscess I&D	x		x	SC		x		x	IN/IV	x
Central/PICC line placement			x	SC		x		PO/IN	IN	x
Bone Marrow Aspirate/Biopsy			x	SC						Routine
Burn Dressing Change								PO/IN	IV/IN	x
Burn Tubbing										Routine
Circumcision (NICU) Nerve block			x	SC		x				
Close Fracture Reduction								PO/IN/IV	IV/IN	x
Chest Tube Placement	x		x	SC		x		PO/IN/IV	IV	x
Heelstick						x	x			
IM injection	x		x		x	x	x			
Implanted Port Access	x		x	NO J-tip		x		IN/PO		
Neonatal Eye Exam						x	x			
Lumbar Puncture			x	SC		x		consider	IV	x
NGT placement/Urinary Cath		X		IN		x	x	IN		
Suturing (LET in ED only)				SC			x	IN	IN	x
Skin Biopsy				SC		x	x	consider	consider	x
Venipuncture & IV starts	x		x	SC	x	x	x			
Wound Packing/Dressing Change								PO/IN/IV	IV/IN	x
Wound Vac Dressing Change								PO/IN	IV/IN	x

LMX 4
≥ 37 wks CGA
Allow 30 min to effect. 45 - 60 minutes for LP and PICC lines

Vapocoolant Spray
≥ 3yr (1 - 3yr VAT)
Caution with thin skin in toddlers. Not recommended for infants

Sucrose (24% solution)
≤ 1yr
Peak effect: 2 minutes Duration: 7 minutes

Buffered 1% Lidocaine
≥ 1.5 kg (NICU)
Jtip device not recommended for: neonates, infants, patients on bleeding precautions, or certain chemo agents.

Dose: 0.1 - 0.2 mL SC (27 or 30 gauge).
Allow 2 - 5 min. for effect.

Maximum dosing if repeated:
Neonates/Infants: 0.6 mL or 4 mg/kg
Older: 0.5 mL/kg (or 5 mg/kg), ≤ 5 mL