# 2016 Pediatric Medication Handbook

For consultations with our surgeons and specialists, call

(757) 668-9999 or 800-207-2022

For urgent referrals and transports to CHKD, call

(757) 668-8000 or 844-480-8000

Pharmacy: (757) 668-7163
Pediatric Clinical Pharmacist On-call:
(757) 456-6180
NICU Clinical Pharmacist On-call:
(757) 475-5724

Children's Hospital *of* The King's Daughters

Care has been taken to confirm the accuracy of the information in this handbook at the time of publication. However, the nature of drug information is that it is constantly changing because of ongoing research and clinical experience and is often subject to interpretation. Thus, the reader is advised that the authors, and Children's Hospital of The King's Daughters, cannot be held responsible for new information or for any errors or omissions in this handbook or from any consequences arising from them. Because of the brevity of this handbook, readers are encouraged to consult other references (eg, Lexi-Comp™) for complete drug information. Also, the reader is advised that decisions regarding drug therapy must be based on the individual patient's clinical status, the judgment of the clinician, changing information about a drug, and changing medical practice. Information in this handbook is initial dose recommendations and guidelines only.

## When referring a child, please have the following information available:

- Name, age, weight, date of birth
- Vital signs including blood pressure, heart rate, respiratory rate, temperature, and oxygen saturations
- Pertinent history and physical findings: general appearance (e.g., degree of distress), capillary refill, quality of pulses, breath sounds, and level of consciousness
- Lab and X-ray data, if available
- IV access - site and type
- Therapies administered

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## 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<br>IV, Max: 1 mg IV |
| Bicarbonate | 1 mEq/kg IV |
| Calcium | **Ca Chloride** 20 mg/kg = 0.2 mL/kg of 10% solution<br>Max:1000 mg/dose<br>**Ca Gluconate** 60 - 100 mg/kg = 0.6 - 1 mL/kg of 10% solution via slow IV push<br>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)<br>Max: 1 mg/dose (10 mL 1:10,000)<br>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)<br>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;<br>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)<br>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;<br>Adult (≥ 40 kg) initial infusion: 0.1 mcg/kg/min |
| Nitroglycerin | 0.25 - 3 mcg/kg/min;<br>Adult (≥ 40 kg) initial infusion:10 mcg/min<br>(Note that dose is not weight-based in adults).<br>Commonly used maximum dose of 200 mcg/min |
| Vasopressin | SHOCK DOSING Initial:<br>0.018 - 0.12 units/kg/hr; titrate based on BP.<br>Adult (≥ 40 kg): 0.01 - 0.04 units/min<br>(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<br>***Contraindicated in heart failure patients |
| Amiodarone | Load: 5 mg/kg IV over 25 min, may repeat x 2<br>Infusion: 3.5 - 15 mcg/kg/min (usual initial goal 5,000 mcg/kg/**day**)<br>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<br>Max: 2 mcg/kg/hr |
| Fentanyl | Initial: 1 - 2 mcg/kg/hr<br>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<br>Max: 150 mcg/kg/hr |
| Ketamine | Initial: 0.3 - 0.5 mg/kg/hr<br>Max: 2 mg/kg/hr |
| Propofol | 50 - 200 mcg/kg/min<br>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.<br>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:<br>0.25 - 0.5 mg/kg/dose IV every 6 hrs<br>Max:8 mg/dose |
| Mannitol (20% or 25%) | Herniation/emergent ICP management: 1 gm/kg/dose IV over 20 - 30 minutes<br>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**<br>Bolus: Infuse 4 - 6 mL/kg over 15 - 30 mins (delivers ~2 - 3 mEq/kg of Na)<br>Continuous infusion: 0.1 - 1 mL/kg/hour |
| THAM (Tromethamine) | 3 - 4 mL/kg/dose IV (~1 mmol/kg/dose) |
| Vasopressin | Diabetes Insipidus:<br>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<br>Initial infusion: 7 - 10 mcg/kg/min |
| Vecuronium | 0.1 - 0.2 mg/kg/dose IV; lasts 20 - 40 min<br>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.<br>May repeat load up to 2 more times if needed. |
| Diazepam (Valium®) | Oral dosing:<br>0.12 - 0.8 mg/kg/**day** PO divided every 6 hrs<br>(Long half- life with chronic dosing; may dose BID or TID)<br>IV dosing:<br>0.04 - 0.3 mg/kg/dose IV every 2 to 6 hrs<br>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<br>2 - 4 mg/kg **IM** for procedural sedation |
| Lorazepam (Ativan®) | 0.05 - 0.1 mg/kg/dose IV/PO every 6 hrs<br>Max: 6 mg/dose (PICU, ED), 2 mg/dose (Floor) |
| Midazolam (Versed®) | IV dosing:<br>0.1 mg/kg/dose IV every 1 hr PRN<br>Max: 5 mg/dose<br>Oral dosing:<br>0.25 - 0.5 mg/kg/dose PO<br>Max: 20 mg/dose<br>Intranasal dosing:<br>0.2 - 0.3 mg/kg/dose INTRANASAL<br>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.

| TOXICOLOGY/REVERSAL AGENTS | |
|---|---|
| Acetylcysteine | Acetaminophen poisoning - use in conjunction with Rumack-Matthew nomogram<br>NG dosing: 140 mg/kg loading dose followed by 70 mg/kg every 4 hrs x 17 doses<br>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)<br>Max dose: 50 gm |
| Albuterol | **Hyperkalemia:** 5 mg nebulized |
| Flumazenil | **Benzodiazepine reversal** (contraindicated in patients with history of seizures)<br>0.01 mg/kg/dose IV; lasts less < 1 hr<br>Max: 0.2 mg/dose, may repeat every 1 min, up to 1 mg PRN |
| Glucagon | **Hypoglycemia secondary to insulin excess**<br>0.02 mg/kg IV/IM/Subq<br>Max: 1 mg; may repeat every 20 min<br>**Beta-blocker overdose**<br>Child: 0.025 - 0.05 mg/kg IV bolus followed by 0.07 mg/kg/hr infusion<br>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:**<br>0.001 - 0.01 mg/kg/dose IV (1 - 10 mcg/kg/dose), may repeat every 2 - 3 min PRN<br>Max: 0.4 mg/dose<br>Titration of small (1 - 2 mcg/kg) doses limits risk of acute pain/stress<br>**Rapid, full reversal of narcotic overdose:**<br>0.1 mg/kg/dose IV, may repeat every 2 - 3 min PRN<br>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 |

# CHKD Pediatric Medications and Dosing Guidelines

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

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

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

## ANTIMICROBIALS

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

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

## CYSTIC FIBROSIS

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

| | |
|---|---|
| Levofloxacin (Levaquin®) | > 5 years: 10 mg/kg/dose IV/PO every 24 hours<br>Max: 750 mg dose |
| Meropenem (Merrem®) | 40 mg/kg/dose IV every 8 hours<br>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<br>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<br>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<br>Max: 2000 mg/dose |
| Methylprednisolone (Solumedrol®) | Load with 2 mg/kg IV, then give 0.5 - 1 mg/kg/dose IV every 6 hrs<br>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<br>Little Noses® Decongestant: Instill 2 - 3 drops in each nostril every 4 hours as needed for ≤ 3 days<br>6 - 12 years: 0.25% solution: Instill 2 - 3 sprays in each nostril every 4 hours as needed for ≤ 3 days<br>> 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<br>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<br>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<br>Infants & Children: Initial Dose: 0.1 mg/kg - monitor for hypotension; then 0.2 - 0.5 mg/kg/dose PO every 6 - 12 hrs<br>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.**<br>Maintenance: 5 - 10 mcg/kg/**day** PO/IV divided BID |
| Enalapril (Vasotec®) | Initial: 0.1 mg/kg/**day** PO divided every 12 - 24 hrs;<br>Max 0.5 mg/kg/**day** up to 40 mg/**day**<br>Adult: 10 - 40 mg/**day** PO daily or divided BID |
| Enalaprilat | Initial: 5 - 10 mcg/kg/dose IV every 6 - 24 hrs<br>Adult dose: 0.625 - 1.25 mg IV every 6 hrs |
| Enoxaparin (Lovenox®) | Initial therapeutic dosing:<br>< 2 months: 1.5 mg/kg/dose subq every 12 hrs<br>> 2 months: 1 mg/kg/dose subq every 12 hrs<br>Initial prophylactic dosing:<br>< 2 months: 0.75 mg/kg/dose subq every 12 hrs<br>> 2 months: 0.5 mg/kg/dose subq every 12 hrs<br>**See enoxaparin order set for monitoring and dose adjustment.** |
| Hydralazine | 0.1 - 0.2 mg/kg/dose every 1 - 2 hrs IV<br>PRN hypertensive urgency<br>(Renal consult required in non-ICU patients)<br>Max: 20 mg/dose IV |
| Labetalol | 0.2 mg/kg/dose IV every 1 - 2 hrs PRN hypertensive urgency<br>Max: 20 mg/dose IV |

| | |
|---|---|
| Propranolol | PO: 0.5 - 1 mg/kg/**day** divided every 6 - 12 hrs<br>Max: 8 mg/kg/**day**<br>IV: 0.01 - 0.1 mg/kg/dose every 6 - 12 hrs<br>Max: Infants - 1 mg/dose<br>Children - 3 mg/dose |
| Sildenafil (Revatio®) | Initial dosing:<br>< 20 kg: 0.25 mg/kg/dose PO every 8 hrs<br>Maximum: 10 mg/dose<br>> 20 kg: 10 mg PO every 8 hrs<br>Maximum: 20 mg/dose<br>**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<br>(0.025 mg/kg equivalent to 1 mg/kg Lasix)<br>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<br>Max dose: 500 mg |
| Furosemide (Lasix®) | 1 mg/kg/dose IV/PO every 6 - 24 hrs<br>(PO bioavailability ~60% of IV)<br>Initial Adult dose: 20 mg<br>Continuous infusion: 0.05 - 0.4 mg/kg/hr titrated to effect |
| Hydrochlorothiazide | Edema:<br>< 6 months: 1 - 3 mg/kg/**day** in 1 - 2 divided doses<br>Max dose: 37.5 mg daily<br>6 mos - 2 years: 1 - 2 mg/kg/**day** in 1 - 2 divided doses<br>Max dose: 37.5 mg daily<br>2 - 12 years: 1 - 2 mg/kg/**day** in 1 - 2 divided doses<br>Max dose: 100 mg/**day**<br>> 12 years: 1 - 2 mg/kg/**day** in 1 - 2 divided doses<br>Max dose: 200 mg/**day**<br>Adult: 25 - 100 mg/**day** in 1 - 2 divided doses<br>Hypertension:<br>Children: 1 mg/kg/**day** initially, increase up to 3 mg/kg/**day**, with a maximum of 50 mg/**day**<br>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<br>Children/Adolescents:<br>Initial: 1 mg/kg/**day** in 1 - 2 divided doses<br>May titrate up to max dose 3 mg/kg/day (or 100 mg)<br>Adults: 25 - 100 mg/**day** in 1 - 2 divided doses<br>(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<br>Adults (> 40 kg): 5 - 10 mg PO every 24 hrs |
| Spironolactone (Aldactone®) | 1 - 3 mg/kg/**day** PO divided every 12 hrs<br>Max: 100 mg/**day** |

## ELECTROLYTE REPLACEMENTS - IV

| | |
|---|---|
| Calcium Chloride | 10 - 20 mg/kg/dose IV over 30 - 60 min<br>Max: 2000 mg/dose given via central IV<br>(1 gram calcium chloride = 13.6 mEq calcium) |
| Calcium Gluconate | 60 - 100 mg/kg/dose IV over 30 - 60 min<br>Max: 4000 mg/dose - may be given via peripheral IV<br>(1 gram calcium gluconate = 4.65 mEq calcium) |
| Magnesium Sulfate | 25 - 50 mg/kg/dose IV over 2 hours<br>Max: 2000 mg/dose<br>(1 gram magnesium sulfate = 8.12 mEq magnesium) |
| Potassium Chloride / Potassium Acetate | **Restricted to PICU, NICU, ED**<br>0.5 - 1 mEq/kg/dose IV (infused at a rate of 0.5 mEq/kg/hr)<br>Max: 20 mEq/dose<br>Potassium usually given as chloride salt but can use acetate salt depending on goal.<br>(75 mg KCl = 1 mEq $K^+$) |
| Potassium Phosphate | 0.2 - 0.5 mmol/kg/dose IV over 4 - 8 hours<br>Max: 15 mmol/dose<br>(1 mmol KPhos = 1.47 mEq $K^+$) |
| Sodium Phosphate | 0.1 - 0.5 mmol/kg/dose IV over 4 - 8 hours<br>Max: 15 mmol/dose<br>(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)<br>*(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<br>KCL **ER** tabs: 8, 10, 15, 20 mEq<br>KCL **ER** caps: 8 mEq,10 mEq<br>KCL powder (per packet): 20 mEq, 25 mEq |
| Calcium (Ca) | 0.5 | 1 mEq = 20 mg (elemental Ca)<br><br>100 mg Ca Carbonate = 40 mg elemental Ca = 2 mEq | 25 - 35%<br>(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<br>Calcium Carbonate Softchew(Rolaids®): 1177 mg [471 mg]<br>Calcium Carbonate tab: 364 mg, 1250 mg **[25 mEq]**, 1500 mg<br>Calcium Carbonate susp: 250 mg/mL [100 mg/mL; **5 mEq/mL**]<br>Calcium glubionate syrup: 360 mg/mL [23 mg/mL; **1.15 mEq/mL**]<br>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<br>Mg Oxide caps: 140 mg, 600 mg<br>Mg Gluconate tabs: 500 mg **[2.4 mEq]**<br>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<br>KPhos Neutral or Phospha 250 Neutral tabs: **250 mg phos [8 mmol]** & 13 mEq Na & 1.1 mEq K per tab<br>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]**<br>*(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<br>> 12 years: 5 - 15 mg as a single dose<br>**PR:** < 2 years: 5 mg as a single dose<br>> 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<br>≥ 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<br>Children: 10 mg/dose PO TID - QID<br>Adults: 20 mg QID, max dose: 40 mg QID |
| Docusate (Colace®) | 5 mg/kg/**day** PO divided every 12 - 24 hrs<br>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<br>10 - 20 kg: 10 mg/**day**, may increase dosing to twice a day up to 10 mg/dose<br>> 20 kg: 1 - 2 mg/kg/**day** IV/PO<br>Max: 80 mg/**day** divided BID<br>Continuous infusion: 0.1 mg/kg/hr |
| Famotidine (Pepcid®) | Pediatrics: 0.5 mg/kg/dose IV every 12 hrs<br>Adult dose: 20 mg/dose every 12 hours<br>**Use Ranitidine as oral agent at CHKD** |
| Gastrografin/Normal Saline/Mineral oil (PoleyBomb) | 15 mL/kg rectally, Max: 1000 mL<br>Must order as follows:<br>Gastrografin/NS/Mineral oil 1:1:1 # of mL |
| Hyoscyamine (Levsin®) | ≤ 2 years: See Lexicomp for dosing table<br>2 - 12 years: 0.0625 - 0.125 PO/SL every 4 hrs PRN<br>Max dose: 0.75 mg/**day**<br>> 12 years: 0.125 - 0.25 mg every 4 hrs PRN<br>Max dose: 1.5 mg/**day** |
| Lactulose | For constipation, 1 - 3 mL/kg/**day** divided every 8 - 12 hrs<br>Max dose: 60 mL/day |
| Magic Mouthwash | Infants > 6 mos: Benadryl/Maalox 1:1 (no lidocaine)<br>1 - 2 mL to each affected area of mouth every 6 hrs PRN<br>Children: Benadryl/Maalox/Viscous Lidocaine 1:1:1<br>3 - 5 mL swish and spit or swallow every 6 hrs PRN |
| Magnesium citrate | < 6 years: 2 - 4 mL/kg PO q6h until stooling<br>6 - 12 years: 100 - 150 mL PO q6h until stooling<br>> 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<br>Max: 1,200 mg/**day**<br>6 to < 12 years: 15 - 30 mL/**day** in single or divided doses<br>Max: 2,400 mg/day<br>≥ 12 years: 30 - 60 mL/**day**) in single or divided doses<br>Max: 4,800 mg/**day** |
| Metoclopramide (Reglan®) | 0.1 mg/kg/dose IV/PO every 6 hrs<br>Max: 10 mg/dose |
| Omeprazole (Prilosec®) | **Restricted to children < 10 kg at CHKD**<br>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<br>Max: 4 mg/dose |
| Pantoprazole (Protonix®) | Same dosing as esomeprazole<br>**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<br>(Do not exceed 6.25 mg/dose IV if given peripherally) |
| Ranitidine (Zantac®) | 4 - 10 mg/kg/day PO divided every 8 - 12 hrs<br>Adult dose: 150 mg BID<br>**Use famotidine as IV agent at CHKD** |
| Rifaximin (Xifaxan®) | Small intestine bacterial overgrowth<br>(> 3 years and adolescents): 200 mg three times daily<br>Inflammatory bowel disease (> 8 years and adolescents):<br>10 - 30 mg/kg/**day** divided three times daily<br>Maximum daily dose: 1200 mg/**day** |
| Senna | < 2 years: 1.25 mL PO BID<br>2 - 6 years: 2.5 mL PO BID<br>6 - 12 years: 5 mL PO BID<br>> 12 years: 10 mL PO BID |
| Senna+Docusate (Peri-Colace®) | 2 to < 6 yrs: 0.5 tablet PO daily at bedtime<br>Max dose: 1 tablet twice daily<br>6 to < 12 yrs: 1 tablet daily at bedtime<br>Max dose: 2 tablets twice daily<br>12 yrs: 2 tablets daily at bedtime<br>Max dose: 4 tablets twice daily |
| Sodium Phosphate-Sodium Bisphosphonate (Fleet® Enema) | Children 2 - 4 years: 33 mL PR once<br>Children 5 - 11 years: 66 mL PR once<br>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<br>Adult dose: 300 mg PO BID |

## INSULIN

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

**Insulin Comparison Chart**

| Formulation | Onset | Peak | Duration | When to Inject |
|---|---|---|---|---|
| **Rapid-acting Insulins** | | | | |
| **Humalog**<br>insulin lispro | 15 - 30 min | 30 min-2.5 hrs | 3 - 6.5 hrs | Within 15 min AC or immediately PC |
| **NovoLog**<br>insulin aspart | 10 - 20 min | 40 - 50 min | 3 - 5 hrs | 5 - 10 minutes AC |
| **Apidra**<br>insulin glulisine | 25 min | 45 - 48 min | 3 - 5.3 hrs | Within 15 min AC or 20 min PC |
| **Short-acting Insulins** | | | | |
| **Humulin R**<br>regular human insulin | 30 - 60 min | 1 - 5 hrs | 6 - 10 hrs | Within 30 min AC |
| **Novolin R**<br>regular human insulin | 30 min | 2 - 4 hrs | 4 - 8 hrs | Within 30 min AC |
| **Intermediate-acting Insulins** | | | | |
| **Humulin N**<br>NPH human insulin | 1 - 2 hrs | 6 - 14 hrs | 4 - 12 hrs | *Timing may vary* |
| **Novolin N**<br>NPH human insulin | 90 min | Up to 24 hrs | Up to 24 hrs | *Timing may vary* |
| **Long-acting Insulins** | | | | |
| **Lantus**<br>insulin glargine | 1 - 2 hrs | n/a | 10.8 to > 24 hrs | Once daily (same time each day) |
| **Levemir**<br>insulin detemir | 1 - 2 hrs | n/a | 7.6 to > 24 hrs | Once or twice daily |
| **Mixed Insulins** | | | | |
| **Humalog 75/25**<br>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**<br>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**<br>70% insulin aspart protamine, 30% insulin aspart | 10 - 20 min | 1 - 4 hrs | Up to 24 hrs | Within 15 min AC |
| **Humulin 70/30**<br>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**<br>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**<br>Initial dose: 0.5 mg in 100 mL NS IV over 1 hr<br>If 1st dose well tolerated, 2nd dose (8 hrs later): 0.75 mg in 250 mL NS IV over 1 hr<br>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<br>≥ 40 kg: 10 mg PO once<br>May repeat in 2 hrs, max dose= 30 mg/**day** |
| Sumatriptan (Imitrex®) | **Caution use in children ≤ 6 years**<br>**PO:** 25 - 100 mg PO once, may repeat in 2 hours<br>Max dose = 200 mg/**day**<br>**SubQ:** 3 - 6 mg subq once, may repeat ≥ 1 hr after 1st dose<br>Max dose = 12 mg/**day** |
| Valproic Acid | 20 mg/kg/dose IV once, may schedule q8h<br>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)<br>Usual initial adult dose: 81 mg/dose PO every 24 hours |
| Belladonna & Opium Suppository | < 1 year: not recommended<br>1 - 7 years: 1/2 of a suppository BID-QID<br>≥ 8 years: 1 suppository BID-QID |
| Bromocriptine | Autonomic dysfunction initial dosing: 0.025 mg/kg/dose PO every 12 hours<br>Usual initial adult dose: 2.5 mg/dose PO every 12 hours |
| Glucagon | Hypoglycemia:<br>< 25 kg: 0.5 mg IM<br>≥ 25 kg: 1 mg IM |
| Glycopyrrolate (Robinul®) | IV dosing: 4 - 10 mcg/kg/dose IV q6h<br>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:<br>< 6 years: 12.5 mg PO four times daily<br>> 6 years: 12.5 - 25 mg PO four times daily<br>Pruritus associated with opioid use:<br>0.5 - 1 mg/kg/dose PO/IM* every 4 - 6 hrs PRN<br>Max: 50 mg/dose<br>*Has been administered slow IV push* |
| Iron supplementation | 3 - 6 mg/kg/day PO **elemental** iron divided every 8 - 24 hrs<br>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<br>> 20 kg: 0.5 mg PO once daily<br>Usual max: 2 - 3 mg/**day** based on indication<br>Delirium<br>Initial dose (< 5 years): 0.1 - 0.2 mg PO once daily<br>Initial dose (> 5 years, 15 - 20 kg): 0.25 mg PO once daily<br>> 20 kg: 0.5 mg PO once daily<br>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:<br>0.6 mg/kg/dose IV/PO x1 dose<br>Extubation:<br>0.25 - 0.5 mg/kg/dose IV every 6 hrs (not to exceed 24 hours unless per attending)<br>Max: 8 mg/dose<br>Airway edema:<br>0.25 - 0.5 mg/kg/dose IV every 6 hours<br>Max: 8 mg/dose<br>Neurosurgical initial dose:<br>0.25 - 0.5 mg/kg/dose IV every 6 hours<br>Max: 8 mg/dose |
| Hydrocortisone (Solu-Cortef®) | Stress dosing: 1 mg/kg/dose IV every 6 hrs<br>(May also use 2 - 4 times home dose )<br>Adult stress dose: 100 mg every 8 hrs |
| Methylprednisolone (Solumedrol®) | Standard dosing:<br>2 mg/kg/day IV divided every 6 - 12 hrs<br>Max: 60 mg/dose<br>Spinal cord injury:<br>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<br>Max: 60 mg/day |

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

| | |
|---|---|
| Cryoprecipitate<br>1 unit = 15 mL | Usual dose: 0.2 units/kg, maximum: 10 units<br>Calculated dose = (desired increase in fibrinogen level (mg/dL) X patient's plasma volume)/250 mg/unit for fibrinogen |
| FFP<br>1 PediFFP unit = 50 mL | 10 mL/kg (do not infuse rapidly - may decrease ionized calcium level) |
| PRBCs<br>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<br>< 10 kg one-half pheresis unit<br>> 10 kg one pheresis unit<br>One pheresis unit = 6 - 10 single donor units | Patients less than 2 yo: 10 mL/kg body weight<br>Patients greater than 2 yo: 1 unit/ 10 kg body weight<br>(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

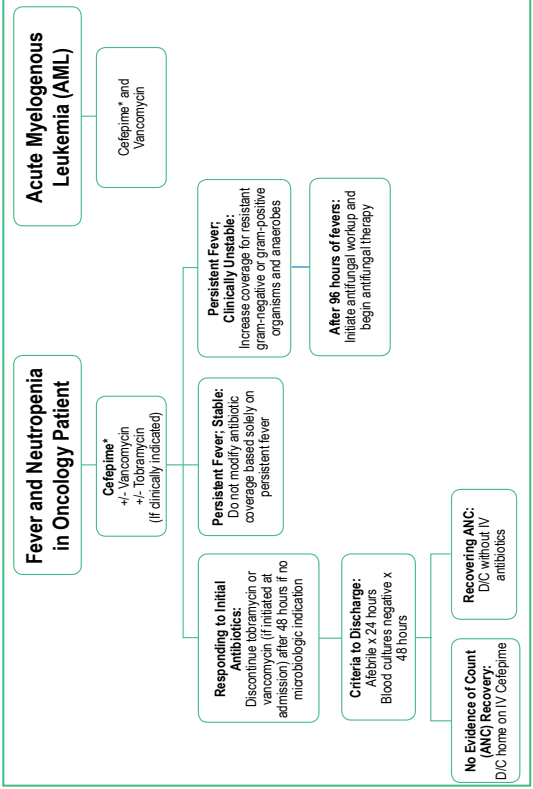
| ANTI-INFECTIVES | |
|---|---|
| Acyclovir | 250 mg/m$^2$/dose IV q8h<br>(HSV in immunocompromised host)<br>500 mg/m$^2$/dose IV q8h<br>(VZV in immunocompromised host)<br>250 mg/m$^2$/dose IV q12h for prophylaxis post-BMT |
| Liposomal Amphotericin B (Ambisome®) | 3 mg/kg/dose IV q24h (empiric therapy)<br>5 mg/kg/dose IV q24h (documented infection)<br>round to nearest 50 mg vial size |
| Azithromycin (Zithromax®) | PO route preferred:<br>10 mg/kg/dose PO/IV x1 on day 1 then<br>5 mg/kg/dose PO/IV daily on days 2 - 5<br>(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<br>Infections -->Refer to page 10 |
| Cefdinir (Omnicef®) | 14 mg/kg/dose PO daily or 7 mg/kg/dose PO q12h<br>(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<br>(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<br>IV: 10 mg/kgdose (Max 400 mg/dose) Q8h |
| Clindamycin (Cleocin®) | 10 mg/kg/dose IV q8h (adult dose: 600 mg/dose)<br>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;<br>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;<br>> 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)<br>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.<br>Max 100 mg/day (Candida) Max 150 mg/day (*Aspergillus*)<br>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;<br>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<br>< 5 years: 8 mg/kg via HHN q 30 days<br>> 5 years: 300 mg via HHN q 30 days<br>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)<br>**MED Service to follow and order levels.** |
| Vancomycin | 15 mg/kg/dose IV q6h (Max 2000 mg/dose)<br>**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:** 38.0º- 38.2º x 2 in a 24 hour period OR 38.3º 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<br>> 12yo: 150 - 300 mL PO q6h until stooling |
| Methylnaltrexone (Relistor®) | < 38 kg: 0.15 mg/kg<br>38 - 62 kg: 8 mg<br>> 62 kg: 12 mg<br>May administer every other day. Do not administer more than once every 24 hours. |
| Omeprazole (Prilosec®) | Restricted to kids < 10 kg at CHKD:<br>0.5 - 1 mg/kg/dose PO daily or BID |
| Pantoprazole (Protonix®) | < 10 kg: 0.5 - 1 mg/kg/dose IV daily or BID;<br>10 - 20 kg: 10 mg PO/IV daily or BID;<br>> 20 - 30 kg: 20 mg PO/IV daily or BID;<br>≥ 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;<br>> 12yo: 2 tabs PO BID |
| Senna | < 2yo: 1.25 mL PO BID; 2 - 6yo: 2.5 mL BID;<br>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<br>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

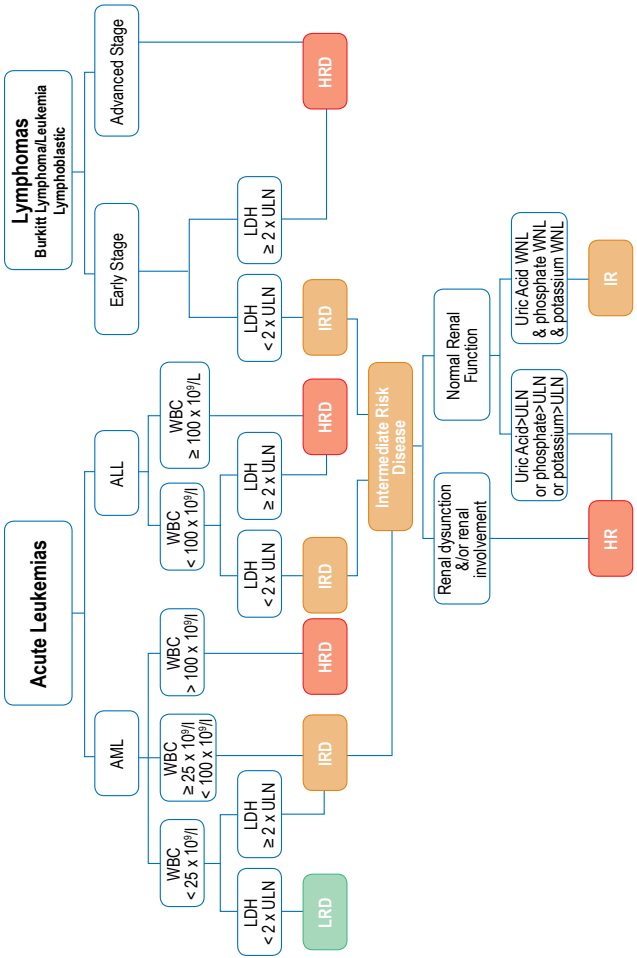
### Equianalgesic Dosing Chart

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

## MISCELLANEOUS

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




## 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

## 1 Request Behavioral Protocol

**MEDIATE before you MEDICATE!**

**Utilize behavioral & environmental interventions first**

*Persistent Agitation* — *+ Extreme Physical Aggression*

## 2 Antihistamine

**Diphenhydramine** (Benadryl)

| | | | |
|---|---|---|---|
| Dose | **1 mg/kg/dose** | | |
| Route | PO | IM | IV |
| Repeat | q30 min | | q30 min |
| | x2 | | |
| Max | **50 mg/dose** | | |
| Caution | Avoid Antihistamine if Delirium Suspected | | |

*Persistent Agitation*

## 3 Benzodiazepine

**Lorazepam** (Ativan)

| | | | |
|---|---|---|---|
| Dose | **0.05 to 0.1 mg/kg/dose** | | |
| Route | PO | IM | IV* |
| Repeat | q30 min | q15 min | q5 min |
| | x 2 | | |
| Max | **2 mg/dose** | | |
| Caution | If **> 0.3 mg/kg in 1 hour** or If **> 6 mg in 1 hour**<br>**Use Monitored Bed**<br>*IV Route Associated with Respiratory Depression | | |

*Persistent Agitation*

## 4 Neuroleptic

**(Choose One)**

| | **Haloperidol** (Haldol) | | | **OR** | **Olanzapine** (Zyprexa) | |
|---|---|---|---|---|---|---|
| Dose | **0.025 to 0.075 mg/kg/dose** | | | | For <12 y/o: **2.5 to 5 mg/dose**<br>For >12 y/o: **10 mg/dose** | |
| Route | PO | IM | IV* | | PO (ODT Available) | IM |
| Repeat | q30 min x 2 | q15 min x 2 | q5 min x 2 | | q30 min x 2 | q15 min x 2 |
| Max | **5 mg/dose** | | | | **10 mg/dose** | |
| Caution | If **>0.2 mg/kg in 1 hour** or If **>10 mg in 1 hour** **Use Monitored Bed**<br>* IV Route Increases Risk of QT Prolongation<br>IV Route May Only Be Used in ED and PICU | | | | If **<12 y/o & Total Doses >5 mg** or If **>12 y/o & Total Doses >10 mg** **Use Monitored Bed** | |

*Persistent Agitation and Aggression*

## 5 Combination of

| | **Lorazepam** (Ativan) | **AND** | **Haloperidol** (Haldol) |
|---|---|---|---|
| Dose | **0.05 mg/kg/dose** | | **0.05 mg/kg/dose** |
| Route | **IM** (Can Administer Lorazepam & Haloperidol in Same Syringe) | | |
| Max | **2 mg/dose** | | **5 mg/dose** |

# 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<br>> 28 | 12<br>8 |
| 30 to 36 | 0 to 14<br>> 14 | 12<br>8 |
| 37 to 44 | 0 to 7<br>> 7 | 12<br>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<br>> 14 | 48<br>24 |
| ≥ 30 | 0 to 7<br>> 7 | 48<br>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<br>8 to 28<br>> 28 | 5<br>4<br>4 | 48<br>36<br>24 |
| 30 to 34 | 0 to 7<br>> 7 | 4.5<br>4 | 36<br>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 hrs

**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<br>> 28 | 48<br>24 |
| 30 to 36 | 0 to 14<br>> 14 | 24<br>12 |
| 37 to 44 | 0 to 7<br>> 7 | 24<br>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<br>> 28 | 12<br>8 |
| 30 to 36 | 0 to 14<br>> 14 | 12<br>8 |
| 37 to 44 | 0 to 7<br>> 7 | 12<br>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<br>> 28 | 12<br>8 |
| 30 to 36 | 0 to 14<br>> 14 | 12<br>8 |
| 37 to 44 | 0 to 7<br>> 7 | 12<br>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<br>> 28 | 12<br>8 |
| 30 to 36 | 0 to 14<br>> 14 | 12<br>8 |
| 37 to 44 | 0 to 7<br>> 7 | 12<br>8 |
| > 44 | ALL | 8 |

**Vancomycin IV**

15 mg/kg/dose

| Dosing Interval Chart | | |
|---|---|---|
| **PMA (weeks)** | **Postnatal (days)** | **Interval (hours)** |
| ≤ 29 | 0 to 14<br>> 14 | 18<br>12 |
| 30 to 36 | 0 to 14<br>> 14 | 12<br>8 |
| 37 to 44 | 0 to 7<br>> 7 | 12<br>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<br>Increase to 2.3 mg/kg/dose IV every 12 hrs after 4 weeks postnatal age | 2 mg/kg/dose PO BID<br>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<br>Increase to 2.3 mg/kg/dose IV every 12 hrs at 15 days postnatal age | 2 mg/kg/dose PO BID<br>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<br>Maintenance: 4 - 8 mg PE/kg/dose IV every 24 hrs<br>(Fosphenytoin 1 mg PE = Phenytoin 1 mg) |
| Levetiracetam (Keppra®) IV, PO | Load: 30 - 50 mg/kg/dose IV X 1<br>Maintenance: 15 mg/kg/dose IV/PO every 12 hrs<br>Max dose: 25 mg/kg/dose IV/PO every 12 hrs<br>Dosing per Neurology |
| Phenobarbital IV, PO | Load: 20 mg/kg/dose IV x 1 over at least 20 mins<br>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<br>Maintenance: 4 - 8 mg/kg/dose IV/PO every 24 hrs |

## CARDIAC

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

**PDA Closure**

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

## GASTROINTESTINAL

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

| | |
|---|---|
| Hyaluronidase<br>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<br>(Regular Only) | **Standard Drip Concentration**<br>Continuous IV Infusion<br>0.01 to 0.1 units/kg/hr; titrate to blood glucose goal |
| Levothyroxine<br>(Synthroid®)<br>IV, PO | IV: 7 - 12 mcg/kg daily<br>PO: 10 - 15 mcg/kg daily<br>(IV= 75% of oral dose) |
| Poly-Vi-Sol with Iron<br>PO only | 0.5 - 1 mL PO daily<br>Dosing based on type of fortification, age, and weight |
| Potassium Chloride<br>(Chloride Supplementation)<br>PO | 1 mEq/kg/dose; frequency dependent upon level of deficiency, start @ every 12hrs |
| Sodium Chloride<br>Supplementation<br>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®<br>(Spironolactone/<br>HCTZ)<br>PO only | 1 mg/kg/dose (each component) BID;<br>may increase to 1.5 - 2 mg/kg/dose BID for chronic patients |
| Budesonide<br>(Pulmicort®) | 0.25 mg nebulized Daily to BID.<br>May increase to 0.5 mg BID in older, chronic patients.<br>Max dose: 1 mg per day |
| Bumetanide<br>(Bumex®) | 0.1 mg/kg/dose IV/PO Daily to q8hr |
| Caffeine Citrate<br>(Cafcit®)<br>IV or PO | IV: Infuse Load over 30mins, daily IV dose over 10 mins<br>**Load:** 40 mg/kg x 1<br>**Initial Maintenance dose:** 8 mg/kg every morning<br>*(may see up to 10 mg/kg/day maintenance dose based on caffeine level or clinical symptoms)*<br>IV dosing = PO dosing |
| Curosurf®<br>(Portactant)<br>ETT only | **Load:** 2.5 mL/kg x 1 dose<br>**Subsequent doses:** 1.25 mL/kg/dose every 12hrs - up to 2 additional doses.<br>Max. total dose 5 mL/kg. |
| Dexamethasone<br>(Decadron®)<br>IV, PO | Days 1 - 3: 0.25 mg/kg/dose every 12hrs; THEN WEAN<br>Days 4 - 6: 0.15 mg/kg/dose every 12hrs<br>IV dosing = PO dosing<br>*(Not recommended to be used in the first 2 weeks of life due to increased risk of neurodevelopment issues)* |
| Furosemide<br>(Lasix)<br>IV, PO | 1 mg/kg/dose IV or 2 mg/kg/dose PO;<br>Frequency from daily - every 12hrs, (Max every 6hrs)<br>***If Cardiac or Pulmonary Hypertension patient: consider 1 mg/kg/dose (PO) and use more frequent interval based on need.*** |
| Atrovent®<br>(Ipratropium) | 0.25 mg nebulized every 8hrs |
| Oxymetazoline<br>(Afrin®) | Instill 1 drop into each nostril twice daily for ≤ 3 days<br>(Dosing typically guided by ENT) |
| Phenylephrine<br>(Little Noses®)<br>0.125% solution | Instill 1 drop in each nostril every 8 - 12 hours as needed for ≤ 3 days |
| Racemic<br>Epinephrine | 0.13 mL of 2.25% solution QS up to 3 mL with NS;<br>give via nebulizer |
| Sodium<br>Bicarbonate<br>IV only | Calculation:<br>$HCO_3$ (mEq) = 0.3 x weight (kg) x base deficit<br>OR<br>2 mEq/kg/dose. Mix 1:1 w/sterile H20.<br>Infuse over 30 mins<br>To be ordered only after Attending Approval<br>**Sodium Bicarbonate Continuous Infusion (standard concentration of 1 mEq/mL):**<br>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:***<br>10 mg/kg/dose IV every 6 hours standing x 48hrs<br>***CPOE order under Post-op Pain Powerorder |
| Clonidine PO only | 5 - 15 mcg/kg/day divided BID - TID<br>**Caution with order entry b/c it is entered as milligrams** | |
| Dexmedetomidine (Precedex®) IV only | **Standard Drip Concentration**<br>Continuous IV infusion: 0.1 mcg/kg/hr: titrate to effect<br>Max: 2 mcg/kg/hr | |
| Diazepam (Valium®) IV, PO | **Consult your NICU Pharmacist on dosing for agitation/sedation.**<br>*reserved for older/TERM infants due to decreased metabolism*<br>**For Tone:** 0.1 mg/kg/dose IV/PO every 8hrs<br>IV dosing = PO dosing | |
| Fentanyl IV only | **Standard Drip Concentration**<br>Continuous IV infusion: 1 to 5 mcg/kg/hr: titrate to effect<br>IV bolus: 1 - 2 mcg/kg/dose IV every 2 - 4hrs PRN<br>**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<br>IV dosing = PO dosing | |
| Methadone IV, PO | (equal analgesia to Morphine but > sedating)<br>0.05 - 0.1 mg/kg/dose every 6 - 12 hrs, titrate to effect<br>**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.<br>IV dosing = PO dosing | |
| Midazolam (Versed®) IV | **Standard Drip Concentration**<br>Continuous IV infusion: 0.05 - 0.2 mg/kg/hr: titrate to effect<br>IV intermittent bolus: 0.05 - 0.15 mg/kg/dose IV every 2 - 4hrs PRN | |
| Morphine IV, PO | **Standard Drip Concentration**<br>Continuous IV infusion: 10 - 20 mcg/kg/hr: titrate to effect<br>IV bolus: 0.05 - 0.2 mg/kg/dose IV every 4 - 6hrs PRN<br>PO: 0.1 - 0.2 mg/kg/dose PO every 4 - 6hrs PRN | |
| Vecuronium IV only | **Standard Drip Concentration**<br>Continuous IV infusion: 0.05 to 0.2 mg/kg/hr<br>IV intermittent bolus: 0.1 mg/kg/dose IV every 1hr PRN movement<br>***For multiple doses per day or if on a drip, also order Lacri-lube OU PRN***<br>*prolonged duration with poor renal function*<br>*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<br>Hepatitis B Immune Globulin (HBIG): 0.5 mL IM x 1<br>*Term and preterm: If HbsAg-positive mother: Give Hep B vaccine and HBIG within 12 hrs of birth.<br>*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.<br>*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**<br>Hepatitis B<br>*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<br>* 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**<br>Pediarix® 0.5 mL IM<br>(Inactivated Polio, dTaP & Hep B)<br>Prevnar 13 0.5 mL IM<br>Haemophilus B 0.5 mL IM<br>**OR**<br>Pentacel® 0.5 mL IM<br>(Inactivated Polio, dTaP & HIB)<br>Prevnar 13 0.5 mL IM<br>Hepatitis B 0.5 mL IM |
| | **Additional 6 month vaccine during flu season**<br>Influenza virus vaccine 0.25 mL IM<br>*Two doses are required 4 weeks apart for first influenza vaccine |
| | **12 month vaccines**<br>Haemophilus B 0.5 mL IM<br>Prevnar 13 0.5 mL IM<br>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<br>**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<br>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<br>TPN: 0.5 unit/mL Heparin per protocol | Heparin 10 units/mL, flush q8hr and prn |
| **PIV** | Clear fluids: No heparin added<br>TPN: 1 unit/mL Heparin per protocol | Saline lock and Flush q8h and prn |
| **PICC (NICU placed)** | Clear fluids: 1 unit/mL Heparin<br>TPN: 1 unit/mL Heparin per protocol | NICU placed PICCs cannot be HEP Locked. Must have a continuous fluid infusing.<br>Minimum KVO rate (in general) is 1 mL/hr per port. |
| **PICC (VAT placed)** | Clear fluids: 1 unit/mL Heparin<br>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**

| 0 | 2 | 4 | 6 | 8 | 10 |
|---|---|---|---|---|---|
| No Hurt | Hurts Little Bit | Hurts Little More | Hurts Even More | Hurts Whole Lot | Hurts Worst |

**(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)<br>PO: 15 mg/kg q4hr<br>PR: 20 mg/kg q4hr<br>Do not exceed 4gm/day in adults<br>or 5 doses daily in children |
| Ibuprofen | 10 mg/kg PO q6 - 8hr |
| Ketorolac | 0.5 mg/kg IV q6hr (Max 5 days)<br>30 mg maximum dose. IV only.<br>*not for use in pts < 2 mo. of age* |
| Oxycodone | 0.05 - 0.15 mg/kg/dose PO Q4 - 6hr<br>Adult dose(> 50 kg): 5 mg PO q4 - 6hr<br>Available as: 5 mg/5 mL elixir OR<br>5 mg immediate release capsule<br>10 mg **extended release** tablet |
| Oxycodone / Acetaminophen (5 mg/325 mg tab) | Same as oxycodone. Max: 10 mg/dose; 12 tabs/day.<br>***caution with daily max dose of acetaminophen*** |
| Tramadol | 1 - 2 mg/kg/dose PO q4 - 6hr.<br>Adolescents & Adults: 50 - 100 mg<br>q4 - 6hr.(Max dose 400 mg)<br>***Check for drug interactions*** |
| Hydrocodone / Acetaminophen<br>Hycet®: 2.5 mg /108 mg per 5 mL;<br>Norco®: 5, 7.5 or 10 mg/325 mg tablets) | Dosed on hydrocodone component: 0.1 - 0.2 mg/kg po Q4h<br>Equivalent to 0.2 - 0.4 mL/kg<br>Adult dosing: 5 - 10 mg/dose (10 - 20 mL)<br>Max: 10 mg/dose (20 mL/dose)<br>***caution with daily max dose of acetaminophen*** |
| Morphine | 0.05 - 0.1 mg/kg IV q2 - 4 hrs<br>**Immediate Release** (IR): 0.2 - 0.5 mg/kg<br>PO q4 - 6hr. Available as:<br>10 mg/5 mL solution<br>IR: 15, 30 mg tab<br>**Extended Release** (ER):<br>15, 30, or 60 mg tab |
| Fentanyl | 1 - 2 mcg/kg/dose IV q1hr<br>**Fentanyl TD patches**<br>Availability:12, 25, 50,100 mcg<br>See Clinical Pharmacist for recs. |
| Hydromorphone | IV: 0.015 mg/kg q4hr<br>PO: 0.03 - 0.08 mg/kg q4hr<br>**Adult doses:**<br>IV: 0.2 - 0.6 mg q4hr<br>PO: 1 - 2 mg q4hr<br>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<br>Titrate up to 0.5 - 2 mg/kg as needed over 2 - 3 weeks.<br>Max dose: 50 mg /dose |
| | Gabapentin | Children:<br>Initial:5 mg/kg PO @HS<br>Day2: 5 mg/kg/dose PO BID<br>Day 3: 5 mg/kg/dose PO TID<br>Maintenance range:<br>8 - 35 mg/kg/day divided in 3 PO doses<br>Adults: 100 mg PO TID initial<br>Max daily dose 3600 mg |
| **Muscle Spasm Agitation OR Anxiety** | Diazepam | 0.05 - 0.15 mg/kg IV q6hr;<br>Max 10 mg/dose<br>0.1 - 0.3 mg/kg/dose PO<br>q6 - 8hr; Max 10 mg/dose |
| | Lorazepam | 0.05 - 0.1 mg/kg/dose<br>IV /PO q6hr<br>Max: 2 mg dose |
| | Baclofen | 2 - 7 yr olds:<br>20 - 30 mg/**day** PO divided<br>every 8 hrs. Titrate up<br>every 3 days by 5 - 15 mg/**day**<br>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.<br>Max PIV dose: 6.25 mg<br>Max Central line Dose: 25 mg<br>Max PR dose: 25 mg<br>Contraindicated in children < 2 yrs. |
| | Ondansetron | 0.15 mg/kg/dose IV/PO q8 hrs PRN<br>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<br>Max dose: 25 mg |
| | Ondansetron<br>May also be helpful | 0.15 mg/kg/dose<br>IV/PO q8 hrs PRN<br>Max: 8 mg/dose |
| **Constipation** | Polyethylene Glycol | < 10 kg : 8.5 gm PO daily or BID<br>> 10 kg: 17 gm PO daily or BID |
| | Pericolace TAB<br><br>**OR** | 2 - 6 yr: ½ tab PO<br>6 - 12 yr: 1 tab PO<br>Over 12 yr: 2 tabs PO BID |
| | Docusate<br><br>**AND**<br><br>Senna | Elixir 2.5 mg/kg/dose PO BID<br>(Max 400 mg/day)<br>PO Capsule: round to nearest 50 mg cap size<br><br>1 mo - < 2y: 1.25 mL PO BID<br>2 y - < 6y: 2.5 mL PO BID<br>6y - < 12y: 5 mL PO BID<br>12 and up: 10 mL PO BID |
| | Methylnaltrexone | < 38 kg: 0.15 mg/kg SC<br>38 - 62 kg: 8 mg;<br>> 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

*Moderate Sedation will require Special Monitoring -  See policy H2214

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