This handbook is intended for use in pediatric critical care and may not be applicable in many situations encountered in general pediatric practice. Due to the specialized nature of the PICU environment and patient population some of the drugs, indications, doses and monitoring requirements may be different in individual situations. While this book is intended to reflect both the best evidence and the practice in the PICU at our institution at the time of writing new information may become available. Every attempt has made to ensure accuracy but these recommendations should be used with caution and with good clinical judgment.

Editor: Mark Duffett

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Filomena Canci    Aman Hansra    Christine Wynne
Jordan Closs    Colleen Miller
## Resuscitation

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose</th>
<th>Supplied</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adenosine</strong></td>
<td>IV/IO: 0.1 mg/kg (max 6 mg)</td>
<td>3 mg/mL: 0.03 mL/kg (max 2 mL)</td>
<td>Rapid bolus followed by rapid flush</td>
</tr>
<tr>
<td></td>
<td>Repeat dose: 0.2 mg/kg (max 12 mg)</td>
<td>Repeat dose: 0.07 mL/kg (max 4 mL)</td>
<td></td>
</tr>
<tr>
<td><strong>Amiodarone</strong></td>
<td>IV/IO: 5 mg/kg (max 300 mg)</td>
<td>50 mg/mL: 0.1 mL/kg (max 6 mL)</td>
<td>Rapid bolus for VF/VT, over 20-60 minutes for perfusing tachycardias</td>
</tr>
<tr>
<td><strong>Atropine</strong></td>
<td>IV/IO: 0.02 mg/kg (min 0.1 mg, max 0.5 mg)</td>
<td>0.1 mg/mL: 0.2 mL/kg (min 1 mL, max 5 mL)</td>
<td>Bolus</td>
</tr>
<tr>
<td></td>
<td>ET: 2-10 times the IV dose</td>
<td></td>
<td>Dilute with NS to 3-5 mL</td>
</tr>
<tr>
<td><strong>Calcium Chloride</strong></td>
<td>IV/O: 20 mg/kg (max 1 g/DOSE)</td>
<td>10% (100 mg/mL): 0.2 mL/kg (max 10 mL)</td>
<td>Give slow push, central line preferred</td>
</tr>
<tr>
<td><strong>Dextrose</strong></td>
<td>IV/IO: 0.5-1 g/kg</td>
<td>D10W: 5-10 mL/kg D50W: 1-2 mL/kg</td>
<td>Avoid hyperglycemia</td>
</tr>
<tr>
<td>Medication</td>
<td>Dose</td>
<td>Supplied</td>
<td>Comments</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------------------------------------</td>
<td>---------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>IV/IO: 0.01 mg/kg</td>
<td>1:10 000: 0.1 mL/kg</td>
<td>Bolus</td>
</tr>
<tr>
<td></td>
<td>ET: 0.1 mg/kg</td>
<td>1:1 000: 0.1 mL/kg</td>
<td>Dilute with NS to 3-5 mL</td>
</tr>
<tr>
<td>Lidocaine</td>
<td>IV/IO: 1 mg/kg</td>
<td>20 mg/mL: 0.05 mL/kg</td>
<td>Bolus</td>
</tr>
<tr>
<td></td>
<td>ET: 2-10 times the IV dose</td>
<td></td>
<td>Dilute with NS to 3-5 mL</td>
</tr>
<tr>
<td>Magnesium Sulfate</td>
<td>IV/IO: 25-50 mg/kg (max 2 g)</td>
<td>0.5 g/mL: 0.05-0.1 mL/kg</td>
<td>Rapid infusion for torsades or severe hypomagnesemia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(max 4 mL)</td>
<td></td>
</tr>
<tr>
<td>Naloxone</td>
<td>IV/IO/IM: 0.1 mg/kg (max 2 mg)</td>
<td>0.4 mg/mL: 0.25 mL/kg</td>
<td>Bolus</td>
</tr>
<tr>
<td></td>
<td>ET: 2-10 times the IV dose</td>
<td></td>
<td>Dilute with NS to 3-5 mL</td>
</tr>
<tr>
<td>Procainamide</td>
<td>IV/IO: 15 mg/kg (max 1 g)</td>
<td>100 mg/mL: 0.15 mL/kg</td>
<td>Give over 30-60 minutes</td>
</tr>
<tr>
<td>Sodium Bicarbonate</td>
<td>IV/IO: 1 mEq/kg</td>
<td>4.2%: 2 mL/kg</td>
<td>Give slowly and if ventilation is adequate. Use 4.2% in neonates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.4%: 1 mL/kg</td>
<td></td>
</tr>
<tr>
<td>Cardioversion</td>
<td>0.5 J/kg, double dose if arrhythmia continues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defibrillation</td>
<td>2 J/kg initially then 4 J/kg for each subsequent defibrillation attempt.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ETT size</td>
<td>(age in years/4) +4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Medications for Intubation

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose</th>
<th>Onset</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sedatives</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>midazolam</td>
<td>0.1-0.25 mg/kg</td>
<td>1-2 min</td>
<td>↓ BP if hypovolemic, minimal effect on ICP</td>
</tr>
<tr>
<td>propofol</td>
<td>1-2 mg/kg</td>
<td>&lt; 1 min</td>
<td>↓ ICP, ↓ BP</td>
</tr>
<tr>
<td>etomidate</td>
<td>0.2-0.4 mg/kg</td>
<td>1 min</td>
<td>↓ ICP, minimal effect on BP</td>
</tr>
<tr>
<td><strong>Analgesics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>morphine</td>
<td>0.2 mg/kg</td>
<td>2-5 min</td>
<td>Minimal effect on ICP, may ↓ BP</td>
</tr>
<tr>
<td>fentanyl</td>
<td>2-5 microgram/kg</td>
<td>1 min</td>
<td>Minimal effect on ICP and BP</td>
</tr>
<tr>
<td>remifentanil</td>
<td>2-4 microgram/kg</td>
<td>&lt; 1 min</td>
<td>Duration of action 3-10 min</td>
</tr>
<tr>
<td><strong>Sedative/Analgesic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ketamine</td>
<td>1-2 mg/kg</td>
<td>1-2 min</td>
<td>bronchodilation, little effect on BP</td>
</tr>
<tr>
<td><strong>Paralytics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rocuronium</td>
<td>1 mg/kg</td>
<td>45-90 s</td>
<td>Duration of action: 30-60 min</td>
</tr>
<tr>
<td>succinylcholine</td>
<td>1-2 mg/kg</td>
<td>45-60 s</td>
<td>Duration of action: &lt;10 min</td>
</tr>
<tr>
<td><strong>Adjuvants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>atropine</td>
<td>0.02 mg/kg</td>
<td>1-2 min</td>
<td>minimum 0.1, maximum 0.5 mg</td>
</tr>
<tr>
<td>lidocaine</td>
<td>2 mg/kg</td>
<td>5 min</td>
<td></td>
</tr>
</tbody>
</table>
## Drug Comparison Charts

### Inotropes and Vasopressors

<table>
<thead>
<tr>
<th>Drug</th>
<th>Receptor Specificity</th>
<th>SVR</th>
<th>Inotropic effects</th>
<th>Heart rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>α</td>
<td>β1</td>
<td>β2</td>
<td>V1*</td>
</tr>
<tr>
<td>Dopamine</td>
<td>high dose</td>
<td>+++</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Dobutamine</td>
<td>+</td>
<td>+++</td>
<td>++</td>
<td>-</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>+++</td>
<td>+++</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Milrinone**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Norepinephrine</td>
<td>+++</td>
<td>++</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Phenylephrine</td>
<td>+++</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vasopressin</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+++</td>
</tr>
</tbody>
</table>

*Vasopressin receptor type 1, **Milrinone is a phosphodiesterase inhibitor.

### Corticosteroids

<table>
<thead>
<tr>
<th>Corticosteroid</th>
<th>Equivalent dose (mg)</th>
<th>Duration of action (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dexamethasone</td>
<td>0.15</td>
<td>&gt;36 h</td>
</tr>
<tr>
<td>Hydrocortisone</td>
<td>4</td>
<td>8-12</td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td>0.8</td>
<td>12-36</td>
</tr>
<tr>
<td>Prednisolone</td>
<td>1</td>
<td>12-36</td>
</tr>
<tr>
<td>Prednisone</td>
<td>1</td>
<td>12-36</td>
</tr>
</tbody>
</table>

### Opioids

<table>
<thead>
<tr>
<th>Opioid</th>
<th>Oral</th>
<th>Parenteral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codeine</td>
<td>200 mg</td>
<td>120 mg</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>-</td>
<td>100 mcg</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>6 mg</td>
<td>2 mg</td>
</tr>
<tr>
<td>Morphine</td>
<td>30 mg</td>
<td>10 mg</td>
</tr>
<tr>
<td>Oxycodone</td>
<td>15 mg</td>
<td>-</td>
</tr>
</tbody>
</table>
## Comparison of IV Solutions

<table>
<thead>
<tr>
<th>IV Solution</th>
<th>Sodium (mEq/L)</th>
<th>Chloride (mEq/L)</th>
<th>Dextrose (g/L)</th>
<th>Osmolarity (mOsm/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium Chloride 0.45 %</td>
<td>77</td>
<td>77</td>
<td>0</td>
<td>154</td>
</tr>
<tr>
<td>Sodium Chloride 0.9 %</td>
<td>154</td>
<td>154</td>
<td>0</td>
<td>308</td>
</tr>
<tr>
<td>Sodium Chloride 3 %</td>
<td>513</td>
<td>513</td>
<td>0</td>
<td>1030</td>
</tr>
<tr>
<td>Dextrose 5 %</td>
<td>0</td>
<td>0</td>
<td>50</td>
<td>250</td>
</tr>
<tr>
<td>Dextrose 5 % Sodium Chloride 0.2 %*</td>
<td>39</td>
<td>39</td>
<td>50</td>
<td>320</td>
</tr>
<tr>
<td>Dextrose 5 % Sodium Chloride 0.45%</td>
<td>77</td>
<td>77</td>
<td>50</td>
<td>405</td>
</tr>
<tr>
<td>Dextrose 5 % Sodium Chloride 0.9 %</td>
<td>154</td>
<td>154</td>
<td>50</td>
<td>560</td>
</tr>
<tr>
<td>Dextrose 5 % Lactated Ringers†</td>
<td>130</td>
<td>109</td>
<td>50</td>
<td>525</td>
</tr>
<tr>
<td>Dextrose 10 %</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>505</td>
</tr>
<tr>
<td>Dextrose 10 % Sodium Chloride 0.2 %*</td>
<td>39</td>
<td>39</td>
<td>100</td>
<td>575</td>
</tr>
<tr>
<td>Dextrose 10 % Sodium Chloride 0.45%*</td>
<td>77</td>
<td>77</td>
<td>100</td>
<td>660</td>
</tr>
<tr>
<td>Dextrose 10 % Sodium Chloride 0.9%</td>
<td>154</td>
<td>154</td>
<td>100</td>
<td>813</td>
</tr>
<tr>
<td>Dextrose 3.3% Sodium Chloride 0.3%</td>
<td>51</td>
<td>51</td>
<td>33</td>
<td>273</td>
</tr>
<tr>
<td>Lactated Ringers†</td>
<td>130</td>
<td>109</td>
<td>0</td>
<td>273</td>
</tr>
</tbody>
</table>

†Also contains Calcium 1.5 mmol/L, Potassium 4 mEq/L and Lactate 28 mmol/L.

*These solutions are not commercially available.
## Continuous Infusions

<table>
<thead>
<tr>
<th>Drug</th>
<th>Usual Dose</th>
<th>&lt;10 kg</th>
<th>10-39 kg</th>
<th>≥40 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>alprostadil</td>
<td>Inf: 0.01-0.1 mcg/kg/min</td>
<td>250 mcg in 50 mL</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>aminophylline</td>
<td>Bolus: 6 mg/kg Inf: 0.5-1 mg/kg/h</td>
<td>250 mg in 50 mL</td>
<td>500 mg in 50 mL</td>
<td></td>
</tr>
<tr>
<td>amiodarone (central)</td>
<td>Bolus: 5 mg/kg Inf: 5-15 mcg/kg/min</td>
<td>150 mg in 50 mL</td>
<td>300 mg in 50 mL</td>
<td>900 mg in 250 mL</td>
</tr>
<tr>
<td>amiodarone (peripheral)</td>
<td>Bolus: 5 mg/kg Inf: 5-15 mcg/kg/min</td>
<td>75 mg in 50 mL</td>
<td>450 mg in 250 mL</td>
<td></td>
</tr>
<tr>
<td>cisatracurium</td>
<td>Bolus: 0.1 mg/kg Inf: 1-3 mcg/kg/min</td>
<td>20 mg in 50 mL</td>
<td>40 mg in 20 mL (undiluted)</td>
<td>100 mg in 50 mL (undiluted)</td>
</tr>
<tr>
<td>dexmedetomidine</td>
<td>Bolus: 0.5-1 mcg/kg Inf: 0.2-0.7 mcg/kg/h</td>
<td></td>
<td>200 microgram in 50 mL</td>
<td></td>
</tr>
<tr>
<td>DOBUTamine</td>
<td>Inf: 2-20 mcg/kg/min</td>
<td>50 mg in 50 mL</td>
<td>250 mg in 50 mL</td>
<td>500 mg in 250 mL</td>
</tr>
<tr>
<td>DOPamine</td>
<td>Inf: 2-20 mcg/kg/min</td>
<td>80 mg in 50 mL (from pre-mixed bag)</td>
<td>400 mg in 250 mL (pre-mixed)</td>
<td></td>
</tr>
<tr>
<td>EPINEPHrine (high dose)</td>
<td>Inf: 0.1-1 mcg/kg/min</td>
<td>5 mg in 50 mL</td>
<td>20 mg in 50 mL</td>
<td>30 mg in 250 mL</td>
</tr>
<tr>
<td>EPINEPHrine (low dose)</td>
<td>Inf: 0.01-0.1 mcg/kg/min</td>
<td>0.5 mg in 50 mL</td>
<td>2 mg in 50 mL</td>
<td>3 mg in 250 mL</td>
</tr>
<tr>
<td>Drug</td>
<td>Usual Dose</td>
<td>&lt;10 kg</td>
<td>10-39 kg</td>
<td>≥40 kg</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------</td>
<td>---------------------------------------------</td>
<td>---------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>esmolol</td>
<td>Bolus: 100-500 mcg/kg Inf: 50-300 mcg/kg/min</td>
<td>500 mg in 50 mL (undiluted)</td>
<td>2 500 mg in 250 mL (pre-mixed)</td>
<td></td>
</tr>
<tr>
<td>fentaNYL</td>
<td>Bolus: 0.5-2 mcg/kg Inf: 0.5-2 mcg/kg/h</td>
<td>1 000 microgram in 50 mL</td>
<td>2 000 microgram in 40 mL (undiluted)</td>
<td></td>
</tr>
<tr>
<td>furosemide</td>
<td>Bolus: 0.5-2 mg/kg Inf: 0.1-0.5 mg/kg/h</td>
<td>80 mg in 50 mL</td>
<td></td>
<td>200 mg in 20 mL (undiluted)</td>
</tr>
<tr>
<td>heparin</td>
<td>Bolus: 50-75 unit/kg Inf: 20-35 unit/kg/h</td>
<td>2000 units in 50 mL (from pre-mixed bag)</td>
<td>20 000 units in 500 mL (pre-mixed)</td>
<td></td>
</tr>
<tr>
<td>HYDROmorphone</td>
<td>Bolus: 0.01-0.02 mg/kg Inf: 2-8 mcg/kg/h</td>
<td>2 mg in 50 mL</td>
<td></td>
<td>8 mg in 50 mL</td>
</tr>
<tr>
<td>insulin</td>
<td>Inf: 0.05-0.1 unit/kg/h</td>
<td></td>
<td>25 units in 250 mL</td>
<td></td>
</tr>
<tr>
<td>isoproterenol</td>
<td>Inf: 0.05-2 mcg/kg/min</td>
<td>2 mg in 50 mL</td>
<td></td>
<td>5 mg in 50 mL</td>
</tr>
<tr>
<td>ketamine</td>
<td>Bolus: 0.5-2 mg/kg Inf: 5-20 mcg/kg/min</td>
<td>100 mg in 50 mL</td>
<td>200 mg in 20 mL</td>
<td>400 mg in 40 mL</td>
</tr>
<tr>
<td>labetalol</td>
<td>Bolus: 0.2-0.5 mg/kg Inf: 0.5-3 mg/kg/h</td>
<td></td>
<td>300 mg in 60 mL (undiluted)</td>
<td></td>
</tr>
<tr>
<td>lidocaine</td>
<td>Bolus: 1 mg/kg Inf: 20-50 mcg/kg/min (from pre-mixed bag)</td>
<td>200 mg in 50 mL</td>
<td>2 g in 500 mL (pre-mixed)</td>
<td></td>
</tr>
<tr>
<td>lipids</td>
<td>Inf: 0.5-3.5 g/kg/day</td>
<td>5 g in 25 mL (pre-mixed)</td>
<td>100 g in 500 mL (pre-mixed)</td>
<td></td>
</tr>
<tr>
<td>Drug</td>
<td>Usual Dose</td>
<td>10-39 kg</td>
<td>≤40 kg</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>------------</td>
<td>----------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>methylPREDNIS-olone</td>
<td>Bolus: 30 mg/kg</td>
<td>500 mg in 50 mL</td>
<td>2 g in 50 mL</td>
<td></td>
</tr>
<tr>
<td>midazolam</td>
<td>Inf: 0.05-0.1 mg/kg/min</td>
<td>5 mg in 50 mL</td>
<td>100 mg in 50 mL</td>
<td></td>
</tr>
<tr>
<td>nitroglycerin</td>
<td>Inf: 0.5-3 mcg/kg/min</td>
<td>10 mg in 50 mL</td>
<td>20 mg in 50 mL</td>
<td></td>
</tr>
<tr>
<td>nitroprusside</td>
<td>Inf: 0.05-1 mcg/kg/min</td>
<td>25 mg in 50 mL</td>
<td>50 mg in 50 mL</td>
<td></td>
</tr>
<tr>
<td>norepinephrine</td>
<td>Inf: 1 mcg/kg/h</td>
<td>2 mg in 50 mL</td>
<td>8 mg in 50 mL</td>
<td></td>
</tr>
<tr>
<td>octreotide</td>
<td>Inf: 0.01-2 mcg/kg/min</td>
<td>500 microgram in 50 mL</td>
<td>80 mg in 50 mL</td>
<td></td>
</tr>
<tr>
<td>pantoprazole</td>
<td>Inf: 1 mcg/kg/h</td>
<td>500 mg in 100 mL</td>
<td>1 000 mg in 250 mL</td>
<td></td>
</tr>
<tr>
<td>PENTobarbital</td>
<td>Bolus: 1-2 mg/kg</td>
<td>10 mg in 50 mL</td>
<td>50 mg in 250 mL</td>
<td></td>
</tr>
<tr>
<td>phenylephrine</td>
<td>Inf: 0.1-2 mcg/kg/min</td>
<td>50 mg in 250 mL</td>
<td>50 mg in 50 mL</td>
<td></td>
</tr>
<tr>
<td>Drug</td>
<td>Usual Dose</td>
<td>&lt;10 kg</td>
<td>10-39 kg</td>
<td>≥40 kg</td>
</tr>
<tr>
<td>-------------</td>
<td>------------</td>
<td>--------</td>
<td>----------</td>
<td>--------</td>
</tr>
<tr>
<td>procainamide</td>
<td>Bolus: 3-6 mg/kg</td>
<td>500 mg in 50 mL (undiluted)</td>
<td>500 mg in 50 mL (undiluted)</td>
<td>500 mg in 50 mL (undiluted)</td>
</tr>
<tr>
<td></td>
<td>Inf: 20-80 mcg/kg/min</td>
<td>[Bolus: 0.5-2 mg/kg</td>
<td>Inf: 0.5-4 mcg/kg/min</td>
<td>Inf: 0.5-4 mcg/kg/min</td>
</tr>
<tr>
<td>propofol</td>
<td>Bolus: 0.5-2 mg/kg</td>
<td>500 mg in 50 mL (undiluted)</td>
<td>[Bolus: 0.6-1.2 mg/kg</td>
<td>Inf: 0.6-1.2 mcg/kg/min</td>
</tr>
<tr>
<td>(sedation)</td>
<td>Inf: 80-200 mcg/kg/min</td>
<td>Inf: 5-15 mcg/kg/min</td>
<td>Inf: 0.05-0.3 mcg/kg/min</td>
<td>Inf: 5-15 mcg/kg/min</td>
</tr>
<tr>
<td>propofol</td>
<td>Bolus: 0.5-2 mg/kg</td>
<td>500 mg in 50 mL (undiluted)</td>
<td>Bolus: 1-4 mcg/kg/min</td>
<td>Inf: 1-10 mcg/kg/min</td>
</tr>
<tr>
<td>(anesthesia)</td>
<td>Inf: 80-200 mcg/kg/min</td>
<td>Inf: 5-15 mcg/kg/min</td>
<td>Inf: 0.05-0.3 mcg/kg/min</td>
<td>Inf: 5-15 mcg/kg/min</td>
</tr>
<tr>
<td>remifentanil</td>
<td>Bolus: 0.5-2 mg/kg</td>
<td>500 mg in 50 mL (undiluted)</td>
<td>Bolus: 0.5-1 mEq/kg/min</td>
<td>Inf: 0.3-1 milliunit/kg/min (usual max 2 unit/h)</td>
</tr>
<tr>
<td>rocuronium</td>
<td>Inf: 0.5-2 mg/kg</td>
<td>500 mg in 50 mL (undiluted)</td>
<td>Bolus: 0.6-1.2 mg/kg</td>
<td>Inf: 0.3-1 milliunit/kg/min (usual max 2 unit/h)</td>
</tr>
<tr>
<td>salbutamol</td>
<td>Bolus: 1-4 mcg/kg/min</td>
<td>500 mg in 50 mL (undiluted)</td>
<td>Inf: 0.5-1 mEq/kg/min</td>
<td>Inf: 0.3-1 milliunit/kg/min (usual max 2 unit/h)</td>
</tr>
<tr>
<td>sodium</td>
<td>Bolus: 1-4 mcg/kg/min</td>
<td>500 mg in 50 mL (undiluted)</td>
<td>Inf: 0.5-1 mEq/kg/min</td>
<td>Inf: 0.3-1 milliunit/kg/min (usual max 2 unit/h)</td>
</tr>
<tr>
<td>bicarbonate</td>
<td>Bolus: 1-4 mcg/kg/min</td>
<td>500 mg in 50 mL (undiluted)</td>
<td>Inf: 0.5-1 mEq/kg/min</td>
<td>Inf: 0.3-1 milliunit/kg/min (usual max 2 unit/h)</td>
</tr>
<tr>
<td>sodium chloride 3%</td>
<td>Bolus: 1-4 mcg/kg/min</td>
<td>500 mg in 50 mL (undiluted)</td>
<td>Inf: 0.5-1 mEq/kg/min</td>
<td>Inf: 0.3-1 milliunit/kg/min (usual max 2 unit/h)</td>
</tr>
<tr>
<td>vasopressin (shock)</td>
<td>Inf: 0.3-1 milliunit/kg/min</td>
<td>500 mg in 50 mL (undiluted)</td>
<td>Inf: 0.5-1 mEq/kg/min</td>
<td>Inf: 0.3-1 milliunit/kg/min (usual max 2 unit/h)</td>
</tr>
<tr>
<td>vasopressin (DI)</td>
<td>Inf: 0.3-1 milliunit/kg/min</td>
<td>500 mg in 50 mL (undiluted)</td>
<td>Inf: 0.5-1 mEq/kg/min</td>
<td>Inf: 0.3-1 milliunit/kg/min (usual max 2 unit/h)</td>
</tr>
</tbody>
</table>

**Dosage Information:***
- **Bolus:** Indicates the initial dose.
- **Inf:** Indicates the infusion rate.
- **(sedation)**: Indicates the use for sedation.
- **(anesthesia)**: Indicates the use for anesthesia.
- **(shock)**: Indicates the use for shock.
- **(DI)**: Indicates the use for dopamine infusion.
Medications
### Acetaminophen

**Analgesic and antipyretic**

**PO/PR:**

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Single Dose (mg) maximum Q4H</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 - 3.9</td>
<td>40</td>
</tr>
<tr>
<td>4.0 - 5.4</td>
<td>60</td>
</tr>
<tr>
<td>5.5 - 7.9</td>
<td>80</td>
</tr>
<tr>
<td>8.0 - 10.9</td>
<td>120</td>
</tr>
<tr>
<td>11.0 - 15.9</td>
<td>160</td>
</tr>
<tr>
<td>16.0 - 21.9</td>
<td>240</td>
</tr>
<tr>
<td>22.0 - 26.9</td>
<td>320</td>
</tr>
<tr>
<td>27.0 - 31.9</td>
<td>400</td>
</tr>
<tr>
<td>32.0 - 43.9</td>
<td>480</td>
</tr>
<tr>
<td>44 - over</td>
<td>650</td>
</tr>
</tbody>
</table>

### Acetazolamide

**Carbonic anhydrase inhibitor diuretic**

**PO:** 5-10 mg/kg/DAY divided Q12-24H (maximum 1 g/DAY)

### Acetylcysteine

**Antidote for acetaminophen overdose:**

**IV:** Total dose 300 mg/kg IV over 21 hours:
- 150 mg/kg over 15-60 min then
- 50 mg/kg over 4 hours then
- 100 mg/kg over 16 hours
Alternative regimens include:

**IV:**
- 140 mg/kg/DOSE then
- 70 mg/kg/DOSE Q4H for 12 doses

**PO:**
- 140 mg/kg/DOSE then
- 70 mg/kg/DOSE Q4H for 17 doses

**Mucolytic:**

**NEB:** (Using 20% solution)
- Infants: 1-2 mL nebulized Q6-8H
- Children: 3-5 mL nebulized Q6-8H
- Adolescents: 5-10 mL nebulized Q6-8H

Longer courses of therapy may be indicated if delayed presentation or slow resolution of liver function abnormalities. If symptoms of histamine release and bronchospasm occur, hold infusion, give antihistamines +/- corticosteroids and bronchodilators, then restart infusion. Pretreatment with a bronchodilator is usually recommended prior to inhaled therapy.

---

**Acetylsalicylic Acid**

**Antiplatelet:**

**PO:**
- 5 mg/kg/DOSE Q24H
  - (minimum 20 mg, usual maximum 80 or 325 mg)

**Kawasaki disease:**

**PO:**
- 20-25 mg/kg/DOSE Q6H.
  - Reduce to 3-5 mg/kg Q24H once fever resolves.

Supplied as 80 mg chewable tablets and 325 and 650 mg tablets and 81, 325 and 650 mg enteric coated tablets.
ACTH
see cosyntropin

Activated Charcoal
see charcoal

Acyclovir
Antiviral

Herpes simplex encephalitis:
  IV:  
    ≤12 years: 20 mg/kg/DOSE Q8H
    >12 years: 10-15 mg/kg/DOSE Q8H
    (maximum 1 g/DOSE)

Other herpes simplex infections:
  IV:  5-10 mg/kg/DOSE Q8H

Varicella (severe) or in immunocompromised:
  IV:  10-15 mg/kg/DOSE Q8H (maximum 1 g/DOSE)
      Switch to PO when lesions crusted.
  PO:  20 mg/kg/DOSE QID (maximum 800 mg/DOSE)

Ensure adequate urine output. Adjust dosing interval in renal impairment.

Adenosine
Antiarrhythmic
Treatment of SVT:
  IV: 0.1 mg/kg (maximum 6 mg) if no response in 2 min:
       0.2 mg/kg bolus (maximum 12 mg)
Not effective for atrial fibrillation/flutter or ventricular fibrillation.
Adverse effects such as dyspnea, arrhythmias, bradycardia, flushing, sinus and AV block are very common but are usually transient due to short (10 seconds) half-life of drug. Give rapid IV bolus followed by rapid NS flush.

Alprostadil
Prostaglandin E1

Maintenance of patent ductus arteriosus:
  IV: Initially 0.05 microgram/kg/min
       (0.01-0.1 microgram/kg/min has been used)

Raynaud’s Phenomenon:
  IV: 0.006-0.01 microgram/kg/min (max
       0.02 microgram/kg/min). Titrate by 0.001 microgram/kg/min every 30 minutes as required and tolerated.
For treatment of PDA, may cause apnea, be prepared to intubate. Most effective in infants less than 96 hours of age.
Alteplase

Thrombolytic

Unblocking of occluded catheters:
   Intracatheter: 1 mg/mL:
      ≥30 kg: 2 mL
      < 30 kg: 110% of lumen volume
         (max 2 mL)
   Instil appropriate volume into occluded lumen. Leave in place for 1-2 hours, then aspirate solution. Do not infuse.
   May repeat once if ineffective. 0.25 mg/mL has been used for infants.

Empyema/Parapneumonic effusions:
   Intrapleural: Dose is not well established.
      0.1 mg/kg/DOSE (usual max 4 or 6 mg/DOSE)
   Dilute in 20-100 mL of saline and clamp thoracostomy tube for 1 hour after administration.

Amiloride

Potassium sparing diuretic
   PO: 0.625 mg/kg/DOSE Q24H (usual maximum 10 mg/DOSE).

Amikacin

Aminoglycoside antibiotic.
   IV: 15-20 mg/kg/DAY divided Q12-24h
   Adjust dosing interval in renal impairment. Ototoxicity and nephrotoxicity may occur, consider monitoring trough levels (<5-10 mg/L) in patients at risk for nephrotoxicity; septic shock, concurrent...
nephrotoxins, fluctuating renal function or extended treatment courses. May potentiate muscle weakness with neuromuscular blockers. Reserved for gram negative organisms with documented resistance to other aminoglycosides.

Aminophylline
Bronchodilator

Acute bronchospasm:
   IV: 6 mg/kg/DOSE then:
      2-6 months: 0.4-0.5 mg/kg/h
      6-11 months: 0.6-0.7 mg/kg/h
      1-12 years: 0.8-1 mg/kg/h
      >12 years 0.7 mg/kg/h

Base dose on ideal body weight. Dose adjustments are required in CHF, liver dysfunction, multisystem organ failure, shock and in smokers. Drug interactions are common, including ciprofloxacin, clarithromycin, erythromycin. Draw level 12-24 hours after initiation of continuous infusion. Target serum level is 10-15 mg/L (55-83 micromol/mL).
Amiodarone

Antiarrhythmic

IV: 5 mg/kg (usual maximum 300 mg) then 5-15 microgram/kg/min

Loading dose may be repeated for breakthrough arrhythmias. Give loading dose over 20-60 minutes for perfusing rhythms or rapid bolus for VF. Hypotension may respond to reducing the infusion rate. Heart block requiring pacing has occurred. Do not use in cardiogenic shock, severe sinus node dysfunction, sinus bradycardia, 2nd and 3rd degree AV block. Central line required for concentrations >2 mg/mL.

Amlodipine

Calcium channel blocker antihypertensive

PO: 0.1-0.3 mg/kg/DAY divided Q12-24H (usual maximum 10 mg/DOSE)

Amoxicillin

Penicillin derivative oral antibiotic

PO: 50 mg/kg/DAY divided Q8H (maximum 90 mg/kg/DAY or 1 g/DOSE)

Amoxicillin/Clavulanic Acid

Penicillin derivative antibiotic and beta-lactamase inhibitor

PO: 30-50 mg/kg/DAY of amoxicillin component divided Q8H (maximum 90 mg/kg/DAY or 875 mg/DOSE)
Active against gram positive, gram negative and anaerobic organisms.

**Amphotericin B**

Antifungal

**IV:** 0.6-1 mg/kg/DOSE Q24H (usual maximum 70 mg/DOSE)

Active against many *Candida* and *Mucor* species and *Aspergillus*.

Consider hydration (10 mL/kg of normal saline) pre-amphotericin to reduce the risk of nephrotoxicity. Commonly causes nephrotoxicity, hypokalemia and hypomagnesemia. Only compatible with dextrose solutions.

**Amphotericin B (Liposomal)**

Antifungal (lipid formulation of amphotericin B)

**IV:** 3-5 mg/kg/DOSE Q24H

Active against many *Candida* and *Mucor* species and *Aspergillus*.

Consider using if renal insufficiency, if nephrotoxicity develops while on standard amphotericin B or with clinical failure with alternate agents. Lipid formulations are better tolerated but are much more costly.
Ampicillin
Penicillin derivative antibiotic

**Meningitis:**
- IV: 50 mg/kg/DOSE Q6H (maximum 100 mg/kg/DOSE or 2 g/DOSE)

**Other infections:**
- IV: 25-50 mg/kg/DOSE Q6H (maximum 2 g/DOSE)
Adjust dosing interval in renal impairment. Use amoxicillin if oral therapy is required.

Anidulafungin
Antifungal

**Invasive candidiasis:**
- IV: Adults: 200 mg then 100 mg Q24H

There is limited experience with anidulafungin in children, caspofungin is usually preferred.

Arginine
Treatment of urea cycle disorders.

**OTC or CPS deficiency:**
- IV: 0.2 g/kg as a loading dose, then 0.2 g/kg/DAY as a continuous infusion

**ASL or ASS deficiency:**
- IV: 0.6 g/kg as a loading dose then 0.6 g/kg/DAY as a continuous infusion
ASA, Aspirin

See acetylsalicylic acid

Atropine

Vagolytic

Bradycardia:

IV: 0.02 mg/kg/DOSE
(minimum 0.1 mg, maximum 0.5 mg/DOSE, to cumulative maximum of 3 mg)

Azithromycin

Azalide antibiotic (related to the macrolides)

PO/IV: 10 mg/kg/DOSE once (maximum 500 mg), then
5 mg/kg/DOSE Q24H x 4 (maximum 250 mg)
For serious infections may give 10 mg/kg/DOSE Q24H.

Chlamydial infection (non-gonococcal urethritis or cervicitis):

PO: 20 mg/kg/DOSE once (maximum 1 g/DOSE)

Benztropine

Anticholinergic

Treatment of extrapyramidal symptoms due to medications:

PO/IV: 0.02-0.05 mg/kg/DOSE (maximum 2 mg/DOSE).
May repeat Q8-24H as needed.
**Budesonide**

Inhaled corticosteroid

NEB: 0.25-1 mg Q12H via nebulizer.

**Caffeine**

Respiratory Stimulant

**Apnea of prematurity:**

PO/IV: 10-20 mg/kg/DOSE of caffeine *citrate* then

5 mg/kg of caffeine *citrate* Q24H

(Equivalent to 5-10 mg/kg/DOSE of caffeine *base* then

2.5 mg/kg of caffeine *base* Q24H)

**Calcium**

Electrolyte

Treatment of hypocalcemia, hyperkalemia and calcium channel antagonist overdose:

**Calcium Gluconate:**

IV: 50-100 mg of calcium gluconate/kg/DOSE

(usual maximum 3 g/DOSE)

or

Add 1 g (2.3 mmol) of calcium gluconate to a total of 50 mL NS and give 0.05-0.1 mmol/kg/h (1-2 mL/kg/h), adjust rate Q4H

**Calcium Chloride:**

IV: 10-20 mg of calcium chloride/kg/DOSE

(usual maximum 1 g/DOSE)
These doses are suggested starting doses, increase and repeat as required. If treating asymptomatic hypocalcemia infuse dose over at least 1 hour. Central line preferred.

<table>
<thead>
<tr>
<th>Elemental Calcium Equivalents</th>
<th>mg/mL</th>
<th>mEq/mL</th>
<th>mmol/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium gluconate 10% (100 mg/mL)</td>
<td>9</td>
<td>0.45</td>
<td>0.23</td>
</tr>
<tr>
<td>Calcium chloride 10% (100 mg/mL)</td>
<td>27</td>
<td>1.4</td>
<td>0.7</td>
</tr>
</tbody>
</table>

**Calcium Polystyrene Sulfonate**
see: Cation Exchange Resins

**Calcium Resonium®**
see: Cation Exchange Resins

**Captopril**
Angiotensin converting enzyme inhibitor

- **PO:** 0.1-0.3 mg/kg/DOSE Q8H initially
  (usual maximum 6 mg/kg/DAY or 200 mg/DAY)

Monitor blood pressure closely after first dose, may cause profound hypotension.
Carbamazepine
Anticonvulsant
  PO: 10-20 mg/kg/DAY initially, usual maintenance dose is 20-30 mg/kg/DAY. Divide daily dose Q8-12H.
Serum trough concentration target is 17-51 micromol/L (4-12 microgram/mL).

Caspofungin
Antifungal
  IV: 70 mg/m$^2$/DOSE (maximum 70 mg) then
      50 mg/m$^2$/DOSE Q24H (maximum 50 mg)
Dosage adjustment may be required hepatic impairment. Caspofungin has many drug interactions including cyclosporine, carbamazepine, dexamethasone and phenytoin.

Cation Exchange Resins
Sodium or Calcium Polystyrene Sulfonate
Treatment for hyperkalemia:
  PO/PR: 0.5-1 g/kg/DOSE may be repeated Q4-6H PRN
      (usual maximum 30-60 g/DOSE)
Give in orally water or juice, do mix with fruit juices. Mix in water for rectal administration and retain in colon for up to several hours, minimum 30-60 min.
Cefazolin
First generation cephalosporin
  IV:  25-50 mg/kg/DOSE Q8H (maximum 2 g/DOSE)
Adjust dosing interval in renal impairment.

Cefixime
Oral third generation cephalosporin
Uncomplicated cervical/urethral gonorrhea:
  PO:  8 mg/kg/DOSE once (maximum 400 mg/DOSE)
Other infections:
  PO:  8 mg/kg/DAY divided q12-24h
       (maximum 400 mg/DAY)
Adjust dose in renal impairment. Not active against Pseudomonas aeruginosa or Staphlococcus aureus.

Cefotaxime
Third generation cephalosporin
Meningitis:
  IV:  50 mg/kg/DOSE Q6H
       (maximum 75 mg/kg/DOSE or 2 g/DOSE)
Other infections:
  IV:  50 mg/kg/DOSE Q8H (maximum 2 g/DOSE)
Adjust dosing interval in renal impairment. Not active against Pseudomonas aeruginosa. Use ceftriaxone for all children greater than 1 month of age.
**Cefprozil**

Oral second generation cephalosporin

PO: 15 mg/kg/DOSE Q12H (maximum 500 g/DOSE)

Adjust dose in severe renal impairment.

---

**Ceftazidime**

Third generation cephalosporin

IV: 25-50 mg/kg/DOSE Q8H (maximum 2 g/DOSE)

Adjust dosing interval in renal impairment. Active against *Pseudomonas aeruginosa*.

---

**Ceftriaxone**

Third generation cephalosporin

**Meningitis:**

IV/IM: 50 mg/kg/DOSE Q12H (maximum 2 g/DOSE)

**Other infections:**

IV/IM: 50-100 mg/kg/DOSE Q24H (maximum 2 g/DOSE)

**Uncomplicated Gonococcal infections:**

IV/IM: <45 kg: 125 mg/DOSE once

>45 kg: 250 mg/DOSE once

No dosage adjustment required in renal impairment. Not active against *Pseudomonas aeruginosa*.

---

**Cefuroxime**

Second generation cephalosporin
IV: 25-50 mg/kg/DOSE Q8H (usual maximum 750 mg/DOSE) Adjust dosing interval in renal impairment.

---

### Cephalexin

First generation cephalosporin

- **PO:** 6.25-12.5 mg/kg/DOSE QID, (maximum 25 mg/kg/DOSE or 1 g/DOSE)

Adjust dosing interval in renal impairment.

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### Charcoal

Adsorbent used in toxic ingestions

- **PO:** 1-2 g/kg/DOSE once, or for multiple dose therapy:
  - 0.5 g/kg/DOSE Q4-6H
    - (usual maximum 50 g/DOSE)

Give via NG if necessary, consider antiemetics.

---

### Chlortal Hydrate

Sedative

**Procedural Sedation:**

- PO/PR: 80 mg/kg/DOSE, may repeat half dose if no effect in 30 minutes
  - (maximum 2 g/DOSE)

**Sedation:**

- PO/PR: 25-50 mg/kg/DOSE Q6H (maximum 500 mg Q6H or 1 g HS).

Avoid in liver dysfunction. Tolerance develops and withdrawal may occur after long-term use.
**Chlorpromazine**

Antipsychotic

PO/IV: 0.5-1 mg/kg/DOSE Q6H PRN (usual maximum 50 mg/dose)

PO administration preferred.

**Ciprofloxacin**

Quinolone antibiotic

IV/PO: 10-15 mg/kg/DOSE Q12H

(maximum 400 mg/DOSE IV or 750 mg/DOSE PO)

Excellent oral absorption, use IV only if PO contraindicated. Feeds, formula, calcium, magnesium, iron, antacids and sulcralfate reduce absorption, hold feeds for 1 hour before and 2 hours after dose. Adjust dosing interval in renal impairment.

**Cisatracurium**

Non-depolarizing neuromuscular blocking agent

IV: 0.1 mg/kg then 0.03 mg/kg/DOSE PRN

or

0.1 mg/kg then 1-3 microgram/kg/min

(range 0.5-10 microgram/kg/min)

Bolus dosing preferred. Does not require dosage modification in renal or hepatic impairment. Regular sedation, analgesia and ocular lubrication required. Monitor depth of paralysis using peripheral nerve stimulation when using infusions (target 1-2 twitches out of 4). Onset of action within 2-3 minutes, duration of action is 30-40 minutes. Prolonged weakness may occur, especially when corticosteroids are
used concurrently with non-depolarizing neuromuscular blocking agents.

---

**Clarithromycin**

Macrolide antibiotic

- **PO:** 7.5 mg/kg/DOSE BID (maximum 500 mg/DOSE)

Drug interactions include theophylline, carbamazepine, cisapride, digoxin, cyclosporine, tacrolimus. Adjust dose in severe renal impairment.

---

**Clindamycin**

Antibiotic

- **IV:** 10-15 mg/kg/DOSE Q8H (maximum 600 mg/DOSE)
- **PO:** 2.5-7.5 mg/kg/DOSE QID (maximum 450 mg/DOSE)

May potentate muscle weakness with neuromuscular blockers. Oral suspension is very poorly tolerated, avoid if possible, use 150 mg capsules or an alternative antibiotic. Active against gram positive and anaerobic organisms.

---

**Clonidine**

α receptor agonist antihypertensive and sedative

- **PO:** 2-5 microgram/kg/DOSE Q6H
    (maximum 200 microgram/kg/DOSE)

Tapering of clonidine dose may be required to prevent rebound hypertension, particularly with longer-term use.
**Cloxacillin**

Beta-lactamase-resistant penicillin.

- **IV:** 25-50 mg/kg/DOSE Q6H (maximum 2 g/DOSE)
- **PO:** 6.25-12.5 mg/kg/DOSE Q6H (maximum 500 mg/DOSE)

Higher oral doses are poorly tolerated, usually use cephalexin instead.

**Cosyntropin**

Adrenal function testing agent

**Standard dose:**

- **IV:** 15 microgram/kg once (maximum 250 mcg)
  
Measure cortisol prior to, and 60 min post injection

**Low dose:**

- **IV:** 1 microgram once
  
Measure cortisol prior to, and 30 min post injection

**Co-trimoxazole**

*(Trimethoprim/Sulfamethoxazole, TMP/SMX)*

Sulfa derivative antibiotic

**Bacterial infections:**

- **PO/IV:** 4 mg of TMP component/kg/DOSE Q12H
  
  (may be increased to 6 mg/kg/DOSE for severe infections)

**Treatment of Pneumocystis carinii (jirovecii) pneumonia:**

- **PO/IV:** 3.75-5 mg of TMP component/kg/DOSE Q6H

Excellent oral absorption, use IV only if PO contraindicated. Maintain good fluid intake and urine output. Adjust dosing interval in renal
Impairment. If PCP is severe (i.e. hypoxia), consider adding methylprednisolone 1 mg/kg Q24H.

Order in mL of suspension or injection or number of tablets:
- Suspension: 8 mg TMP and 40 mg SMX/mL
- Injection: 16 mg TMP and 80 mg SMX/mL
- Tablet: 80 mg TMP and 400 mg SMX
- DS tablet: 160 mg TMP and 800 mg SMX

---

**Cyclosporine**

*Immunosuppressant*

- **IV:** 1.5-3 mg/kg/DOSE Q12H
- **PO:** 2.5-5 mg/kg/DOSE Q12H

Dose and target serum levels vary widely with indication and the individual protocol. IV dose is approximately 30-50% of oral dose. Requires dose reduction in liver or renal dysfunction. Cyclosporine interacts with many medications, including fluconazole, erythromycin, tacrolimus, diltiazem, methylprednisolone, phenytoin, phenobarbital, carbamazepine, trimethoprim. Trough levels usually 100-300 microgram/L but varies with the indication.

---

**Dantrolene**

*Malignant hyperthermia treatment:*

- **IV:** 1-3 mg/kg/DOSE rapid IV push, repeat as needed to usual maximum of 10 mg/kg, may be repeated if symptoms recur
Desmopressin (DDAVP)

Analogue of vasopressin

**Diabetes Insipidus:**
- IV/SC: 0.25-1 microgram/DOSE (maximum 4 microgram/DOSE)
- PO: 25-100 microgram/DOSE
- Nasal: 2.5-10 microgram/DOSE

These are initial doses, the dose and frequency of administration must be determined based on the patient’s response, usually given Q12-24H.

**Coagulopathy:**
- IV/SC: 0.3 microgram/kg/DOSE (maximum 20 microgram/DOSE)

Used as replacement therapy in diabetes insipidus, treatment of prolonged bleeding times and mild bleeding associated with some types of hemophilia. In the treatment of diabetes insipidus check urine output, volume status, serum and urine electrolytes prior to each dose. Parenteral dose is approximately 10% of intranasal dose and 1% of the oral dose.

Nasal spray=10 microgram/puff, nasal solution = 100 microgram/mL.

Dexamethasone

Corticosteroid

**Croup:**
- IV/PO: 0.6 mg/kg/DOSE once

**Meningitis:**
- IV: 0.15 mg/kg/DOSE Q6H for 4 days (maximum 10 mg/DOSE)

Begin with first antibiotic dose.
Prevention of post-extubation stridor:
   IV: 0.25-0.5 mg/kg/DOSE (max 10 mg/DOSE) Q6H Begin 24 hours pre-extubation if possible and, continue 24h after extubation.

Nausea and vomiting post chemotherapy:
   IV: 0.15 mg/kg/DOSE Q6H
Discontinuation of therapy >14 days requires gradual tapering. Consider supplemental steroids at times of stress if patient has received long-term or frequent bursts of steroid therapy. Prolonged weakness may occur when corticosteroids are used concurrently with non-depolarizing neuromuscular blocking agents.

---

**Dexmedetomidine**

α receptor agonist sedative
   IV: 0.5-1 microgram/kg then 0.2-0.7 microgram/kg/h
   May cause hypotension or bradycardia, particularly with loading dose.

---

**Dextrose**

Treatment of hypoglycemia
   IV: 0.5-1 g/kg/DOSE:
      1-2 mL/kg of 50% dextrose
      5-10 mL/kg of 10% dextrose
   1 mmol of dextrose (0.2 g of dextrose) provides 2.8 kJ (0.67 kcal).
Diazepam

Benzodiazepine sedative, anxiolytic and amnestic

Status epilepticus:

IV: 0.25 mg/kg/DOSE (maximum 10 mg/DOSE)
PR: 0.5 mg/kg/DOSE (maximum 20 mg/DOSE)

Sedation:

IV: 0.1-0.3 mg/kg/DOSE Q1H PRN

Fast onset and short duration of action with single doses, duration of action prolonged with continued use. Not first line drug for ICU sedation due to short duration of action and the potential for accumulation. Withdrawal may occur if discontinued abruptly after prolonged use. Can give parenteral preparation rectally, diluted with water.

Digoxin

<table>
<thead>
<tr>
<th>Loading dose</th>
<th>Total loading dose (maximum 1 mg)</th>
<th>Divide dose Q6H x 3 doses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PO</td>
<td>IV</td>
</tr>
<tr>
<td>37 weeks - 2 years</td>
<td>50 microgram/kg</td>
<td>35 microgram/kg</td>
</tr>
<tr>
<td>&gt; 2 years</td>
<td>40 microgram/kg</td>
<td>30 microgram/kg</td>
</tr>
<tr>
<td>Maintenance dose</td>
<td>Daily maintenance dose</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(usual maximum 250 microgram/DAY)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Begin 12 h after last loading dose</td>
<td></td>
</tr>
<tr>
<td>PO</td>
<td>IV</td>
<td></td>
</tr>
<tr>
<td>37 weeks - 2 years</td>
<td>10 microgram/kg</td>
<td>8 microgram/kg</td>
</tr>
<tr>
<td>&gt; 2 years</td>
<td>8 microgram/kg</td>
<td>6 microgram/kg</td>
</tr>
</tbody>
</table>

Usually divide daily maintenance dose Q12H if less than 10 years of age, otherwise give dose once daily. Doses based on ideal body weight, decrease dose for patients with renal impairment. Digoxin has many drug interactions including nifedipine, verapamil, amiodarone, erythromycin, cisapride and sucralfate. IV dose is approximately 80% of PO dose. Monitor trough levels (0.5-2 microgram/L or 1-2.6 micromol/L).

**Dimenhydrinate**

Antihistamine used to treat nausea and vomiting

- IV/PO: 1 mg/kg/DOSE Q4-6H (maximum 50 mg/DOSE)

**Diphenhydramine**

Antihistamine used primarily to treat urticaria

- IV/PO: 0.5-1 mg/kg/DOSE Q6H (maximum 50 mg/DOSE)

**Divalproex**

See valproic acid.
Dobutamine

Inotrope

IV: 2-20 microgram/kg/min
Correct hypovolemia first to prevent hypotension. Give via central line if possible.

Domperidone

Prokinetic agent

PO: 1.2-2.4 mg/kg/DAY divided Q6-8H (maximum 20 mg/DOSE)

Dopamine

Vasopressor and inotrope

IV: 2-20 microgram/kg/min
Correct hypovolemia first. Give via central line if possible.

Enalapril, Enalaprilat

Angiotensin converting enzyme inhibitor

PO: 0.1 mg/kg/DAY divided Q12-24H, increase as required (maximum 0.5 mg/kg/DAY or 40 mg/DAY).

IV: 5-10 microgram/kg/DOSE Q6-12H, titrated to clinical effect (usual maximum 30 microgram/kg/DOSE or 5 mg/DOSE).
Monitor blood pressure and renal function. Enalaprilat is the IV formulation of enalapril.
Enoxaparin

Anticoagulant, low-molecular weight heparin

Treatment:
  SC:  <2 months of age: 1.5 mg/kg/DOSE Q12H
       >2 months of age: 1 mg/kg/DOSE Q12H

Prophylaxis:
  SC:  <2 months of age: 0.75 mg/kg/DOSE Q12H
       >2 months of age: 0.5 mg/kg/DOSE Q12H
       (maximum 30 mg Q12H or 40 mg Q24H)

Monitor platelets and hemoglobin. Anti-factor Xa level drawn 4 hours post SC injection should be 0.5-1 unit/mL for treatment and 0.1-0.3 unit/mL for prophylaxis.

Epinephrine

Vasopressor and inotrope

Symptomatic bradycardia or pulseless arrest:
  IV:    0.01 mg/kg/DOSE (0.1 mL/kg of 1:10 000 solution)

Vasopressor (high dose):
  IV:    0.1-1 microgram/kg/min initially, titrated to effect

Inotrope (low dose):
  IV:    0.01-0.1 microgram/kg/min initially, titrated to effect

Post-extubation stridor/croup:
  NEB:   2.5 or 5 mg/DOSE via nebulizer PRN

Bronchiolitis:
  NEB:   1.5 or 2.5 mg/DOSE via nebulizer PRN

1:10 000 solution = 0.1 mg/mL and 1:1 000 solution = 1 mg/mL
**Ertapenem**

Broad spectrum carbapenem antibiotic

- **IV:**
  - <13 years: 15 mg/kg/DOSE Q12H (maximum 500 mg/dose)
  - >13 years: 1 g Q24H

Allergic reactions may occur in patients with penicillin hypersensitivities. Reserved for documented resistance. Not active against *Pseudomonas aeruginosa*.

**Erythromycin**

Macrolide antibiotic

- **IV:** 6.25-12.5 mg/kg/DOSE Q6H (maximum 1 g/DOSE)
- **PO:** 7.5-10 mg/kg/DOSE QID (maximum 500 mg/DOSE)

Has many drug interactions, may increase levels of midazolam, carbamazepine, theophylline, cyclosporine, phenytoin. GI adverse effects common, even with IV use. Thrombophlebitis common.

**Esmolol**

Short acting β blocking agent

Atrial fibrillation/atrial flutter/VT/hypertension:

- **IV:**
  - 100-500 microgram/kg then
  - 50-300 microgram/kg/min

  Titrate by 50-100 microgram/kg/min Q5-10MIN, doses of 500-1000 micrograms/kg/min have been rarely required.

Short-term use only, consider bolus dose with each increase in infusion. Change to longer acting agent once desired effect achieved. Duration of action is approximately 10 minutes.
Ethacrynic Acid
Loop diuretic
  IV:  0.5-1 mg/kg/DOSE (usual maximum 50 mg/DOSE)
Use only if poor response to appropriate doses of furosemide. Repeat
doses are not usually recommended but has been given Q8-24H.
Monitor for hypokalemia and consider supplementation.

Etomidate
Sedative
Endotracheal intubation:
  IV:  0.2-0.4 mg/kg/DOSE
Onset of action is within 1 minute, minimal hemodynamic effect.
Etomidate is not marketed in Canada and may not be available in all
situations. May cause adrenal insufficiency.
Fentanyl

Short-acting opioid analgesic

Procedural sedation/analgesia:
  IV: 0.5-1 microgram/kg/DOSE, repeated PRN

Sedation/analgesia:
  IV: 0.5-2 microgram/kg then
     0.5-2 microgram/kg/h (usual maximum 10 microgram/kg/h)
     and/or
     0.5-2 microgram/kg/DOSE Q1-2H PRN

Reduce dose if used in combination with benzodiazepines. Use with caution in non-ventilated patients due to potential for respiratory depression. Rapid IV administration may cause chest wall rigidity with subsequent difficulty with ventilation (give naloxone or paralysis). Withdrawal may occur if discontinued abruptly after prolonged use.

Ferrous Sulfate

See iron

Fluconazole

Antifungal

Oropharyngeal candidiasis:
  IV/PO: 3 mg/kg/DOSE Q24H (maximum 200 mg/DOSE)

Esophageal candidiasis:
  IV/PO: 6 mg/kg/DOSE Q24H (maximum 400 mg/DOSE)
Candidemia:
   IV/PO: 12 mg/kg/DOSE once (maximum 800 mg) then
   6 mg/kg/DOSE Q24H (usual maximum 400 mg, but higher
doses have been used)
Excellent oral absorption, use IV only if PO is not possible. Adjust
dosing interval in renal impairment. May increase serum levels of
cyclosporine, midazolam, cisapride, phenytoin. *Aspergillus* species
and *Candida krusei* are intrinsically resistant, *Candida glabrata* may
respond to higher doses.

---

**Flumazenil**

Benzodiazepine antagonist
   IV: 0.01 mg/kg/DOSE Q1-3MIN PRN (maximum 0.2 mg/DOSE)
   (maximum total dose is 0.05 mg/kg or 1 mg)
Reverses sedation but may not reliably reverse respiratory depression.
Monitor for recurring sedation, as repeat doses may be required. May
precipitate seizures and/or benzodiazepine withdrawal. Not
recommended for routine use in the PICU or in suspected overdoses.

---

**Fluticasone**

Inhaled corticosteroid
   INH: 125-500 microgram Q12H
Higher doses may be required if administered through a
ventilator due to loss of drug in the circuit.
**Fomepizole**

Treatment of methanol or ethylene glycol overdose:
- **IV:** 15 mg/kg/DOSE then
  - 10 mg/kg/DOSE Q12H until levels are below toxic range

Doses may require adjustment during hemodialysis or if therapy is required for longer than 48h.

---

**Furosemide**

Loop diuretic
- **PO:** 1-2 mg/kg/DOSE Q6-24H
- **IV:** 0.5-2 mg/kg/DOSE Q6-24H or
  - 0.1 mg/kg/hour and titrate to effect (max 0.5 mg/kg/h)

Monitor for hypokalemia and consider supplementation.

---

**Gentamicin**

Aminoglycoside antibiotic

**Gram negative infections:**
- **IV:** 5-6 mg/kg/DOSE Q24H
  - (4 mg/kg/DOSE Q24H in newborns)

**Enterococcal infections (for synergy with beta-lactams):**
- **IV:** 3 mg/kg/DOSE Q24H

Adjust dosing interval in renal impairment. Ototoxicity and nephrotoxicity may occur, consider monitoring trough levels (target <2 mg/L) in patients at risk for nephrotoxicity; septic shock, concurrent nephrotoxins, fluctuating renal function or extended treatment courses.
Glucagon

Treatment of hypoglycemia:
   IV/IM/SC:  0.025-0.1 mg/kg/DOSE (maximum 1 mg/DOSE)
   or
   <20 kg:  0.5 mg
   >20 kg:  1 mg

Hypotension and bradycardia caused by β blocker overdose:
   IV:   0.05-0.15 mg/kg then 1-5 mg/h (maximum 15 mg/h), titrate
         to heart rate and blood pressure.

For hypoglycaemia, may need to repeat dose and/or give glucose due
to short duration of action.

Glycopyrrolate

Anticholinergic

Reduction of secretions:
   IV:  4-10 microgram/kg/DOSE Q6H
   PO:  40-100 microgram/kg/DOSE Q6H

Note difference between IV and PO doses.

Haloperidol

Antipsychotic

   PO/IV/IM:  <12 years:  0.5-1 mg/DOSE Q6H PRN
              >12 years:  1-2.5 mg/DOSE Q6H PRN
              (usual maximum 6-10 mg/DAY)

PO route of administration preferred. Extrapyramidal reactions can be
treated with diphenhydramine or benztropine
Helium/Oxygen

Low density gas mixture of helium and oxygen

Upper airway obstruction:
  INH: 80% helium and 20% oxygen (80:20)
  or
  70% helium and 30% oxygen (70:30)

The greater the helium content, the less dense the gas. Used in the treatment of upper airway obstruction due to post-extubation stridor or status asthmaticus.

Heparin

Anticoagulant

IV: 75 units/kg bolus (maximum 5 000 units) then:
  <1 year of age: 28 units/kg/hour
  >1 year of age: 20 units/kg/hour (maximum 1 000 units/h)

Measure APTT 4 hours after loading dose and target 60-85 seconds.

<table>
<thead>
<tr>
<th>APTT (s)</th>
<th>Bolus (units/kg)</th>
<th>Hold (minutes)</th>
<th>Dose Change (units/kg/h)</th>
<th>Repeat APTTT (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50</td>
<td>50</td>
<td>0</td>
<td>↑20%</td>
<td>4</td>
</tr>
<tr>
<td>50-59</td>
<td>0</td>
<td>0</td>
<td>↑10%</td>
<td>4</td>
</tr>
<tr>
<td>60-85</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>86-95</td>
<td>0</td>
<td>0</td>
<td>↓10%</td>
<td>4</td>
</tr>
<tr>
<td>96-120</td>
<td>0</td>
<td>30</td>
<td>↓10%</td>
<td>4</td>
</tr>
<tr>
<td>&gt;120</td>
<td>0</td>
<td>60</td>
<td>↓15%</td>
<td>4</td>
</tr>
</tbody>
</table>
Hydralazine

Antihypertensive, vasodilator

IV: 0.1-0.5 mg/kg/DOSE Q4-6H (usual maximum 20 mg/DOSE)
PO: 0.75-1 mg/kg/DAY divided TID-QID, increase as required and tolerated (maximum of 5 mg/kg/DAY)

May cause reflex tachycardia. Onset of action within 15 minutes after IV administration.

Hydrochlorothiazide

Thiazide diuretic

PO: 0.5-1 mg/kg/DOSE BID
Hydrocortisone

Corticosteroid.

**Acute asthma:**
- IV: 1-2 mg/kg/DOSE Q6H (maximum 5 mg/kg/DOSE)

**Anaphylaxis:**
- IV: 5-10 mg/kg/DOSE

**Refractory septic shock:**
- IV: 1 mg/kg/DOSE Q6H (maximum 50 mg/DOSE)

**Acute adrenal crisis:**
- IV: 1-2 mg/kg then
  - Infants: 25-150 mg/DAY divided Q6-8H
  - Older children: 150-300 mg/DAY divided Q6-8H

Discontinuation of therapy >14 days requires gradual tapering.
Consider supplemental steroids at times of stress if patient has received long-term or frequent bursts of steroid therapy. Prolonged weakness may occur when corticosteroids are used concurrently with non-depolarizing neuromuscular blocking agents.

Hydromorphone

Opioid analgesic

**Sedation/analgesia:**
- IV: 0.01-0.02 mg/kg/DOSE Q2-4H and increase as required or
  0.01-0.02 mg/kg then 2-8 microgram/kg/h (usual maximum 10 microgram/kg/h) and 0.01-0.02 mg/kg /DOSE Q2-4H PRN
Reduced doses may be required if used in combination with benzodiazepines. Use with caution in non-ventilated patients due to potential for respiratory depression. There is no upper dose limit if increased gradually. To prevent withdrawal, avoid abrupt cessation following high doses or long duration of therapy (> 5 days). Common adverse effects are pruritus, nausea and constipation, which may be overlooked in PICU patients.

**Hypertonic saline**
see: Sodium Chloride 3%

**Ibuprofen**
Analgesic and anti-inflammatory (NSAID)

<table>
<thead>
<tr>
<th>PO/PR:</th>
<th>Weight (kg)</th>
<th>Single Dose (mg) maximum Q6H</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.0 - 5.4</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>5.5 - 7.9</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>8.0 - 10.9</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>11.0 - 15.9</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>16.0 - 21.9</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>22.0 - 26.9</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td>27.0 - 31.9</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>32.0 - 43.9</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>44 - over</td>
<td>400</td>
</tr>
</tbody>
</table>

Avoid in children with, or at high risk of, renal dysfunction or bleeding.
**Insulin**

Diabetic ketoacidosis:
- **IV:** 0.05-0.1 units/kg/h initially, measure blood glucose Q1H, adjust dose as required.

Hyperkalemia:
- **IV:** 0.1 units/kg IV bolus AND dextrose 0.5 g/kg,
For IV administration MUST use regular insulin.

**Ipratropium**

Inhaled anticholinergic bronchodilator

Severe asthma:
- **NEB:** 125-250 microgram (0.5-1 mL) Q4-6H
- **INH:** 2-4 puffs Q4-6H
  Higher doses may be required if administered through a ventilator due to loss of drug in the circuit.

**Iron**

Treatment of iron deficiency anemia:
- **PO:** 4-6 mg/kg/DAY divided Q8-24H

Prevention of iron deficiency anemia:
- **PO:** 2-3 mg/kg/DOSE Q24H
Dosed in mg of elemental iron. Give with food if GI upset occurs.

**Isoproterenol**

β adrenergic agonist
Temporary management of bradycardia:
   IV: 0.025-1 microgram/kg/min (maximum 2 microgram/kg/min)
Used for the treatment of atropine resistant bradyarhythmias, ventricular arrhythmias due to A-V block. Increases risk of arrhythmias.

Kayexalate®
See cation exchange resins

Ketamine
Dissociative anaesthetic and analgesic.

Procedural sedation/ intubation:
   IV: 0.5-2 mg/kg/DOSE
   IM: 3-5 mg/kg/DOSE

Sedation in intubated patients (rarely used):
   IV: 5-20 microgram/kg/min

Ketamine has little respiratory or cardiovascular depressant effect. Useful for short painful procedures. Avoid in the presence of increased ICP or intraocular pressure. Emergence reactions such as vivid dreams or hallucinations may be treated with benzodiazepines.

Ketorolac
Analgesic and anti-inflammatory (NSAID)
   IV/IM: 0.5 mg/kg/DOSE Q6H (maximum 15-30 mg/DOSE)
Avoid in children with, or at high risk of, renal dysfunction or bleeding. Use ibuprofen if oral NSAID is required.
Labetalol
Antihypertensive, α and β receptor blocker

Hypertensive urgencies/emergencies:
IV: 0.2-0.5 mg/kg/DOSE (maximum 20 mg/DOSE) Q15-20MIN until desired response is obtained
or
0.5-3 mg/kg/h

Lactulose
Osmotic laxative
PO: infants: 2.5-5 mL Q8-24H
children: 5-10 mL Q8-24H
adolescents: 15-30 mL Q8-24H

Lansoprazole
Inhibitor of gastric acid secretion (proton pump inhibitor)
PO: Adult dose: 15 or 30 mg/DOSE Q24H
Use omeprazole if other doses or an oral liquid is required.

Levofloxacin
Quinolone antibiotic
IV/PO: 10 mg/kg/DOSE Q24H (maximum 500 or 750 mg/DOSE)
Excellent oral absorption, use IV only if PO contraindicated. Feeds, formula, calcium, magnesium, iron, antacids and sucralfate reduce
absorption, hold feeds for 1 hour before and 2 hours after dose. Adjust dosing interval in renal impairment.

**Lidocaine**

**Antiarrhythmic:**
- IV: 1 mg/kg/DOSE, repeat PRN to a maximum of 3 doses then 20-50 microgram/kg/min. Use lower doses in children with shock, hepatic disease, cardiac arrest and CHF to prevent toxicity.

**Prevention of increased ICP with intubation or suctioning:**
- IV: 1-2 mg/kg/DOSE (usual maximum Q4H)
2% solution = 20 mg/mL, 1% solution = 10 mg/mL

**Linezolid**

**Antibiotic**
- IV/PO: 10 mg/kg/DOSE Q12H (maximum 600 mg/DOSE)
Q8H dosing has been used in younger children. Excellent oral absorption, use IV only if PO contraindicated. Linezolid has many drug interactions, including serotonergic agents (e.g. SSRIs and tricyclic antidepressants), meperidine, dextromethorphan.

**Lipid Emulsion (20%)**

**Lipid rescue for cardiovascular toxicity with lipid-soluble medications:**
- IV: 1.5 mL/kg then 7.5 mL/kg over 30 minutes
  May repeat bolus dose twice every 5 minutes
Lorazepam

Benzodiazepine sedative, anxiolytic and amnestic

Status epilepticus:
- **IV:** 0.1 mg/kg/DOSE (usual maximum 4 mg/DOSE)
- **PR:** 0.2 mg/kg/DOSE (usual maximum 8 mg/DOSE)

ICU sedation:
- **IV/PO:** 0.05-0.1 mg/kg/DOSE Q1H PRN (may increase to 0.2 mg/kg/DOSE)

Intermediate duration of action and no active metabolites. Withdrawal may occur if discontinued abruptly after prolonged use. May give parenteral preparation rectally, diluted with water.

Magnesium Sulfate

Electrolyte

**Hypomagnesemia:**
- **IV:** 25-100 mg/kg/DOSE of magnesium sulfate (maximum 5 g/DOSE, usual maximum rate is 20 mg/kg of magnesium sulfate/h)

**Severe asthma:**
- **IV:** 25-75 mg/kg/DOSE of magnesium sulfate once over 20 minutes (maximum 2 g/DOSE)

**Torsades des pointes:**
- **IV:** 25-50 mg/kg/DOSE of magnesium sulfate given as a rapid infusion (maximum 2 g/DOSE)

Order in mg or g of magnesium sulfate to reduce the potential for error. Watch for hypotension with faster infusion rates. Usual dilution
for infusion is 10 mg of magnesium sulfate/mL. 1 g of magnesium sulfate=4 mmol of magnesium=8 mEq of magnesium=100 mg of elemental magnesium.

**Mannitol**

Osmotic diuretic

**Reduction of intracranial pressure:**

**IV:** 0.25-1 g/kg (1.25-5 mL/kg of 20% solution) over 15-30 minutes Q4-6H PRN

Contraindicated in anuric patients. Monitor serum osmolality if frequent doses are required. (20% solution=0.2 g/mL)

**Meropenem**

Broad spectrum carbapenem antibiotic

**Meningitis:**

**IV:** 40 mg/kg/DOSE Q8H (maximum 2 g/DOSE)

**Other infections:**

**IV:** 60 mg/kg/DAY divided Q6-8H

(usual max 500 mg Q6H or 1 g Q8H)

Increase dosing interval for patients with renal impairment. Allergic reactions may occur in patients with penicillin hypersensitivities. Reserved for documented resistance.

**Methylene Blue**

Treatment of drug induced methemoglobinemia:

**IV:** 1-2 mg/kg/DOSE, may repeat in 1 hour PRN
Methylprednisolone

Corticosteroid

Severe acute asthma:
  IV:  0.5-1 mg/kg/DOSE Q12H (usual maximum 40 mg/dose)
  or
  1-2 mg/kg/DOSE Q6H has been used
  Change to oral prednisone when improved.

Anti-inflammatory:
  IV:  1-2 mg/kg/DOSE Q24H

High dose/pulse therapy:
  IV:  10-30 mg/kg/DOSE Q24H for 1-3 doses

Spinal cord injury:
  IV:  30 mg/kg over 15 minutes then
        5.4 mg/kg/h beginning 45 minutes later for 23 or 48 h

Discontinuation of therapy >14 days requires gradual tapering.
Consider supplemental steroids at times of stress if patient has received long-term or frequent bursts of steroid therapy. Prolonged weakness may occur when corticosteroids are used concurrently with non-depolarizing neuromuscular blocking agents.

Metoclopramide

Antiemetic, gastrointestinal prokinetic agent
  IV/PO: 0.1-0.2 mg/kg/DOSE Q6H (maximum 10-20 mg/DOSE)
Extrapyramidal reactions may be treated with diphenhydramine or benztropine.
Metolazone

Thiazide diuretic

PO: 0.2-0.4 mg/kg/Dose Q24h (usual maximum 10 mg/Dose)

Metronidazole

Anti anaerobic antibiotic

Aerobic infections:

IV/PO: 10-15 mg/kg/Dose Q12H (maximum 500 g/Dose)

CNS infections/C. difficile:

IV/PO: 7.5 mg/kg/Dose Q6H (maximum 250-500 g/Dose)

Excellent oral absorption, use IV only if PO contraindicated or not tolerated. Enteral administration preferred for C. difficile, but IV can be used.
Midazolam

Benzodiazepine sedative, anxiolytic and amnestic

**Procedural sedation:**
- **IV:** 0.05-0.1 mg/kg/DOSE, repeat PRN to desired level of sedation
- **PO:** 0.25-0.5 mg/kg (usual maximum 20 mg)

**ICU sedation:**
- **IV:** 0.05-0.1 mg/kg/DOSE Q1H PRN
  - or
  - 1-4 microgram/kg/min
  - (usual maximum 6 microgram/kg/min) and
  - 0.05-0.1 mg/kg Q1H PRN

**Refractory status epilepticus:**
- **IV:** 0.2 mg/kg then
  - 1 microgram/kg/min, increased Q15MIN PRN, most cases require less than 5 microgram/kg/min but doses of up to 24 mcg/kg/min have been used

Midazolam has a short duration of action after single doses, but may have an extended duration of action after repeated dosing due to accumulation. Continuous infusions of benzodiazepines for ICU sedation are recommended only if intermittent boluses are ineffective. Always order a breakthrough dose to treat acute agitation if using a continuous infusion. Withdrawal may occur if discontinued abruptly after prolonged use.
Milrinone

Inotrope and vasodilator

IV: 50 microgram/kg over 15 min then 0.25-0.75 microgram/kg/min (maximum 1 microgram/kg/min)

If hypotensive, loading dose may be omitted or the rate of administration decreased. Hemodynamic effects are similar to dobutamine, watch for hypotension and thrombocytopenia.

Morphine

Opioid analgesic

Sedation/analgesia:

IV: 0.05-0.1 mg/kg/DOSE Q2H PRN and increase as required or 0.05-0.1 mg/kg/DOSE then 10-40 microgram/kg/h (usual maximum 100 microgram/kg/h) and 0.05-0.1 mg/kg DOSE Q1-2H PRN

PO: 0.2-0.5 mg/kg/DOSE Q4H PRN (usual maximum 15 mg/DOSE)

Reduced doses may be required if used in combination with benzodiazepines. Use with caution in non-ventilated patients due to potential for respiratory depression. There is no upper dose limit if increased gradually. To prevent withdrawal, avoid abrupt cessation following high doses or long duration of therapy (> 5 days). Common adverse effects are pruritus, nausea and constipation, which may be overlooked in PICU patients.
**Naloxone**

Opioid antagonist used to reverse opioid induced respiratory depression

**Opioid overdose/respiratory arrest:**

- **IV/IM/SC:** 0.1 mg/kg Q1-2MIN PRN (maximum 2 mg/DOSE)
  
  If re-sedation occurs despite frequent doses, an infusion may be necessary. Initial hourly dose of infusion should be equal to two-thirds of the total bolus doses given.

**Partial reversal of opioid induced respiratory depression:**

- **IV/IM/SC:** 0.01 mg/kg q1-2 minutes PRN until desired effect
  
  (usual maximum 0.1 mg/DOSE)

**Treatment of opioid induced pruritis:**

- **IV:** 0.25-2 microgram/kg/h

May precipitate withdrawal in opioid dependent patients. Will also reverse analgesia.

---

**Naproxen**

Analgesic and anti-inflammatory (NSAID)

- **PO:** 5-10 mg/kg/DOSE Q12H (maximum 500 MG/DOSE)

Avoid in children with, or at high risk of, renal dysfunction or bleeding.

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**Neostigmine**

Reversal of non-depolarizing neuromuscular blockers:

- **IV:** 0.025-0.1 mg/kg/DOSE
  
  (usual maximum 0.5-2 mg/DOSE, to a total dose of 5 mg)
Will not reverse the effects of succinylcholine. Give with atropine to prevent bradycardia and other cholinergic effects. Complete reversal may take several minutes and repeat doses may be required.

**Nifedipine**

Antihypertensive, calcium channel blocker

**Hypertensive urgencies:**

PO: 0.25-0.5 mg/kg/DOSE, 0.1 mg/kg/DOSE has also been used (maximum 10 mg/DOSE). 5 or 10 mg/DOSE preferred for ease of administration.

**Hypertension:**

PO: 0.5-1 mg/kg/DAY (usual maximum 3 mg/kg/DAY or 120 mg/DAY)

Bite and swallow capsule for rapid (<5 minutes) effect, very little drug is absorbed sublingually. May cause rapid and profound hypotension. Available as 5 and 10 mg short acting capsules (dose Q6-8H) and 20, 30 and 60 mg extended release tablets (dose Q24H).

**Nitric Oxide**

Pulmonary vasodilator

**Treatment of pulmonary hypertension:**

INH: 10 ppm initially then titrated based on response (maximum 20 ppm)

May increase methemoglobinemia, inhibit platelet aggregation or cause rebound pulmonary vasoconstriction. Check methemoglobin levels within first 6 h then Q12H.
Nitroglycerin
Antihypertensive, vasodilator
  IV: 0.5-5 (maximum 10) microgram/kg/min
  Titrate to effect, tolerance may develop requiring dosage adjustment.

Nitroprusside
Antihypertensive, vasodilator
  IV: 0.5-3 (maximum 5) microgram/kg/min
  Monitor for cyanide toxicity in patients with renal insufficiency, high doses or prolonged infusions.

Norepinephrine
Vasopressor with α and β activity
  IV: 0.05-1 microgram/kg/min
  Give via central line.

Nystatin
Topical antifungal

Oral candidiasis:
  PO: infants: 100 000 units Q6H
       children: 250 000 units Q6H
       adolescents: 500 000 units Q6H
  Swish and swallow or apply to mouth with swab.
Octreotide
Synthetic analogue of somatostatin

Variceal bleeding:
   IV: 1 microgram/kg then
       1 microgram/kg/h (usual maximum 50 microgram/h)

Chylothorax:
   IV: 0.3 microgram/kg/h initially.
       Up to 10 microgram/kg/h has been used.
   SC: 2-10 microgram/kg/DOSE Q8H

Sulfonylurea overdose:
   SC: 1-1.5 microgram/kg/DOSE Q6-12H PRN initially.
       Adjust dose and frequency based on response.

Olanzapine
Antipsychotic
   PO: <12 years: 2.5-5 mg/DOSE Q6H PRN
       >12 years: 5-10 mg/DOSE Q6H PRN
       (maximum 20 mg/DAY)
   IM: 5-10 mg/DOSE (1 dose only)

Orally disintegrating tablets provide a similar onset of action to regular tablets.

Omeprazole
Inhibitor of gastric acid secretion (proton pump inhibitor)
   PO: 1 mg/kg/DOSE Q12-24H (maximum 40 mg/DAY)
An oral solution is available but is very unpalatable.
**Ondansetron**

Antiemetic

**Nausea and vomiting:**
- IV: 0.1 mg/kg/DOSE Q8H PRN (maximum 4 mg/DOSE)

**Chemotherapy induced nausea and vomiting:**
- IV: 0.15 mg/kg/DOSE Q8H (maximum 8 mg/DOSE)

---

**Oseltamivir**

**PO:**

<table>
<thead>
<tr>
<th>Age/Weight</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Younger than 3 months*</td>
<td>12 mg Q12H*</td>
</tr>
<tr>
<td>3-5 months*</td>
<td>18 mg Q12H*</td>
</tr>
<tr>
<td>6-11 months*</td>
<td>24 mg Q12H</td>
</tr>
<tr>
<td>Older than 12 months</td>
<td></td>
</tr>
<tr>
<td>&lt;15 kg</td>
<td>30 mg Q12H</td>
</tr>
<tr>
<td>&gt;15-23 kg</td>
<td>48 mg Q12H</td>
</tr>
<tr>
<td>&gt;23-40 kg</td>
<td>60 mg Q12H</td>
</tr>
<tr>
<td>&gt;40 kg</td>
<td>75 mg Q12H</td>
</tr>
</tbody>
</table>

*3 mg/kg/DOSE Q12H may also be used for children less than 12 months of age. Round doses to nearest 3 mg.

---

**Pancuronium**

Non-depolarizing neuromuscular blocking agent

- IV: 0.1 mg/kg/DOSE Q1H PRN
Duration of action approximately 60-90 minutes. Regular analgesia, sedation and ocular lubrication required. Duration of action may be prolonged for patients with renal impairment. May cause tachycardia. Prolonged weakness may occur, especially when corticosteroids are used concurrently with non-depolarizing neuromuscular blocking agents.

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**Pantoprazole**

Inhibitor of gastric acid secretion (proton pump inhibitor)

**Stress ulcer prophylaxis:**

- **IV:** 1-1.5 mg/kg/DOSAGE Q24H (maximum 40 mg/DOSAGE)

**Major gastrointestinal hemorrhage:**

- **IV:** 1-2 mg/kg (maximum 80 mg) then
  - 0.1-0.2 mg/kg/h (maximum 8 mg/h)

Intravenous and oral proton pump inhibitors provide equivalent acid suppression.

---

**Paraldehyde**

Anticonvulsant

- **IV:** 100-200 mg/kg/DOSAGE over 20 min to 2 h, may follow with
  - 20-50 mg/kg/h, titrated to response.
- **PR:** 200-400 mg/kg/DOSAGE

Paraldehyde has largely been supplanted by other less toxic and easier to administer agents. Give rectally diluted with an equal amount of saline or oil (mineral or olive). Paraldehyde is supplied as a 1 000 mg/mL solution.
Penicillin G

Antibiotic

Meningitis:
- IV: 400 000 units/kg/DAY divided Q4H (max 4 million units/DOSE)

Other infections:
- IV: 100 000-400 000 units/kg/DAY divided Q4-6H (maximum 4 million units/DOSE)

Increase dosing interval for patients with renal impairment.

Pentobarbital

Barbiturate sedative and anticonvulsant

Procedural sedation:
- IV: 1-3 mg/kg/DOSE, repeat 1-2 mg/kg Q5-10MIN until adequate sedation (usual maximum 6 mg/kg or 200 mg total dose)

Refractory status epilepticus:
- IV: 3-5 mg/kg/DOSE over 20 min, repeat 1-2 doses if required, then
  1-3 mg/kg/hour, higher doses may be required

Hypotension is common, especially with rapid infusion, treat promptly with fluids and vasopressors. Avoid extravasation, central line preferred. Respiratory depression is common. Coma usually occurs at 20-40 mg/L (88-177 micromol/L), but higher levels may be required. Has no analgesic properties.
Phenobarbital

Barbiturate anticonvulsant

Status epilepticus:
  IV: 15-20 mg/kg/DOSE over 20 minutes (maximum 1 g)

Maintenance:
  IV/PO: 3-5 mg/kg/DOSE Q24H

Usual serum level for seizure control: 65-172 micromol/L (15-40 mg/L).

Phentolamine

α receptor blocker

Treatment of α agonist drug extravasation:
  SC: Dilute 5 mg in 10 mL of NS and infiltrate area of extravasation
       (maximum 0.1-0.2 mg/kg or 5 mg total dose)

Consider use in extravasations of dopamine, epinephrine, norepinephrine and phenylephrine.

Phenylephrine

Vasopressor, α receptor agonist

Refractory hypotension and shock:
  IV: 0.1-2 microgram/kg/min (usual maximum 4 microgram/kg/min)
     For tetralogy of Fallot/hypercyanotic spells may give bolus of 5-10 microgram/kg before beginning infusion.

Give via central line.
Phenytoin

Anticonvulsant, antiarrhythmic

Status epilepticus:

IV: 20 mg/kg/DOSE over 20 minutes (maximum 1 g/DOSE)

Maintenance:

IV/PO: 5 mg/kg/DAY (range 3-10 mg/kg/DAY) divided Q8-12H

Anti-arrhythmic:

IV: 1.25 mg/kg/DOSE Q5MIN until arrhythmia suppressed (maximum of 15 mg/kg total dose)

or

15 mg/kg/DOSE over 20 min

May require higher doses for patients with head injuries. Must be diluted in saline only and requires in-line filter (0.22 micron). Hold feeds 1-2 hours before and after enteral administration as continuous feeds and formula may decrease absorption of oral phenytoin. Significantly increased free fraction in patients with hypoalbuminemia may result in underestimation of effective drug concentration and difficulty in interpretation of drug levels and toxicity may occur at “therapeutic” serum levels. Therapeutic level: 40-80 micromol/L (10-20 microgram/mL).

Phosphate

Electrolyte

Hypophosphatemia:

IV: 0.15-0.6 mmol/kg of phosphate/DOSE

as either potassium or sodium phosphate
Potassium phosphate supplies approximately 1.5 mEq of potassium for each mmol of phosphorus. Please round doses to 15 or 30 mmol of phosphate if appropriate. Maximum rate of administration is 0.3 mmol of phosphate/kg/h (to maximum of 15 mmol/h). Correct deficit slowly and check serum phosphate and potassium after each dose as potassium phosphate may cause arrhythmias and cardiac arrest with rapid IV administration.

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**Phytonadione**

See vitamin K

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**Piperacillin**

Broad spectrum penicillin

- **IV:** 50-75 mg/kg/DOSE Q6H (maximum 4 g/DOSE)

Adjust dose interval in severe renal impairment. Active against *Pseudomonas aeruginosa*.

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**Piperacillin/Tazobactam**

Broad spectrum penicillin with beta-lactamase inhibitor

- **IV:** 75 mg/kg of piperacillin component/DOSE Q6-8H (maximum 4 g/DOSE)

Adjust dosage interval for patients with severe renal impairment. Active against gram positive, (including *S. aureus*), gram negative and anaerobic organisms.
Polyethylene glycol (PEG) 3350

Osmotic laxative

PO: infants: 0.5-1 g/kg/DOSE Q24H  
     children: 8.5-17 g/DOSE Q24H  
     adolescents: 17 g/DOSE Q24H  

Titrate dose to effect. Dissolve each 17 g in 250 mL of water (minimum 80 mL if fluid restricted).

Potassium Chloride

Electrolyte

Treatment of hypokalemia:

PO: 1-2 mEq/kg/DAY divided Q6-12H  
     (usual maximum 20 or 40 mEq/DOSE)  
IV: 0.25-1 mEq/kg/DOSE

Please round doses to 10 or 20 mEq if appropriate.

Maximum rate of administration in PICU is 0.5 mEq/kg/h (maximum 20 mEq/h). Use 0.1 mEq/mL for peripheral use, 0.2 mEq/mL for central lines. For maintenance fluids the usual maximum concentration for a peripheral IV is 40 mEq/L. Risk of arrhythmias and cardiac arrest with rapid IV administration. Dose recommendations assume normal renal function.

<table>
<thead>
<tr>
<th>Serum potassium (mmol/L)</th>
<th>IV dose (mmol/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2.5</td>
<td>1</td>
</tr>
<tr>
<td>2.5-3</td>
<td>0.5</td>
</tr>
<tr>
<td>3-3.5</td>
<td>Enteral route, TPN or IV fluids preferred.</td>
</tr>
<tr>
<td>3.5</td>
<td>0.25 if clinically indicated</td>
</tr>
</tbody>
</table>
Potassium Citrate

Treatment of hypokalemia:
PO: 1-2 mEq/kg/DAY divided Q6-12H (usual max 25 or 50 mEq/DOSE)
Dose recommendations assume normal renal function. Supplied as a 25 mEq tablet.

Potassium Phosphate
See phosphate

Prednisone, Prednisolone
Corticosteroid
Acute asthma:
PO: 1-2 mg/kg Q24H (usual maximum 50 mg/DOSE)
1 mg prednisone = 1 mg prednisolone. Discontinuation of therapy >14 days requires gradual tapering. Consider supplemental steroids at times of stress if patient has received long-term or frequent bursts of steroid therapy. Prolonged weakness may occur when corticosteroids are used concurrently with non-depolarizing neuromuscular blocking agents.
Procainamide

Antiarrhythmic

IV: Loading dose: 15 mg/kg over 30-60 min
or
3-5 mg/kg over 5 min Q5-10MIN until arrhythmia is
suppressed (maximum 1 g total dose)
then 20-80 microgram/kg/min

Do not use with other drugs that prolong the QT interval such as
amiodarone.

Propofol

General anaesthetic

Procedural sedation and intubation:
IV: 1-3 mg/kg

ICU sedation:
IV: 0.5-4 mg/kg/h

Anesthesia:
IV: 80-200 microgram/kg/min

Limit use to <12h and <4 mg/kg/h, prolonged use in children is not
recommended because of a
suggested risk of fatal metabolic
acidosis. May cause hypotension,
local pain with infusion and infection
(lipid vehicle is an excellent medium
for microbial growth).

<table>
<thead>
<tr>
<th>Dosing unit conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>mg/kg/h</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
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<tr>
<td>6</td>
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<tr>
<td>8</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>12</td>
</tr>
</tbody>
</table>
Propranolol

Non-selective β receptor blocker

Arrhythmias:
  IV: 0.01-0.15 mg/kg/DOSE may repeat Q6-8H PRN (max 3 mg/DOSE)
  PO: 0.5-4 mg/kg/DAY divided Q6-8H (usual maximum 320 mg/DAY)

Tetralogy Spells:
  IV: 0.05-0.1 mg/kg/DOSE over 10 minutes
      (maximum 0.25 mg/kg/DOSE or 3 mg/DOSE).
  PO: 1-6 mg/kg/DAY divided Q6-8H (usual maximum 320 mg/DAY)

Note difference between IV and PO doses. Use is contraindicated in bradycardia, heart block and asthma.
Protamine

Heparin reversal agent

**IV:** 1 mg for each 100 units of heparin given within the previous 2 h (maximum of 50 mg/DOSE)

or:

<table>
<thead>
<tr>
<th>Minutes since last heparin dose</th>
<th>Protamine dose per 100 units heparin (maximum 50 mg/DOSE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30</td>
<td>1 mg</td>
</tr>
<tr>
<td>30-60</td>
<td>0.5-0.75 mg</td>
</tr>
<tr>
<td>60-120</td>
<td>0.375-0.5 mg</td>
</tr>
<tr>
<td>&gt;120</td>
<td>0.25-0.375 mg</td>
</tr>
</tbody>
</table>

Give over at least 10 minutes. Use with caution in patients with known reactions to fish. Check APTT 15 minutes after administration of protamine. May need repeat doses if heparin was given by SC injection due to slower absorption. Protamine will not reliably neutralize low molecular weight heparins, but with life threatening bleeding can try 1 mg protamine for every 1 mg or 100 Units of low molecular weight heparin.

Ranitidine

H2 receptor antagonist

**Reduction of gastric acid secretion:**

**IV:** 2-4 mg/kg/DAY divided Q8-12H (maximum 50 mg/DOSE)

**PO:** 2-5 mg/kg/DOSE Q12H (usual maximum 150 mg/DOSE)

IV dose is approximately 50% of oral dose. Modify dosage interval for patients with renal impairment. May add daily dose to TPN.
Remifentanil

Opioid anesthetic and analgesic

**Rapid sequence induction:**
- **IV:** 2-4 microgram/kg/DOSE

**Short-term sedation:**
- **IV:** 0.05-0.3 microgram/kg/min initially, higher doses may be required

Rapid onset of action, very short duration of action (3-10 min). Other agents preferred for continuing sedation and analgesia. Has no amnestic activity, the addition of propofol or benzodiazepines should be considered.

Resonium Calcium®

See cation exchange resins
Rocuronium
Non-depolarizing neuromuscular blocking agent.

Endotracheal intubation:
  IV: 0.6-1.2 mg/kg/DOSE (usual maximum 50 mg/DOSE)

Continuing neuromuscular blockade:
  IV: 0.6-1.2 mg/kg/DOSE Q30-60MIN PRN
    (usual maximum 50 mg/DOSE)
    or
    5-15 mcg/kg/min

Rapid onset of action (<1 min), duration of action is approximately 30-60 minutes. Regular analgesia, sedation and ocular lubrication required. Monitor depth of paralysis using peripheral nerve stimulation when using infusions (target 1-2 twitches out of 4). Prolonged weakness may occur, especially when corticosteroids are used concurrently with non-depolarizing neuromuscular blocking agents.

Salbutamol
Bronchodilator, β2 agonist

Severe acute asthma:
  MDI: 4-8 puffs/DOSE Q20-60MIN PRN, adjust frequency based on response
  NEB: 0.15 mg/kg/DOSE (usual maximum 5 mg) Q20-60MIN PRN, adjust frequency based on response, may give continuously if required.
  IV: 15 microgram/kg/DOSE over 10 minutes
    or
1 microgram/kg/min initially (maximum 10 microgram/kg/min)

**Maintenance therapy:**
- MDI: 1-2 puffs Q4H PRN
  - Higher doses may be required if administered through a ventilator due to loss of drug in the circuit.

**Acute treatment of hyperkalemia:**
- IV: 4 microgram/kg/DOSE over 20 min
  - Titrate dose to effect and/or adverse effects (tachycardia, tremor and hypokalemia). For most patients metered dose inhalers with a spacer device are the preferred method of drug delivery. Wet nebulization is less efficient and more costly. Monitor serum potassium, especially with IV. Cardiac monitoring required for IV use.

---

**Senna**

Stimulant laxative

<table>
<thead>
<tr>
<th>PO:</th>
<th>infants:</th>
<th>1 or 2.5 mL (1.7 or 4.25 mg) Q24H</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>children:</td>
<td>2.5 or 5 mL (4.25 or 8.5 mg) Q24H</td>
</tr>
<tr>
<td></td>
<td>adolescents:</td>
<td>5 or 10 mL (8.5 or 17 mg) Q24H</td>
</tr>
</tbody>
</table>

Some patients, particularly those receiving opioids may require higher doses and/or more frequent administration. Also supplied as 8.6 mg tablets.

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**Septra®**

See co-trimoxazole
Sodium Bicarbonate

Alkalinizing agent

Cardiopulmonary resuscitation/metabolic acidosis:
   IV: 1 mEq/kg/DOSE (usual maximum 50 mEq/DOSE)

Urinary alkalization:
   IV: 0.6 mEq/kg/DOSE Q4H (usual maximum 50 mEq/DOSE)

Avoid extravasation, tissue necrosis can occur. Incompatible with many drugs including calcium, atropine and epinephrine. For oral administration sodium citrate is usually preferred. Use 4.2% (0.5 mEq/mL) in neonates, otherwise use 8.4% (1 mEq/mL).

Sodium Benzoate

Treatment of urea cycle disorders:
   IV: 250-500 mg/kg/DAY as a continuous infusion or divided Q6H
   250 mg/kg loading dose may be given
   For adolescents may use 5 g/m^2/DAY

Sodium Benzoate/Sodium Phenylacetate

Treatment of urea cycle disorders:
   IV: 250-500 mg/kg/DAY as a continuous infusion or divided Q6H
   250 mg/kg loading dose may be given
   For adolescents may use 5 g/m^2/DAY

Solution contains 100 mg/mL of each component.
Sodium Chloride 3%

Bronchiolitis:
NEB: 4 mL/DOSE via nebulizer Q6-8H

Acute reduction of raised intracranial pressure/Traumatic brain injury:
IV: 6.5-10 mL/kg/DOSE over 5-20 minutes
(usual maximum 250 mL/DOSE)
and/or
0.1-1 mL/kg/h (usual maximum 100 mL/h) to keep serum sodium >160 or osmolarity >360 mOsm/L

Correction of hyponatremia:
IV: 2 mL/kg (usual maximum 150 mL/DOSE)
and/or
0.1-1 mL/kg/h (maximum 100 mL/h)

Correct long-standing hyponatremia slowly, serum sodium should generally rise no faster than 10 mmol/L in the first 24 hours. Rapid correction of long-standing hyponatremia has been associated with central pontine myelinolysis. Follow serum sodium and osmolality frequently. Central line recommended. 3% NaCl = 0.513 mmol/mL.

Sodium Phosphate
See phosphate

Sodium Polystyrene Sulfonate
See cation exchange resins
Sotalol
Antiarrhythmic
   PO:  1 mg/kg/DOSE Q12H initially
        (usual maximum 4 mg/kg/DOSE or 120-240 mg/DOSE)
Infants tend to require lower doses than older children. Monitor heart rate, QTc interval.

Spironolactone
Potassium sparing diuretic
   PO:  1-3 mg/kg/DAY divided Q12-24H

Succinylcholine
Depolarizing neuromuscular blocking agent
   IV:  1-2 mg/kg/DOSE (maximum 150 mg)
   IM:  2.5-4 mg/kg/DOSE
Onset of action within 30-60 seconds, duration of action less than 5-10 minutes. Contraindicated in hyperkalemia, increased intraocular pressure, extensive burns, crush injuries and rhabdomyolysis.
Bradycardia may be reduced by pre-treatment with atropine and should be routinely given in children less than 5-8 years of age. Repeat doses of succinylcholine increase risk of bradycardia and asystole and should generally be avoided.

Sucrose 24%
Analgesic
PO: 1-2 mL within 2 min prior to procedure
Used in children less than 1 year of age for analgesia during minor procedures. Duration of action is brief, effectiveness peaks within 2 minutes of administration

**Surfactant**

*Early ARDS not responding to conventional therapy:*

- **Intratracheal:**
  - >10 kg: 80 mL/m²/DOSAGE
  - <10 kg: 3 mL/kg/DOSAGE

A single repeat dose may be given in 12 hours.

**Theophylline**

See aminophylline

**Tobramycin**

Aminoglycoside antibiotic.

*Gram negative infections:*

- **IV:** 5-6 mg/kg/DOSAGE Q24H
  - (4 mg/kg/DOSAGE Q24H in newborns)
- **NEB:** 40-80 mg Q8-12H (Doses of up to 300 mg Q12H have been used in cystic fibrosis)

*Enterococcal infections (for synergy with beta-lactams):*

- **IV:** 3 mg/kg/DOSAGE Q24H

Adjust dosing interval in renal impairment. Ototoxicity and nephrotoxicity may occur, consider monitoring trough levels (target <2 mg/L) in patients at risk for nephrotoxicity)
**t-PA**

See alteplase

---

**Tranexamic Acid**

Fibrinolysis inhibitor

**Treatment of excessive bleeding due to hyperfibrinolysis:**

- **PO:** 25 mg/kg/DOSE Q6-12H (usual maximum 1.5 g/DOSE)
- **IV:** 10 mg/kg/DOSE Q6-8H (usual maximum 1 g/DOSE)

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**Valproic Acid**

Anticonvulsant

**Maintenance:**

- **PO:** 15-20 mg/kg/DAY divided Q6-12H, (max 30-60 mg/kg/DAY)
- **IV:** Divide total daily maintenance Q6H

**Refractory status epilepticus:**

- **IV:** 20-40 mg/kg/DOSE over 10-60 minutes
  
  or
  
  1-5 mg/kg/hour

Desired therapeutic range: 350-690 micromol/L (50-100 microgram/mL). Dosing is equivalent for valproic acid, divalproex and sodium valproate.

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**Vancomycin**

Antibiotic
Meningitis:
   IV: 15 mg/kg/DOSE Q6H (maximum 1 g/DOSE)

Other infections:
   IV: 40 mg/kg/DAY divided Q6-12H (usual maximum 2 g/DAY)

C difficile infection refractory to metronidazole:
   PO: 12.5 mg/kg/DOSE Q6H (maximum 125 mg/DOSE)

Reserved for the treatment of infections caused MRSA or coagulase negative Staphylococci. Infuse over at least one hour to avoid red man syndrome, increase infusion duration if reaction occurs. Adjust dosage interval in renal impairment. Consider monitoring trough levels in patients with septic shock, concurrent nephrotoxins, fluctuating renal function or extended treatment courses. May need to maintain troughs > 10 mg/L in *S aureus* infections, 15-20 mg/L may be warranted in CNS infections, osteomyelitis and other complicated infections.

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**Vasopressin**

Antidiuretic hormone, vasoconstrictor

**Diabetes Insipidus:**
   IV: 0.5-10 milliunits/kg/h, requirements are highly variable, desmopressin is usually preferred

**Refractory septic shock:**
   IV: 0.3-1 milliunits/kg/min (usual maximum of 2 units/h)

In refractory septic shock, add vasopressin to allow dosage reduction of conventional vasopressors, keep titration of vasopressin to a minimum and use the lowest effective dose. In the treatment of diabetes insipidus follow urine output, volume status, serum and urine electrolytes frequently.
**Verapamil**

Calcium channel antagonist antiarrhythmic

**Supraventricular tachydrhythmias (>1 year of age):**

- **IV:** 0.1 mg/kg/DOSE (maximum 5 mg/DOSE) may repeat once in 30 minutes if needed

Do not use for SVT in patients less than 1 year due to reports of refractory hypotension and cardiac arrest. Give IV under ECG monitoring. Have IV calcium chloride available. Adverse effects include severe hypotension and AV block. Can precipitate congestive heart failure and/or heart block if given with β-blockers.

**Vitamin K**

Reduction of increased INR or warfarin induced anticoagulation:

- **IV/PO:** 0.5-10 mg/DOSE.

Use lower doses if there is no significant bleeding and patient will require warfarin in the future. May repeat in 6-8 hours. Injection may be given enterally, undiluted or in juice or water.

**Voriconazole**

Antifungal

- **IV/PO:** 6 mg/kg/DOSE Q12H for 2 doses then 4 mg/kg/DOSE Q12H

Active against many Candida species and Aspergillus. Dose adjustment required in hepatic dysfunction. The use of the IV formulation is not recommended in severe renal dysfunction.
Voriconazole has many drug interactions including midazolam, phenytoin and phenobarbital.
Blood Products
**Albumin**

Colloid plasma volume expander (human plasma protein).

- **IV:** 0.5-1 g/kg/DOSE:
  - 5% solution (50 mg/mL): 10-20 mL/kg/DOSE
  - 25% solution (250 mg/mL): 2-4 mL/kg/DOSE

Use 5% solution for fluid resuscitation and volume expansion, 25% albumin is very viscous and hyperosmolar, use with caution.

**Cryoprecipitate**

Contains factor VIII, von Willebrand factor, fibrinogen and factor XIII.

Only give for fibrinogen

- **IV:** 1 unit for every 5-10 kg

**Factor VIIa**

- **Treatment of Hemophilia A/B with inhibitors:**
  - **IV:** 70 to 90 micrograms/kg Q2H until clinical improvement

- **Treatment of severe bleeding:**
  - **IV:** 35-70 micrograms/kg once

**Fresh Frozen Plasma**

Contains all coagulation factors

- **IV:** 10 mL/kg

**Immune Globulin, Intravenous (IgG, IVIg)**

Pooled human immune globulins
ITP:
  IV: 0.8-1 g/kg with a second dose given within 48 h if the platelet count has not increased to >20x10^9/L

Kawasaki disease:
  IV: 2 g/kg once

Guillain-Barre syndrome:
  IV: 1 g/kg Q24H for 2 days

Streptococcal Toxic Shock:
  IV: 1 g/kg once then
  0.5 g/kg Q24H for 2 doses
  or
  0.15 g/kg Q24H for 5 doses

Hypogammaglobulinemia
  IV: 0.3-0.6 g/kg q3-4 weeks

Most adverse reactions, fever and hypotension are related to the rate of infusion. Anaphylaxis can occur. For most products begin at 0.6 mL/kg/h and increase q30min if tolerated to maximum of 4.8 mL/kg/h.

Red Cell Concentrate
  IV: 10 mL/kg (maximum 2 units; 1 unit is approximately 350 mL)

Platelet Concentrate
  IV: 10 mL/kg (maximum 1 unit = 300 mL)

Tetanus Immune Globulin
  IM: 4 units/kg (maximum 250 units)
Varicella-Zoster Immune Globulin

IM: 125 units/10 kg (maximum 625 units)
Enteral Feeding
Starting enteral feeding

Early enteral nutrition within 24-48 hours of admission. Start as soon as hemodynamically stable; high doses and multiple inotropes may be a contraindication to enteral nutrition support. Feed continuously if intubated/ventilated, do not bolus feeds into the small bowel.

Start feeds at 0.5-1 mL/kg/h and increase by 0.5-1.0mL/kg/h Q4H (if lower risk feeding intolerance ie RSV bronchiolitis) or up to Q12H if higher risk for feeding intolerance.

Formula selection

Formula selection should be based on age of the child, disease state or clinical condition and formula composition. Ketogenic and Metabolic formulas are available in consultation with the Dietician.

1 year of age or less:
   Breast milk is preferred if available
   Enfamil A+ is our preferred first choice for formula. Iron fortified formulas are recommended. Infant formulas can be concentrated stepwise from 20 kcal/oz to 24 kcal/oz, 27 kcal/oz and 30 kcal/oz. Dietician involvement advised.
1- 10 years of age
   Pediasure products are our preferred first choice. If high severity of illness or impaired digestion/absorption use Peptamen products.

10 years of age or greater
   Jevity products are our preferred first choice. If high severity of illness or impaired digestion/absorption use Peptamen products. These feeds are designed for adult use. In consultation with the Dietitian they can also be used in younger children. Use high protein feeds with caution with adolescents in ICU with very high energy requirements.
<table>
<thead>
<tr>
<th>Feed</th>
<th>Energy (kCal/100 mL)</th>
<th>Protein (g/100 mL)</th>
<th>Osmolality</th>
<th>Fat source</th>
<th>Indications For Use/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human milk</td>
<td>70</td>
<td>1.1</td>
<td>290</td>
<td>Human milk fat</td>
<td>Preferred feeding for infants</td>
</tr>
<tr>
<td>Enfamil A+</td>
<td>67</td>
<td>1.4</td>
<td>300</td>
<td>Palm olein, soy, coconut, sunflower</td>
<td>Iron fortified term infant formula with added DHA and ARA</td>
</tr>
<tr>
<td>Alimentum</td>
<td>68</td>
<td>1.9</td>
<td>370</td>
<td>MCT 33%, safflower, soy</td>
<td>Hydrolyzed casein for milk protein allergy (33% MCT). Lactose-free.</td>
</tr>
<tr>
<td>Enfamil A+ Thickened</td>
<td>68</td>
<td>1.7</td>
<td></td>
<td>Palm olein, soy, coconut, sunflower</td>
<td>For babies with reflux; thickens when combines with stomach acids. Max concentration 24 kcal/oz. ARA &amp; DHA added.</td>
</tr>
<tr>
<td>Enfamil Lactose Free</td>
<td>67</td>
<td>1.4</td>
<td>180</td>
<td>Coconut, sunflower soy, palm olein</td>
<td>Milk-based, lactose free formula</td>
</tr>
<tr>
<td>Enfamil Soy A+</td>
<td>68</td>
<td>1.7</td>
<td>182</td>
<td>Coconut, sunflower soy, palm olein</td>
<td>Soy based formula. Milk, lactose and sucrose free. Use powdered form for galactosemia, vegan diet</td>
</tr>
<tr>
<td>Formula</td>
<td>Score</td>
<td>kcal</td>
<td>Total kcal</td>
<td>Fat Source</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
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<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Goodstart</td>
<td>67</td>
<td>1.5</td>
<td>265</td>
<td>Palm olein, soy, coconut, safflower</td>
<td>Iron fortified hydrolyzed whey-for infants at risk for milk protein allergy, poor gastric emptying or mild reflux., DHA &amp; ARA added</td>
</tr>
<tr>
<td>Nutramigen</td>
<td>67</td>
<td>1.9</td>
<td>320</td>
<td>Palm olein, soy, coconut, sunflower</td>
<td>Hydrolyzed casein for milk protein allergy. Lactose and sucrose free.</td>
</tr>
<tr>
<td>Portagen</td>
<td>67</td>
<td>2.4</td>
<td>230</td>
<td>MCT, corn, coconut</td>
<td>Fat malabsorption, , chylothorax ,defective lymphatic transport. Recipe on can =1 kcal/mL;</td>
</tr>
<tr>
<td>Pregestimil</td>
<td>68</td>
<td>1.9</td>
<td>273</td>
<td>MCT, corn, soy, high oleic sunflower</td>
<td>Hydrolyzed casein for milk protein allergy, fat malabsorption. (55% MCT). Lactose and sucrose free.</td>
</tr>
<tr>
<td>Similac Advance + Iron</td>
<td>68</td>
<td>1.4</td>
<td>300</td>
<td>Safflower, coconut, sunflower, soy</td>
<td>Iron fortified term infant formula with added DHA and ARA</td>
</tr>
<tr>
<td>Puramino A+</td>
<td>68</td>
<td>1.9</td>
<td>320</td>
<td>Palm olein, soy, coconut, sunflower</td>
<td>Hydrolyzed casein for milk protein allergy/multiple allergy</td>
</tr>
<tr>
<td>Feed</td>
<td>Energy (kCal/100 mL)</td>
<td>Protein (g/100 mL)</td>
<td>Osmolality</td>
<td>Fat source</td>
<td>Indications For Use/Comments</td>
</tr>
<tr>
<td>---------------------------</td>
<td>----------------------</td>
<td>--------------------</td>
<td>------------</td>
<td>--------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Pediasure</td>
<td>100</td>
<td>3.0</td>
<td>310</td>
<td>Safflower, soy MCT, sunflower</td>
<td>Sole source of nutrition or supplement, oral/tube feed. Gluten and lactose free (20% MCT).</td>
</tr>
<tr>
<td>Pediasure Plus + Fibre</td>
<td>150</td>
<td>4.2</td>
<td>345</td>
<td>Safflower, soy MCT, sunflower</td>
<td>High calorie (1.5 kcal/mL). Oral/tube feed. Lactose and gluten free (20% MCT, 0.75g fibre/100 mL FOS = 0.35g/100 mL)</td>
</tr>
<tr>
<td>Nutren Jr</td>
<td>100</td>
<td>3</td>
<td>350</td>
<td>Soy, MCT, canola, soy lecithin</td>
<td>Sole source nutrition or supplement. Oral/tube feed. (20% MCT, 80% LCT) Lactose &amp; gluten free</td>
</tr>
<tr>
<td>Nutrin Jr + Fibre</td>
<td>100</td>
<td>3</td>
<td>350</td>
<td>Soy, MCT, canola, soy lecithin</td>
<td>Supplement/tube feed. (20% MCT, 80% LCT) Lactose and gluten free. 0.36g pea fibre and 0.22g FOS/inulin per 100 mL.</td>
</tr>
<tr>
<td>Product</td>
<td>Calorias</td>
<td>Protein</td>
<td>Calories/mL</td>
<td>Ingredients</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
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<td>-------------</td>
<td>--------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Peptamen Jr</td>
<td>100</td>
<td>3</td>
<td>360</td>
<td>MCT, soy, canola</td>
<td>Partially hydrolyzed protein. (60% MCT, 100% whey peptides)</td>
</tr>
<tr>
<td>Peptamen Jr 1.5</td>
<td>150</td>
<td>4.5</td>
<td>450</td>
<td>MCT, soy, canola, refined tuna oil</td>
<td>Partially hydrolyzed protein, hypercaloric. EPA and DHA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Contains inulin prebiotic</td>
</tr>
<tr>
<td>Vivonex Pediatric</td>
<td>80</td>
<td>2.4</td>
<td>360</td>
<td>Coconut, soybean 68% MCT</td>
<td>Elemental low fat formula for fat malabsorption. 1 packet powder +</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>220 mL water = 250 mL formula. 68% MCT</td>
</tr>
<tr>
<td>Neocate Jr (unflavoured)</td>
<td>100</td>
<td>3</td>
<td>607</td>
<td>Coconut, canola, safflower</td>
<td>Amino acid based formula for allergy, protein intolerance,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>malabsorption. Tropical Fruit flavour available.</td>
</tr>
</tbody>
</table>
# Feeds for children 10 years of age or more

<table>
<thead>
<tr>
<th>Feed</th>
<th>Energy (kCal/100 mL)</th>
<th>Protein (g/100 mL)</th>
<th>Osmolality</th>
<th>Fat source</th>
<th>Indications For Use/Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jevity 1 Cal</td>
<td>106</td>
<td>4.4</td>
<td>310</td>
<td>Sunflower, canola safflower, MCT</td>
<td>Isotonic, fibre containing formula for tube feeding. 1.4 g fibre per 100 mL. Lactose and gluten free</td>
</tr>
<tr>
<td>Jevity 1.5</td>
<td>150</td>
<td>6.4</td>
<td>525</td>
<td>Canola, MCT, soy Corn oil</td>
<td>High nitrogen, calorically dense for fluid restriction/elevated energy needs. 0.9 g fibre per 100 mL.</td>
</tr>
<tr>
<td>Peptamen 1</td>
<td>100</td>
<td>4.0</td>
<td>380</td>
<td>Coconut, palm, soybean, 70% MCT</td>
<td>Elemental diet for impaired GI function/malabsorption. Oral supplement or tube feed. 100% whey protein. 70% MCT. Vanilla flavour</td>
</tr>
<tr>
<td>Peptmen 1.5</td>
<td>150</td>
<td>6.8</td>
<td>550</td>
<td>Coconut, palm, soybean, 70% MCT</td>
<td>High calorie diet for impaired GI function/malabsorption. 100% whey protein. 70% MCT. Vanilla flavour</td>
</tr>
<tr>
<td>Formula</td>
<td>Calories</td>
<td>Protein</td>
<td>Carbs</td>
<td>Fat Content</td>
<td>Description</td>
</tr>
<tr>
<td>---------------</td>
<td>----------</td>
<td>---------</td>
<td>-------</td>
<td>-------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Peptamen AF</td>
<td>120</td>
<td>7.6</td>
<td>390</td>
<td>MCT, soybean oil, fish oil</td>
<td>High calorie whey protein for impaired GI function/malabsorption. 50% MCT, EPA/DHA and prebiotics</td>
</tr>
<tr>
<td>Ensure HP</td>
<td>96</td>
<td>5.0</td>
<td>546</td>
<td>Safflower, corn sunflower, canola</td>
<td>High protein supplement or tube feed. Lactose and gluten free. Vanilla, chocolate and strawberry flavours</td>
</tr>
<tr>
<td>Isosource VHN</td>
<td>100</td>
<td>6.2</td>
<td>335</td>
<td>Canola, MCT, soy</td>
<td>High nitrogen, isotonic. 50% of fat as MCT 0.5 g fibre per 100 mL. Lactose and gluten free. Oral supplement or tube feed.</td>
</tr>
<tr>
<td>Nepro Carb Steady</td>
<td>180</td>
<td>8.1</td>
<td>745</td>
<td>Safflower, soy lecithin, canola</td>
<td>Acute or chronic renal failure requiring dialysis. Oral supplement or tube feed. Vanilla flavour.</td>
</tr>
<tr>
<td>Nutren 1.5</td>
<td>150</td>
<td>6.0</td>
<td>510</td>
<td>MCT (50%), canola, corn</td>
<td>High calorie, high protein. No fibre. Lactose and gluten free</td>
</tr>
<tr>
<td>Product</td>
<td>Calories</td>
<td>Carbohydrates</td>
<td>Fat</td>
<td>Protein</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
<td>---------------</td>
<td>-----</td>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>Oxepa</td>
<td>150</td>
<td>6.25</td>
<td>535</td>
<td>-</td>
<td>Low CHO, calorically dense tube feed for modulating inflammation in the critically ill on mechanical ventilation. For sepsis and ARDS. Contains EPA&amp;GLA. 25% of fat as MCT. Lactose/gluten free.</td>
</tr>
<tr>
<td>Promote</td>
<td>100</td>
<td>6.2</td>
<td>340</td>
<td>-</td>
<td>High protein, fibre, gluten free.</td>
</tr>
<tr>
<td>Resource 2.0</td>
<td>200</td>
<td>8.4</td>
<td>790</td>
<td>-</td>
<td>High nitrogen, calorically dense for fluid restriction and dialysis dependent. Oral supplement or tube feed.</td>
</tr>
<tr>
<td>Suplena</td>
<td>200</td>
<td>3.0</td>
<td>600</td>
<td>-</td>
<td>Low protein for chronic/acute renal failure patient not on dialysis. Oral supplement or tube feed.</td>
</tr>
</tbody>
</table>
# Standard Medication Times

Oral Medications ordered Q6H will be given QID
Oral Medications ordered Q8H will be given TID
Oral Medications ordered Q12H will be given BID

<table>
<thead>
<tr>
<th>Ordered schedule</th>
<th>Route</th>
<th>Time(s) given</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once Daily / Q24H</td>
<td>Enteral or parentral</td>
<td>0900</td>
</tr>
<tr>
<td>BID</td>
<td>Enteral</td>
<td>0900 / 2100</td>
</tr>
<tr>
<td>TID</td>
<td>Enteral</td>
<td>0900 / 1400 / 2100</td>
</tr>
<tr>
<td>QID</td>
<td>Enteral</td>
<td>0900 / 1200 / 1600 / 2100</td>
</tr>
<tr>
<td>Q2H</td>
<td>Enteral or parentral</td>
<td>0200 / 0400 / 0600 ... 2000 / 2200 / 2400</td>
</tr>
<tr>
<td>Q3H</td>
<td>Enteral or parentral</td>
<td>0300 / 0600 / 0900 / 1200 / 1500 / 1800 / 2100 / 2400</td>
</tr>
<tr>
<td>Q4H</td>
<td>Enteral or parentral</td>
<td>0400 / 0600 / 1200 / 1600 / 2000 / 2400</td>
</tr>
<tr>
<td>Q6H</td>
<td>Parentral</td>
<td>0600 / 1200 / 1800 / 2400</td>
</tr>
<tr>
<td>Q8H</td>
<td>Parentral</td>
<td>0600 / 1400 / 2200</td>
</tr>
<tr>
<td>Q12H</td>
<td>Parentral</td>
<td>0900 / 2100</td>
</tr>
<tr>
<td>HS (Bedtime)</td>
<td>Enteral</td>
<td>2200</td>
</tr>
<tr>
<td>Before Meals</td>
<td>Enteral</td>
<td>0730 / 1130 / 1630</td>
</tr>
<tr>
<td>With Meals</td>
<td>Enteral</td>
<td>0800 / 1200 / 1700</td>
</tr>
<tr>
<td>After Meals</td>
<td>Enteral</td>
<td>1000 / 1400 / 1800</td>
</tr>
</tbody>
</table>

Enteral = PO / SL / PR / Buccal / Topical etc.
Parentral = IV / IM / SubCut / Epidural etc.