Certified Pediatric Emergency Nurse Review
Third Edition

Scott L. DeBoer RN, MSN, CEN, CPEN, CCRN, CFRN, EMT-P

Founder
Peds-R-Us Medical Education

Flight Nurse: UCAN
University of Chicago Medicine

Editors
Julie Bacon RN, BA, CPEN (Editions II & III)
Emily C. Dawson MD (Edition III)
Lou Romig MD, FAAAP, FACEP (Editions I & II)
Michael Seaver RN, BA (Editions I-III)

"You make 'em, I amuse 'em"
Dr. Seuss

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Editors - 3rd Edition

Certified Pediatric Emergency Nurse (CPEN) Review III

Julie Bacon BA, RNC-LRN, CPEN, CPN, C-NPT
Chief Flight Nurse & Florida EMSC Chairperson
St. Petersburg, Florida
(Editions II & III)

Emily C. Dawson MD
Pediatric Emergency Medicine & Critical Care Attending Physician
Chicago, Illinois
(Edition III)

Lou Romig MD, FAAP, FACEP
Pediatric Emergency Medicine & EMS Attending Physician
Miami, Florida
(Editions I & II)

Michael Seaver RN, BA
Senior Healthcare Informatics Consultant
Vernon Hills, Illinois
(Editions I-III)
Senior Reviewers/Contributors - 3rd Edition

Sean G. Smith, BSN, RN, Paramedic
FP-C, C-NPT, CCRN-CMC, CFRN, CEN, CPEN
Critical Care Professionals International
Durham, North Carolina

Kathleen Adams RCP, RRT-NPS (OK 5 31 13)
Founder and Owner
Packmule Education and Consulting Services
Yucaipa, California

John R. Clark JD, MBA, NREMT-P, FP-C, CCP-C
Manager: Critical Care Transport
St. Vincent’s Hospital
Indianapolis, Indiana
Adult vs. Pediatric Airways

Illustration by Nina DeBoer, then age 9 (my aspiring artist daughter, now aspiring baker daughter)
# Pediatric Assessment Triangle (PAT) and Pathophysiology

**First Impression**

- **Appearance**
  - Mental status
  - Muscle tone
  - Body position

- **Breathing**
  - Visible movement
  - Work of breathing (normal/increased)

- **Circulation**
  - Color

<table>
<thead>
<tr>
<th>Gen. Appearance</th>
<th>Work of Breathing</th>
<th>Circulation to Skin</th>
<th>Pathophysiologic Category</th>
<th>Compensated?</th>
<th>Sick?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>Normal</td>
<td>Normal</td>
<td>No active compromise to vital functions</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Good</td>
<td>Increased</td>
<td>Normal</td>
<td>Respiratory distress (varying degrees)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Poor</td>
<td>Increased or poor effort</td>
<td>Normal</td>
<td>Respiratory failure</td>
<td>No</td>
<td>YES!</td>
</tr>
<tr>
<td>Good</td>
<td>Normal</td>
<td>Abnormal</td>
<td>Peripheral vasoconstriction (medications, fever, hypothermia)</td>
<td>Yes</td>
<td>Probably not</td>
</tr>
<tr>
<td>Poor</td>
<td>Normal to mildly increased</td>
<td>Abnormal</td>
<td>Shock</td>
<td>No</td>
<td>YES!</td>
</tr>
<tr>
<td>Poor</td>
<td>Normal</td>
<td>Normal</td>
<td>Central nervous system dysfunction (postictal, head injury, intoxication)</td>
<td>No</td>
<td>YES!</td>
</tr>
<tr>
<td>Poor</td>
<td>Poor effort</td>
<td>Abnormal</td>
<td>Cardiopulmonary failure</td>
<td>No</td>
<td>YES!</td>
</tr>
<tr>
<td>Poor</td>
<td>None</td>
<td>None</td>
<td>Cardiopulmonary arrest</td>
<td>No</td>
<td>YES!</td>
</tr>
</tbody>
</table>

*Courtesy of Lou Romig MD, FAAP, FACEP*

[www.jumpstarttriage.com](http://www.jumpstarttriage.com)
Range of BP Cuff Sizes

Photo courtesy of Welch Allyn

www.welchallyn.com
Pediatric Spinal Positioning

Photos courtesy of the

Journal of Bone and Joint Surgery
“Peanut” Papoose

Photo courtesy of Ossur

www.ossur.com
Pedi-Align Pediatric Spinal Board

Photo courtesy of Iron Duck

www.ironduck.com
<table>
<thead>
<tr>
<th>Two-level triage</th>
<th>Three-level triage</th>
<th>Four-level triage</th>
<th>Five-level triage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergent</td>
<td>Emergent</td>
<td>Critical</td>
<td>Resuscitation</td>
</tr>
<tr>
<td>Non-emergent</td>
<td>Urgent</td>
<td>Acute</td>
<td>Emergent</td>
</tr>
<tr>
<td></td>
<td>Non-urgent</td>
<td>Urgent</td>
<td>Urgent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-urgent</td>
<td>Semi-urgent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Non-urgent</td>
</tr>
</tbody>
</table>

Overview of triage classifications

Adapted from the Emergency Nursing Pediatric Course, 3’rd edition, www.ena.org
# Normal Pediatric Vital Signs

Adapted from Crash Cards - www.CrashCards.com

<table>
<thead>
<tr>
<th>Age</th>
<th>Heart Rate/min</th>
<th>Respiratory Rate/min</th>
<th>Systolic Blood Pressure (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full term newborn</td>
<td>80-160</td>
<td>30-50</td>
<td>60-90</td>
</tr>
<tr>
<td>6 months</td>
<td>80-150</td>
<td>30-50</td>
<td>87-105</td>
</tr>
<tr>
<td>7 months to 1 ½ years</td>
<td>80-150</td>
<td>30-50</td>
<td>87-105</td>
</tr>
<tr>
<td>2 to 3 ½ years</td>
<td>100-110</td>
<td>20-35</td>
<td>90 + (2 x years)</td>
</tr>
<tr>
<td>3 ½ to 5 years</td>
<td>70-110</td>
<td>20-35</td>
<td>90 + (2 x years)</td>
</tr>
<tr>
<td>5 ½ years to 7 years</td>
<td>70-100</td>
<td>15-25</td>
<td>90 + (2 x years)</td>
</tr>
<tr>
<td>7 ½ years to 9 ½ years</td>
<td>60-100</td>
<td>15-25</td>
<td>90 + (2 x years)</td>
</tr>
<tr>
<td>10 to 12 years</td>
<td>55-90</td>
<td>12-20</td>
<td>90 + (2 x years)</td>
</tr>
</tbody>
</table>
### Five-Level Triage

<table>
<thead>
<tr>
<th>Title</th>
<th>Vital Signs and Resource Utilization</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resuscitation (I)</td>
<td>Unstable vitals and maximum use of resources</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Definite threat to life”</td>
<td>Respiratory or cardiac arrest</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Major trauma</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Completely unconscious</td>
</tr>
<tr>
<td>Emergent (II)</td>
<td>Threatened vitals and high use of resources</td>
<td>“Not normal” level of consciousness</td>
</tr>
<tr>
<td></td>
<td>“Potential threat to life or limb”</td>
<td>Moderate-severe respiratory distress</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fever in an infant under one month of age</td>
</tr>
<tr>
<td>Urgent (III)</td>
<td>Stable vitals and medium use of resources</td>
<td>Belly pain</td>
</tr>
<tr>
<td></td>
<td>“Not likely to lose life or limb”</td>
<td>Moderate pain</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dehydration</td>
</tr>
<tr>
<td>Semi-urgent (IV)</td>
<td>Stable vitals and low use of resources</td>
<td>Bumps, bruises, and breaks</td>
</tr>
<tr>
<td></td>
<td>“Really not likely to lose life or limb”</td>
<td>Little kids with fevers</td>
</tr>
<tr>
<td>Non-urgent (V)</td>
<td>Stable vitals and no use of resources</td>
<td>Fast track</td>
</tr>
<tr>
<td></td>
<td>“They are not going to lose life or limb”</td>
<td></td>
</tr>
</tbody>
</table>

### APPENDIX 1-C

#### Triage Practice – What Level are These Patients?

<table>
<thead>
<tr>
<th>Chief Complaint</th>
<th>Resuscitation (I)</th>
<th>Emergent (II)</th>
<th>Urgent (III)</th>
<th>Semi-Urgent (IV)</th>
<th>Non-Urgent (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conjunctivitis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory arrest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unresponsiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate respiratory distress</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active seizure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dehydration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ear discomfort</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unstable vital signs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple laceration</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Altered mental status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cold or flu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intubated patient</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fever in an infant &lt;1 month of age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I highly recommend that those taking the CPEN exam review ENA’s Emergency Nursing Pediatric Course (ENPC) textbook, especially the section on triage, prior to taking the examination. ([www.ena.org](http://www.ena.org))
## TICLS

<table>
<thead>
<tr>
<th>TICLS</th>
<th>Questions to be answered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tone</strong></td>
<td>Is the child actively moving with good muscle tone, or is the child limp?</td>
</tr>
<tr>
<td><strong>Interactivity</strong></td>
<td>Is the child alert and attentive to what’s going on, or is too sick to care?</td>
</tr>
<tr>
<td></td>
<td>Will the child reach for a cool toy?</td>
</tr>
<tr>
<td></td>
<td>Does the child respond to people, objects, and sounds?</td>
</tr>
<tr>
<td><strong>Consolability</strong></td>
<td>Does comforting the child help them chill out and stop crying?</td>
</tr>
<tr>
<td><strong>Look/Gaze</strong></td>
<td>Do the child’s eyes follow your every move, or is the kid staring out into space?</td>
</tr>
<tr>
<td><strong>Speech/Cry</strong></td>
<td>Do they have a strong cry, or is it weak, muffled, or hoarse?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C</th>
<th>(C)hief complaint</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>(I)mmunizations and isolation</td>
</tr>
<tr>
<td>A</td>
<td>(A)llergies</td>
</tr>
<tr>
<td>M</td>
<td>(M)edications</td>
</tr>
<tr>
<td>P</td>
<td>(P)ast medical history and (P)arent’s or caregiver’s impression of the child</td>
</tr>
<tr>
<td>E</td>
<td>(E)vents surrounding the illness or injury</td>
</tr>
<tr>
<td>D</td>
<td>(D)iet and (D)iapers</td>
</tr>
<tr>
<td>S</td>
<td>(S)ymptoms associated with the illness or injury</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Family Behaviors</th>
<th>Child Behaviors</th>
<th>Historical Findings</th>
<th>Physical Findings</th>
<th>Radiographic Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inappropriate parent-child interactions</td>
<td>Extreme behaviors, i.e. withdrawn or acting out</td>
<td>Story inconsistent with physical findings (doesn’t fit)</td>
<td>Multiple injuries in various stages of healing</td>
<td>Multiple fractures</td>
</tr>
<tr>
<td>Hostile or unconcerned interactions with hospital staff</td>
<td>Doesn’t oppose painful procedures</td>
<td>Story inconsistent with developmental stage (kids can’t do that)</td>
<td>Injury and location of injury don’t fit developmental stage</td>
<td>Fractures in different stages of healing</td>
</tr>
<tr>
<td>Unrealistic expectations of the child</td>
<td>Inappropriate sexual behavior</td>
<td>Delay in seeking medical care</td>
<td>Characteristic patterns (belt or bite marks)</td>
<td>Skull fractures</td>
</tr>
<tr>
<td>Parents deny any knowledge as to how injury occurred</td>
<td>Somatic complaints (i.e. chronic headaches, sleep disorders, bedwetting)</td>
<td>Child verbalizes abuse</td>
<td>Signs of poor overall care</td>
<td>Intracranial hemorrhage</td>
</tr>
<tr>
<td>Siblings blamed for injury</td>
<td>Suicidal threats or attempts</td>
<td>Multiple visits to the ED</td>
<td>Genital bleeding or discharge in pre-teen age children</td>
<td></td>
</tr>
<tr>
<td>Parents over or under reacting to child’s condition</td>
<td>Alcohol or drug abuse</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you remember nothing else about growth and development...

Remember these milestones

“Head and shoulders, knees, and toes…”
(Feel free to sing along)

2 months: (Head) Holds head up

4 months: (Shoulders) Rolls over

6 months: (Knees) sits unsupported

1 year: (Toes) walking

Or

3-6-9-12

3 months – Should be able to lift head

6 months – Should be able to sit up alone

9 months – Should be crawling and everything they find goes in their mouths

12-18 months – Should start walking and says/understands “No!”

Thanks to Kathleen Piotrowski-Walters BSN,RN,CCRN and Lynn Mohr MS,APN,
PCNS-BC,CPN for their help with these short and sweet summaries
### Crash Cards Pediatric Resuscitation Guide

Photo courtesy of Crash Cards

www.Peds-R-Us.com
Bone Injection Gun

Photo courtesy of WaisMed

www.waismed.com
SVT and Adenosine
Radiograph of Tibial IO Placement

Photo courtesy of WaisMed

www.waismmed.com
Size Range of Ventilation Bags

Size Range of Ventilation Masks

Infant Ventilation Bag
Infant Ventilation Bag with Pop-Off Valve

Photos courtesy of Mercury Medical

www.mercurymedical.com
Colorimetric End-Tidal CO₂ Detectors

Photos courtesy of Mercury Medical

www.mercurymedical.com
Massive abdominal distension

Courtesy of Christopher Straus MD - University of Chicago Hospitals
Esophageal Intubation Detection Devices

Photos courtesy of Wolfe-Tory

www.wolfetory.com
Consult individual intraosseous device manufacturers for their recommendations as to placement guidelines.

Bone Injection Gun (BIG) pediatric tibial intraosseous device placement landmarks

Courtesy of Waisméd - www.waismed.com
Arterial, venous, and intraosseous pressures

Intraosseous fluid administration with pressure bag

Courtesy of Vidacare – www.vidacare.com
3-way stopcock review - “OFF” on stopcock means “OFF,” i.e. no fluid will go that way

Courtesy of Medtronics - www.medtronics.com
Syringe flush of intraosseous device

Courtesy of Vidacare – www.vidacare.com
Intraosseous blood flow

Courtesy of Vidacare – www.vidacare.com
### Fluid Bolus IV

<table>
<thead>
<tr>
<th>Fluid Bolus IV</th>
<th>Normal Saline - Lactated Ringers</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 mL per kg Bolus</td>
<td>210 mL</td>
</tr>
<tr>
<td>10 mL per kg Bolus</td>
<td>105 mL</td>
</tr>
<tr>
<td>5 mL per kg Bolus</td>
<td>55 mL</td>
</tr>
</tbody>
</table>

**Push Directions**

Initial fluid therapy is aimed at restoration of circulating blood volume and renal perfusion. In the presence of shock, an isotonic fluid bolus of 20 mL/kg should be given as fast as possible, otherwise, many providers prefer a smaller (10 mL/kg) bolus be given over 30-60 minutes.

---

Color coded isotonic fluid bolus

Courtesy of James Broselow MD & Robert Luten MD – www.ebroselow.com
### Maintenance Fluids Table

<table>
<thead>
<tr>
<th>Maintenance Fluids</th>
<th>DSW % NS</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-11kg</td>
<td>43 mL</td>
</tr>
</tbody>
</table>

### Remarks

Note: D5W 1/4 NS has traditionally been used for pediatric maintenance fluid therapy. We are recommending D5W 1/4 NS because there has been much concern over the use of hypotonic fluids and development of hyponatremia in hospitalized patients. One must always follow the sodium concentration in these patients, especially if they are at risk (see example below) for non-osmotic secretion of Anti-diuretic Hormone (ADH).

**Example:** CNS infections, significant volume loss, drugs, and metabolic and endocrine disorders such as hypoadrenalism, and particularly the postoperative state.

**Color coded maintenance IV fluids**

**Courtesy of James Broselow MD & Robert Luten MD – www.ebroselow.com**
“Pull and push” fluid bolus technique

Photo courtesy of Joshua DeBoer, my now 14-year old aspiring computer genius son
Intramuscular injection sites

Dorsogluteal
Deltoid
Ventrogluteal
Vastus lateralis

Courtesy of Nina DeBoer, my now 12-year old aspiring artist/baker daughter
Car seat image 1 - Child in forward-facing convertible seat

- Child sitting upright
- Car seat’s harness is flat and snug
- Harness retaining clip is at the armpit level (where it should be as this is a pre-crash position)
- Top of child’s head well below top of car seat shell – (when the top of the child’s ears are in line with the top of the car seat, the child will be too tall for the seat)
Car seat image 2 - Mother checking internal harness to make sure it is snug
Car seat image 3 - Child in rear-facing infant seat with a 5-point harness

- Harness is laying flat and snug
- Harness retaining clip is at armpit level
- Seat appropriate for weight and height of child
- Top of head well below top of car seat shell

(for infants the top of the head must be one inch and below the top of the car seat shell)
Car seat image 4 - Rear-facing

Mother is tightening internal harness so that it is snug on the baby
Car seat image 5 - Rear-facing convertible seat

Probably rated up to 35 pounds (16 kg)

This can be used after an infant outgrows the infant seat, but must remain rear-facing until 2 years old (this is the new 2011 guideline from the AAP and NHTSA)
Car Seat Recommendations for Children

- Select a car seat based on your child's age and size, and choose a seat that fits in your vehicle and use it every time.
- Always refer to your specific car seat manufacturer's instructions; read the vehicle owner's manual on how to install the car seat using the seat belt or LATCH system, and check height and weight limits.
- To maximize safety, keep your child in the car seat for as long as possible, as long as the child fits within the manufacturer's height and weight requirements.
- Keep your child in the back seat at least through age 12.

**Birth – 12 months**

Your child under age 1 should always ride in a rear-facing car seat. There are different types of rear-facing car seats: Infant-only seats can only be used rear-facing. Convertible and 3-in-1 car seats typically have higher height and weight limits for the rear-facing position, allowing you to keep your child rear-facing for a longer period of time.

**1 – 3 years**

Keep your child rear-facing as long as possible. It's the best way to keep him or her safe. Your child should remain in a rear-facing car seat until he or she reaches the top height or weight limit allowed by your car seat's manufacturer. Once your child outgrows the rear-facing car seat, your child is ready to travel in a forward-facing car seat with a harness.

**4 – 7 years**

Keep your child in a forward-facing car seat with a harness until he or she reaches the top height or weight limit allowed by your car seat's manufacturer. Once your child outgrows the forward-facing car seat with a harness, it's time to travel in a booster seat, but still in the back seat.

**8 – 12 years**

Keep your child in a booster seat until he or she is big enough to fit in a seat belt properly. For a seat belt to fit properly, the lap belt must lie snugly across the upper thighs, not the stomach. The shoulder belt should lie snug across the shoulder and chest and not cross the neck or face. Remember: your child should still ride in the back seat because it's safer there.

**Description (Restraint Type)**

- **A rear-facing car seat** is the best seat for your young child to use. It has a harness and in a crash, cradles and moves with your child to reduce the stress to the child's fragile neck and spinal cord.
- **A forward-facing car seat** has a harness and tether that limits your child's forward movement during a crash.
- **A booster seat** positions the seat belt so that it fits properly over the stronger parts of your child's body.
- **A seat belt** should lie across the upper thighs and be snug across the shoulder and chest to restrain the child safely in a crash. It should not rest on the stomach area or across the neck.

Images courtesy of the National Highway Traffic Safety Administration

www.nhtsa.gov
<table>
<thead>
<tr>
<th>DEVICE</th>
<th>FLOW RATE</th>
<th>OXYGEN CONCENTRATION DELIVERED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal cannula</td>
<td>1-6 LPM</td>
<td>24-44 Percent</td>
</tr>
<tr>
<td>Venturi mask</td>
<td>Varied depending on device and desired oxygen percentage</td>
<td>24-60 Percent</td>
</tr>
<tr>
<td>Partial rebreather mask</td>
<td>10-12 LPM</td>
<td>40-60 Percent</td>
</tr>
<tr>
<td>Non-rebreather mask</td>
<td>12-15 LPM</td>
<td>80-90 Percent</td>
</tr>
</tbody>
</table>
Size range of oral airways

Courtesy of Mercury Medical – www.mercurymedical.com
Oral airway in proper position

Courtesy of Nina DeBoer, my now 12-year old aspiring artist/baker daughter
Oral airway that is “too small”
Oral airway that is “too big”

Oral airway that is “just right”

Photos courtesy of Joshua DeBoer, my now 14-year old aspiring computer genius son
King Airway with gastric decompression port

Courtesy of King Systems - www.kingsystems.com
Range of King airway sizes

Courtesy of King Systems - www.kingsystems.com
Range of LMA Supreme Laryngeal Mask Airway Sizes

Courtesy of LMA North America - www.lmana.com
LMA Supreme with gastric decompression port

Courtesy of LMA North America - www.lmana.com
Size range of nasal airways

Courtesy of Med-Tech Resource - www.gomed-tech.com
Nasal airway in proper position

Courtesy of Nina DeBoer, my now 12-year old aspiring artist/baker daughter
Nasal airway that is “too small”

Nasal airway that is “too big”
Nasal airway that is “just right”

Photos courtesy of Joshua DeBoer, my now 14-year old aspiring computer genius son
Range of Air-Q Laryngeal Mask Sizes

Photo courtesy of Mercury Medical

www.mercurymed.com
King Airway

Photo courtesy of King Systems

www.kingsystems.com
Tension pneumothorax

"Courtesy of Christopher Straus MD - University of Chicago Hospitals"
Tracheostomy tubes

Courtesy of Nina DeBoer, my now 12-year old aspiring artist/baker daughter
Step 1: Pass catheter through trache tube

Step 2: Pass catheter through Stoma into airway. Then slide trache tube over catheter into airway.

Replacing trach tubes with a suction catheter “guide wire”

Courtesy of Nina DeBoer, my now 12-year old aspiring artist/baker daughter
Endotracheal or tracheostomy tube capnography device

Courtesy of Oridion Medical - www. oridion.com
Overview of chest drain components 1
Overview of chest drain components 2
Suction control dial

Bubbles in water seal chamber

Above chest drain components images courtesy of Atrium Medical
www.atriummed.com
Nasopharyngeal RSV/pertussis/influenza swab technique

Courtesy of Nina DeBoer, my now 12-year old aspiring artist/baker daughter
Morgan Lens® step 1 – Instill topical ocular anesthetic, if available.

Morgan Lens® step 2 – Attach Morgan Lens® delivery set, IV set-up, or syringe using solution and rate of choice; Start flow.
Morgan Lens® step 3 – Have patient look down, insert Morgan Lens® under upper lid. Have patient look up, retract lower lid, drop lens in place.

Morgan Lens® step 4 – Release the lower lid over Morgan Lens® and adjust flow. Tape tubing to patient’s forehead to prevent accidental lens removal. Absorb outflow with the Medi-Duct®. Do not run dry.
Morgan Lens® step 5 – Removal: Continue flow, have patient look up, retract lower lid – hold position.
Morgan Lens® step 6 – Slide Morgan Lens® out; Terminate flow
<table>
<thead>
<tr>
<th>Morgan Lens Uses</th>
<th>Solution</th>
<th>Mode with Morgan Lens</th>
<th>Rate</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocular injury due to acid burns or solvents, gasoline, detergents, etc.</td>
<td>Lactated Ringer’s** I.V. Solution</td>
<td>Morgan Lens Delivery Set or I.V. set-up</td>
<td>500 ml rapid/free flow. Reassess and continue at slower rate.</td>
<td>Once. Repeat as necessary.</td>
</tr>
<tr>
<td>Alkali burns</td>
<td>Lactated Ringer’s** I.V. Solution</td>
<td>Morgan Lens Delivery Set or I.V. set-up</td>
<td>2000 ml rapid/free flow. Reassess. Continue at 50 ml/hour or 15 drops/minute.</td>
<td>Continuous until pH of cul-de-sac is returned to neutrality.</td>
</tr>
<tr>
<td>Non-embedded foreign bodies</td>
<td>Lactated Ringer’s** I.V. Solution</td>
<td>Morgan Lens Delivery Set or I.V. set-up</td>
<td>500 ml rapid/free flow. Reassess and continue at slower rate.</td>
<td>Once. Repeat as necessary.</td>
</tr>
<tr>
<td>Foreign body sensation with no visible foreign body</td>
<td>20 cc sterile solution</td>
<td>20 cc syringe</td>
<td>Slowly without force.</td>
<td>Once. Repeat once if necessary.</td>
</tr>
<tr>
<td>Routine pre-operative</td>
<td>10 cc of preferred ocular antiseptic</td>
<td>10 cc syringe</td>
<td>Slowly without force.</td>
<td>Once.</td>
</tr>
<tr>
<td>Eyelid surgery</td>
<td>Lactated Ringer’s** I.V. Solution</td>
<td>Morgan Lens Delivery Set or I.V. set-up</td>
<td>4 drops/minute.</td>
<td>During entire procedure.</td>
</tr>
<tr>
<td>Severe infection</td>
<td>Lactated Ringer’s** I.V. Solution with suitable antibiotic and steroid***</td>
<td>Morgan Lens Delivery Set or I.V. set-up</td>
<td>50 ml/hour or 15 drops/minute.</td>
<td>Continuous for 70 hours, then 10-hour intervals until marked improvement.</td>
</tr>
</tbody>
</table>

*Allows lens to “float” over cornea and sclera.
**Recommendation based on pH: Tears approximately 7.1, Normal Saline 4.5 to 7.0, Lactated Ringers 6.0 to 7.5.
***Use only when indicated.

Quality Certified
ISO 9001 & 13485

Morgan Lens® images courtesy of MorTan – www.mortan.com
Peripheral nerves vs. brain issues and resulting facial droops

Courtesy of Nina DeBoer, my now 12-year old aspiring artist/baker daughter
The Modified Westley Clinical Scoring System for Croup

- Inspiratory stridor:
  - Not present - 0 points.
  - When agitated/active - 1 point.
  - At rest - 2 points.

- Intercostal recession:
  - Mild - 1 point.
  - Moderate - 2 points.
  - Severe - 3 points.

- Air entry:
  - Normal - 0 points.
  - Mildly decreased - 1 point.
  - Severely decreased - 2 points.

- Cyanosis:
  - None - 0 points.
  - With agitation/activity - 4 points.
  - At rest - 5 points.

- Level of consciousness:
  - Normal - 0 points.
  - Altered - 5 points.

Possible score 0-17: <4 = mild croup, 4-6 = moderate croup, >6 = severe croup.
Illustration by Nina DeBoer, then age 9 (my aspiring artist daughter, now aspiring baker daughter)
Patent Ductus Arteriosus (PDA)

Illustration by Nina DeBoer, then age 9 (my aspiring artist daughter, now aspiring baker daughter)
Fallot's Tetralogy: Four defects make up this congenital heart disorder

1. A hole in the wall between the two sides of the heart
2. Narrowing (stenosis) of the main artery to the lungs
3. Abnormal thickening of the right ventricle
4. Abnormality in the position of the main artery

Tetralogy of Fallot 1

Courtesy of Nina DeBoer, my now 12-year old aspiring artist/baker daughter
Tetralogy of Fallot

Overriding aorta

Pulmonic stenosis

Ventricular septal defect

Right ventricular hypertrophy

Tetralogy of Fallot 2

Courtesy of Nina DeBoer, my now 12-year old aspiring artist/baker daughter
Review of Common ECG Rhythms

- **Normal Sinus Rhythm** - Rate 60-100 (age dependent)

- **Sinus Bradycardia** - Rate less than 60 (age dependent)

- **Sinus Tachycardia** - Rate over 100 (age dependent)

- **Supraventricular Tachycardia “SVT”** (Fast and skinny (QRS))

- **Ventricular Tachycardia** (Fast and fat (QRS))

- **Torsades de Pointes** (Fast, fat, funky, and flipping (QRS))
1'st Degree AV block (PR >0.20)

2'nd Degree AV block – Type I (bad)

PR intervals getting longer and longer, then drop a QRS
2nd Degree AV block – Type II (worse)

PR intervals OK, but drop a QRS

3rd Degree AV block (worst)

Atria (Ps) march out and ventricles (QRSs) march out;

But they are marching to different drummers and they are independent of each other

Junctional Rhythm – Slow and steady, but no P waves

Atrial Flutter – Look for the saw tooth pattern
Atrial Fibrillation – No Ps and irregularly irregular

Multifocal PVC’s – Simply PVC’s that look different because they are different

Ventricular Fibrillation – Imagine ECG leads on Jell-O
Agonal – About to be asystolic

Asystole – If you can’t identify this one, you probably shouldn’t be taking the exam
<table>
<thead>
<tr>
<th>Type of defect</th>
<th>Description</th>
<th>Pink or blue?</th>
<th>Blood flow</th>
<th>Medical or surgical management?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atrial septal defect (ASD)</td>
<td>Hole between the right and left atriums</td>
<td>Pink</td>
<td>Increased pulmonary</td>
<td>Medical and either cardiac catheterization lab or surgical closure</td>
</tr>
<tr>
<td>Ventricular septal defect (VSD)</td>
<td>Hole between the right and left ventricles</td>
<td>Pink</td>
<td>Increased pulmonary</td>
<td>Medical and either cardiac catheterization lab or surgical closure</td>
</tr>
<tr>
<td>Patent ductus arteriosus (PDA)</td>
<td>Artery between the aorta and pulmonary artery that didn’t close on its own</td>
<td>Pink</td>
<td>Increased pulmonary</td>
<td>Medical and either cardiac catheterization lab or surgical closure</td>
</tr>
<tr>
<td>Atrioventricular canal (AV canal)</td>
<td>ASD joined with a VSD</td>
<td>Pink</td>
<td>Increased pulmonary</td>
<td>Medical and surgical repair</td>
</tr>
<tr>
<td>Coarctation of the aorta (Coarc)</td>
<td>Narrowing of the aorta</td>
<td>Pink</td>
<td>Obstructed from ventricles</td>
<td>Medical and either cardiac catheterization or surgical repair</td>
</tr>
<tr>
<td>Tetralogy of Fallot (Tet)</td>
<td>Four defects: 1) VSD 2) Pulmonary stenosis (narrowing of artery) 3) Overriding aorta (aorta sits on top of both ventricles), and 4) Right ventricular hypertrophy (ventricle gets big trying to pump against the pulmonary stenosis)</td>
<td>Blue</td>
<td>Decreased pulmonary</td>
<td>Medical and surgical repair</td>
</tr>
<tr>
<td>Transposition of the great vessels</td>
<td>“Big vessels are switched.” The pulmonary artery comes off of the left ventricle and the aorta comes off of the right ventricle</td>
<td>Blue</td>
<td>Decreased pulmonary</td>
<td>Medical, cardiac catheterization lab, and surgical repair</td>
</tr>
<tr>
<td>Hypoplastic left heart syndrome</td>
<td>Profound badness. Babies born with essentially no left ventricle.</td>
<td>Blue</td>
<td>Mixed</td>
<td>Medical and surgical repair vs. transplant vs. hospice</td>
</tr>
</tbody>
</table>
“Color-Coded” Cervical Collars

Photo courtesy of Ossur

www.ossur.com
Decorticate and Decerebrate Posturing

Illustration by Nina DeBoer, then age 9 (my aspiring artist daughter, now aspiring baker daughter)
Autism Risk & Safety Management

Autism Emergency Contact Form

Name of child or adult with autism: ______________________________

Nickname if any: ______________________________ Date of birth: __________ Height: ______________________________

Weight: __________ Eye color: ______________________________ Hair color: ______________________________

Scars or identifying marks: ______________________________

Medical conditions: ______________________________

Address: ______________________________ City: ______________________________ State: ______________________________

Zip: __________ Home phone: ______________________________ Other phone: ______________________________

Method of communication, if non-verbal: sign language, picture boards, written word, etc: ______________________________

Identification worn: ex: jewelry/Medic Alert®, clothing tags, ID card, tracking monitor, etc: ______________________________

Current prescriptions (include dosage): ______________________________

Sensory, medical, or dietary issues and requirements, if any: ______________________________

Inclination for wandering behaviors or characteristics that may attract attention: ______________________________

Favorite attractions and locations where person may be found if missing: ______________________________

Likes and dislikes (include approach and de-escalation techniques): ______________________________

Attach map and address guide to nearby properties with water sources and dangerous locations highlighted.

Attach blueprint or drawing of home, with bedrooms of individual highlighted.

Medical Care Providers:

Name: ______________________________ Phone: __________

Name: ______________________________ Phone: __________

Name: ______________________________ Phone: __________

Parents/Caregiver name: ______________________________ Phone: ______________________________

Address: ______________________________ City: ______________________________

State: ______________________________ Zip: __________ Cell phone: ______________________________

Other contact info:

Emergency contact name: ______________________________ Home phone: ______________________________

Address: ______________________________ City: ______________________________

State: ______________________________ Zip: __________ Cell phone: ______________________________

Please attach any additional information, use extra paper if necessary.

Autism Emergency Contact Form

Courtesy of Autism Risk & Safety Management - www.autismriskmanagement.com
Vascular malformations of the brain

A) Cerebral angiogram showing AVM cluster of abnormal blood vessels

B) Artist diagram of AVM with shunting between arteries and veins

C) Magnetic resonance scan showing dark spots characteristic of cerebral cavernous malformations or cavernous angiomas

D) Artist diagram illustrating mulberry-like vascular structure

Courtesy of Professor Issam Awad MD, MSc, FACS, MA (hon)

Neurovascular Surgery Program, University of Chicago Hospitals, www.issamawad.com
Horseshoe towel / car seat spinal immobilization technique

Courtesy of William Justice NREMT-P,TEMS-I & Sara House EMT-P

Proper post-removal from car seat spinal immobilization technique

Courtesy of William Justice NREMT-P,TEMS-I & Sara House EMT-P
Miami-Jr. pediatric cervical collars (that actually fit kids)

Courtesy of Ossur - www.ossur.com
Color coded mannitol administration

Courtesy of James Broselow MD & Robert Luten MD – www.ebroselow.com
External ventricular drain (EVD) in ventricular space
Duet™ external ventricular drain
Correct level of EVD (ear) for drainage and pressure reading (Upright patient)

Correct level of EVD (ear) for drainage and pressure reading (Supine patient)
Adjusting the desired CSF drainage level

External ventricular drain images courtesy of Medtronic – www.medtrronics.com
# Pediatric Glasgow Coma Scale

<table>
<thead>
<tr>
<th>Eye opening</th>
<th>(4)</th>
<th>&lt;1 year</th>
<th>&gt;1 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
<td>Spontaneous</td>
<td>Spontaneous</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>To shout</td>
<td>To command</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>To pain</td>
<td>To pain</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motor</th>
<th>(6)</th>
<th>&lt;1 year</th>
<th>&gt;1 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td></td>
<td>Spontaneous</td>
<td>Obeyes command</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Localizes pain</td>
<td>Localizes pain</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Withdraws pain</td>
<td>Withdraws pain</td>
</tr>
<tr>
<td>3</td>
<td>Abnormal flexion</td>
<td>Abnormal flexion</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Abnormal extension</td>
<td>Abnormal extension</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
### Voice (5)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 years</td>
<td>5</td>
<td>Babbles or coos appropriately</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Cries, but is consolable</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Persistent crying or screaming</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Grunts or moans to pain</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>2-5 years</td>
<td>5</td>
<td>Appropriate words and phrases</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Inappropriate words</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Persistent crying or screaming to pain</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Grunts or moans to pain</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>None</td>
</tr>
<tr>
<td>&gt;5 years</td>
<td>5</td>
<td>Oriented and converses</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Confused conversation</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Inappropriate words</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Incomprehensible sounds</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>None</td>
</tr>
</tbody>
</table>
Adult and Pediatric Rule of 9’s

Illustration by Nina DeBoer, then age 9 (my aspiring artist daughter, now aspiring baker daughter)
Handheld BladderScan® Bladder Volume Instrument to

Ensure Urine is Present in the Bladder Prior to Catheterization

BladderScan BVI 9400 Bladder Volume Instrument, ©2011 Verathon Inc.

Photo Courtesy of Verathon

www.Verathon.com
Pediatric vs. Adult Airway Edema

Illustration by Nina DeBoer, then age 9 (my aspiring artist daughter, now aspiring baker daughter)
### PEDIATRIC ANTIDOTES FOR CHEMICAL WARFARE DRUG VOLUMES (in mL)

<table>
<thead>
<tr>
<th>DRUGS</th>
<th>3 kg</th>
<th>4 kg</th>
<th>5 kg</th>
<th>6 kg</th>
<th>8 kg</th>
<th>10 kg</th>
<th>13 kg</th>
<th>16 kg</th>
<th>20 kg</th>
<th>26 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atropine IV/IM</td>
<td>0.15 mg</td>
<td>0.2 mg</td>
<td>0.25 mg</td>
<td>0.3 mg</td>
<td>0.4 mg</td>
<td>0.5 mg</td>
<td>0.65 mg</td>
<td>0.8 mg</td>
<td>1 mg</td>
<td>1.3 mg</td>
</tr>
<tr>
<td>0.05 mg/mL** conc</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>13</td>
<td>16</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>0.1 mg/mL** conc</td>
<td>1.5</td>
<td>2</td>
<td>2.5</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6.5</td>
<td>8</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>0.4 mg/mL conc</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>1</td>
<td>1.3</td>
<td>1.6</td>
<td>2</td>
<td>2.5</td>
<td>3.2</td>
</tr>
<tr>
<td>0.5 mg/mL conc</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>1</td>
<td>1.3</td>
<td>1.6</td>
<td>2</td>
<td>2.6</td>
</tr>
<tr>
<td>0.8 mg/mL conc</td>
<td>0.2</td>
<td>0.25</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>1</td>
<td>1.2</td>
<td>1.6</td>
</tr>
<tr>
<td>1 mg/mL conc</td>
<td>0.15</td>
<td>0.2</td>
<td>0.25</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.65</td>
<td>0.8</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>2PAM</td>
<td>75 mg</td>
<td>100 mg</td>
<td>125 mg</td>
<td>165 mg</td>
<td>215 mg</td>
<td>265 mg</td>
<td>325 mg</td>
<td>415 mg</td>
<td>525 mg</td>
<td>665 mg</td>
</tr>
<tr>
<td>IV 50 mg/mL</td>
<td>1.5</td>
<td>2</td>
<td>2.5</td>
<td>3.3</td>
<td>4.3</td>
<td>5.3</td>
<td>6.5</td>
<td>8.3</td>
<td>10.5</td>
<td>13.3</td>
</tr>
<tr>
<td>IM 300 mg/mL</td>
<td>0.25</td>
<td>0.33</td>
<td>0.42</td>
<td>0.55</td>
<td>0.7</td>
<td>0.9</td>
<td>1.1</td>
<td>1.4</td>
<td>1.8</td>
<td>2.2</td>
</tr>
<tr>
<td>IV Drip 20 mg/mL</td>
<td>1.5-3 mL/hr</td>
<td>2-4 mL/hr</td>
<td>2.5-5 mL/hr</td>
<td>3.3-6.5 mL/hr</td>
<td>4.3-8.5 mL/hr</td>
<td>5.3-10.5 mL/hr</td>
<td>6.5-13 mL/hr</td>
<td>8.3-17 mL/hr</td>
<td>11-21 mL/hr</td>
<td>13-27 mL/hr</td>
</tr>
</tbody>
</table>
| **Concentrations are too dilute for IM injection in most patients. All IV medications may be given IO.**

---

**Color Coded Chemical Warfare Antidotes**

Photo Courtesy of James Broselow MD

[www.ebroselow.com](http://www.ebroselow.com)
Color coded 2-PAM administration for chemical weapon exposure

Courtesy of James Broselow MD & Robert Luten MD - www.ebroselow.com
The nomogram has been developed to estimate the probability that acute acetaminophen overdose will result in hepatotoxicity based on plasma acetaminophen levels in relation to hours after ingestion.

Adapted from ACETADOTE® Package Insert, 2008

Rumack-Matthew nomogram for acetaminophen overdose

Courtesy of Cumberland Pharmaceuticals - www.cumberlandpharma.com
### Acetylcysteine Loading IV

<table>
<thead>
<tr>
<th>Acetylcysteine Loading IV</th>
<th>150 mg/kg/dose (ACETADOTE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.11 kg</td>
<td>1000 mg</td>
</tr>
<tr>
<td>60 mg/mL</td>
<td></td>
</tr>
</tbody>
</table>

**Preparation Instructions**

Add 25 mL Acetadote 200 mg/mL (20%) to 100 mL bag Dextrose 5% in Water (D5W) = 5600 mg per 125 mL total volume = 48 mg/mL (4%).

**Preparation and Administration**

Administer via syringe or infusion pump over 15-50 minutes.

### Acetylcysteine 1st Maintenance IV

<table>
<thead>
<tr>
<th>Acetylcysteine 1st Maintenance IV</th>
<th>58 mg/kg/dose over next 4 hours (ACETADOTE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.11 kg</td>
<td>52.5 mg</td>
</tr>
<tr>
<td>60 mg/mL</td>
<td>3.3 mL/4 hours</td>
</tr>
</tbody>
</table>

**Preparation Instructions**

Add 25 mL Acetadote 200 mg/mL (20%) to 100 mL bag Dextrose 5% in Water (D5W) = 5000 mg per 125 mL total volume = 48 mg/mL (4%).

**Preparation and Administration**

Following loading dose administer this 1st Maintenance dose via syringe or infusion pump over the next 4 hours. This solution is compatible with 5% Dextrose in Normal Saline (D5 1/2 NS) and for those zones with low infusion rates should be piggy-backed into patient’s maintenance infusion.

### Remarks

Serious anaphylactic reactions have been reported with patients receiving IV Acetylcysteine. Use with caution in patients with history of asthma or bronchospasm.

**Note:** Advise reactions include:

STOP THE INFUSION if patient develops a rash, tachycardia, hypotension, respiratory distress or allergic symptoms.

---

**Color coded intravenous Acetadote® administration**

**Courtesy of James Broselow MD & Robert Luten MD – www.ebroselow.com**
Color coded atropine administration for chemical weapon exposure

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Volume</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05 mg/mL**</td>
<td>16 mL</td>
<td>0.5 mg</td>
</tr>
<tr>
<td>0.1 mg/mL**</td>
<td>5 mL</td>
<td>0.5 mg</td>
</tr>
<tr>
<td>0.3 mg/mL**</td>
<td>1.3 mL</td>
<td>0.5 mg</td>
</tr>
<tr>
<td>0.5 mg/mL**</td>
<td>1 mL</td>
<td>0.5 mg</td>
</tr>
<tr>
<td>1 mg/mL**</td>
<td>0.5 mL</td>
<td>0.5 mg</td>
</tr>
</tbody>
</table>

** Concentrations are too dilute for IM injection in most patients. All IV medications may be given IO (intraosseous)

Courtesy of James Broselow MD & Robert Luten MD – www.ebroselow.com
<table>
<thead>
<tr>
<th>Type</th>
<th>Caused by:</th>
<th>Signs and Symptoms (systemic)</th>
<th>Signs and Symptoms (rash)</th>
<th>Management</th>
<th>Contagious Period</th>
<th>Route of Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicken Pox</td>
<td>Virus</td>
<td>Flu</td>
<td>Chicken Pox rash</td>
<td>Benadryl (diphenhydramine) PO or lotion, Calamine lotion, time – Varicella-zoster immunoglobulin (VZIG) in high-risk kids</td>
<td>1 day before visible lesions until ALL lesions are crusted over</td>
<td>Primarily respiratory, but also direct contact with open lesions - Scabs are not infectious</td>
</tr>
<tr>
<td>Mumps</td>
<td>Virus</td>
<td>Fever/malaise x 24 hours, followed by “earache” that is aggravated by chewing – Then parotid gland swelling</td>
<td>None</td>
<td>Tylenol or Motrin Fluids</td>
<td>Most communicable immediately before and after swelling begins</td>
<td>Respiratory and saliva</td>
</tr>
<tr>
<td>Roseola</td>
<td>Virus</td>
<td>3-4 days of high fever in a cute kid – Fever goes away with rash</td>
<td>Discreet rose-pink rash – First on trunk, then to face and extremities – not itchy</td>
<td>Tylenol or Motrin</td>
<td>During the actively febrile period</td>
<td>Respiratory and saliva</td>
</tr>
<tr>
<td>Rubella</td>
<td>Virus (German measles)</td>
<td>None in most children</td>
<td>Pinkish red rash starts in the face and rapidly moves down – Disappears in same order it began and is usually gone by 3rd day</td>
<td>Tylenol or Motrin</td>
<td>7 days before rash to about 5 days after rash appears</td>
<td>Respiratory and saliva</td>
</tr>
<tr>
<td>Type</td>
<td>Caused by</td>
<td>Signs and Symptoms</td>
<td>Signs and Symptoms (rash)</td>
<td>Management</td>
<td>Contagious Period</td>
<td>Route of Transmission</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------</td>
<td>--------------------</td>
<td>---------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Rubeola (measles)</td>
<td>Virus</td>
<td>Fever, malaise, and Koplik spots (red spot with a blue-white center found in the mouth)</td>
<td>Red rash – starts in face and becomes less red as it moves down the body</td>
<td>Rest, Tylenol or Motrin; antibiotics to prevent secondary infection in high-risk kids</td>
<td>4 days before rash until 5 days after rash appears</td>
<td>Respiratory and saliva</td>
</tr>
<tr>
<td>Fifth’s Disease</td>
<td>Virus</td>
<td>“Flu” symptoms Usually afebrile</td>
<td>“Slapped face” appearance which disappears by 1-4 days, red, symmetrical, itchy rash moving proximal to distal</td>
<td>Tylenol or Motrin Antihistamines for itching</td>
<td>1-2 days before the rash starts until the rash appears</td>
<td>Respiratory and saliva</td>
</tr>
<tr>
<td>Scarlet Fever</td>
<td>Strep.</td>
<td>Malaise, high fever, and high pulse out of proportion to fever</td>
<td>Sandpaper-like red rash starting on the neck within 12 hours of fever</td>
<td>Penicillin or cephalosporins Tylenol or Motrin</td>
<td>First 10 days of symptoms</td>
<td>Respiratory and saliva</td>
</tr>
</tbody>
</table>
## Laboratory Detection of Drugs

| Drug            | Detection Time
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>12-24 hours</td>
</tr>
<tr>
<td>Amphetamines</td>
<td>2-4 days</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>1-14 days</td>
</tr>
<tr>
<td>Rohypnol</td>
<td>36 hours</td>
</tr>
<tr>
<td>Cannabinoids</td>
<td>Occasional use: 1-7 days</td>
</tr>
<tr>
<td>Cannabinoids</td>
<td>Chronic use: 1-4 weeks</td>
</tr>
<tr>
<td>Cocaine</td>
<td>12-48 hours</td>
</tr>
<tr>
<td>GHB</td>
<td>4 hours (blood) - 12 hours (urine)</td>
</tr>
<tr>
<td>Opiates</td>
<td>1-3 days</td>
</tr>
<tr>
<td>PCP</td>
<td>Occasional use: 1-8 days</td>
</tr>
<tr>
<td>PCP</td>
<td>Chronic use: Up to 30 days</td>
</tr>
</tbody>
</table>

(Actual figures will vary due to metabolism, user laboratory, and excretion)

*If someone asks how long a certain drug is detectable in their urine, what do you tell them???

Tell them whatever drug they asked about is detected in urine for 2 years!"
# One Pill or One Swallow Killers

<table>
<thead>
<tr>
<th>Agent or Class</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camphor</td>
<td>Camphor mothballs and camphor oil</td>
</tr>
<tr>
<td>Salicylates</td>
<td>Oil of wintergreen and methylsalicylate</td>
</tr>
<tr>
<td>Podophyllin</td>
<td>Podofilox (podophyllin)</td>
</tr>
<tr>
<td></td>
<td>Also occasionally in herbal medications</td>
</tr>
<tr>
<td>Local anesthetics</td>
<td>Nupercainal (Dibucaine) ointment</td>
</tr>
<tr>
<td>Anti-arrhythmics</td>
<td>Quinaglut (quinidine), Norpace (disopyramide), Enkaid (encainide), and Rhythmol (propafenone)</td>
</tr>
<tr>
<td>Anti-malarials</td>
<td>Quinine and chloroquine</td>
</tr>
<tr>
<td>Anti-hypertensives</td>
<td>Catapres (clonidine)</td>
</tr>
<tr>
<td>Tricyclic antidepressants</td>
<td>Elavil (amitriptyline), Tofranil (imipramine), and Pamelor (nortriptyline) - Depending on dose and size of child</td>
</tr>
<tr>
<td>Calcium channel blockers</td>
<td>Calan or Isoptin (verapamil), Cardizem (diltiazem), and Procardia (nifedipine)</td>
</tr>
<tr>
<td>Oral hypoglycemics</td>
<td>Amaryl (glimepiride), Glucotrol (glypizide), and Glyburide (glibenclamide)</td>
</tr>
<tr>
<td>(sulfonyleureas)</td>
<td></td>
</tr>
<tr>
<td>Opioids</td>
<td>Vicodin (hydrocodone with acetaminophen), Lomotil (diphenoxylate and atropine), and Duragesic (fentanyl) patch</td>
</tr>
<tr>
<td>Toxic alcohols</td>
<td>Windshield washer fluid (methanol) and antifreeze (ethylene glycol)</td>
</tr>
<tr>
<td>Theophylline</td>
<td>Theo-Dur, Theostat, and Theo-Dur Sprinkle</td>
</tr>
</tbody>
</table>

*Thanks to James Rhee MD and Anthony Scalzo MD for their help with the creation of this chart*
Snakebite Tidbits from the Texas Panhandle Poison Center www.poisoncontrol.org

- The annual incidence of snake bite in the United States is 3-4 bites per 100,000 population; with only about 20 deaths reported each year. Rattlesnake bites are the most common envenomation, and the victim is often a young, intoxicated male who was teasing or trying to capture the snake.

- The potency of the venom and the amount of venom injected vary considerably. About 25% of all snake strikes are dry bites in which there is no envenomation.

- Fang marks from the Crotalidae (rattlesnake, copperhead, and the cottonmouth) may look like puncture wounds or lacerations.

- Coral snake envenomation is rare because of the snake’s small mouth and fangs. The snake must hold on and chew for several seconds or more to work its rear fangs into the skin.

- Red on yellow... Kill a fellow  Red on black...Venom lack

- A child gets the same amount of antivenin as an adult.

- If platelets are low, give more antivenin... not more platelets.

- Do not pack the wound in ice or use a tourniquet.

- Never perform a fasciotomy unless compartment syndrome is documented with tissue compartment pressure monitoring.

- Electric shock treatment for snakebite is ineffective and is potentially dangerous!
BabyPod II Infant Warmer

Photo courtesy of BabyPod

www.babypod.com
Intussusception

Courtesy of Nina DeBoer, my now 12-year old aspiring artist/baker daughter
Double bubble & double trouble abdominal x-ray

Courtesy of Gerald A. Mandell MD - Phoenix Children’s Hospital
## Appendix 7-A

### APGAR Scores

<table>
<thead>
<tr>
<th>Element</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance (skin color)</td>
<td>Body and extremities blue, pale</td>
<td>Body pink, extremities blue</td>
<td>Completely pink</td>
<td></td>
</tr>
<tr>
<td>Pulse rate</td>
<td>Absent</td>
<td>Below 100/min</td>
<td>100/min or above</td>
<td></td>
</tr>
<tr>
<td>Grimace (Irritability)</td>
<td>No response</td>
<td>Grimeace</td>
<td>Cough, sneeze, cry</td>
<td></td>
</tr>
<tr>
<td>Activity (Muscle tone)</td>
<td>Limp</td>
<td>Some flexion of extremities</td>
<td>Active motion</td>
<td></td>
</tr>
<tr>
<td>Respiratory effort</td>
<td>Absent</td>
<td>Slow and irregular</td>
<td>Strong cry</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL SCORE =**
Color coded DKA intravenous insulin and fluid management

Courtesy of James Broselow MD & Robert Luten MD – www.ebroselow.com
## Insulin Preparations

Since 1982, most of the newly approved insulin preparations have been produced by inserting portions of DNA ("recombinant DNA") into special lab-cultivated bacteria or yeast. This process allows the bacteria or yeast cells to produce complete human insulin. Recombinant human insulin has, for the most part, replaced animal-derived insulin, such as pork and beef insulin. More recently, insulin products called "insulin analogs" have been produced so that the structure differs slightly from human insulin (by one or two amino acids) to change onset and peak of action. The following table lists some of the more common insulin preparations available today. Onset, peak, and duration of action are approximate for each insulin product, as there may be variability depending on each individual, the injection site, and the individual's exercise program.

<table>
<thead>
<tr>
<th>Type of Insulin</th>
<th>Examples</th>
<th>Onset of Action</th>
<th>Peak of Action</th>
<th>Duration of Action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rapid-acting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humalog (lispro)</td>
<td>15 minutes</td>
<td>30-90 minutes</td>
<td>3-5 hours</td>
</tr>
<tr>
<td></td>
<td>Eli Lilly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NovoLog (aspart)</td>
<td>15 minutes</td>
<td>40-50 minutes</td>
<td>3-5 hours</td>
</tr>
<tr>
<td></td>
<td>Novo Nordisk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Short-acting (Regular)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humulin R</td>
<td>30-60 minutes</td>
<td>50-120 minutes</td>
<td>5-8 hours</td>
</tr>
<tr>
<td></td>
<td>Eli Lilly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novolin R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novo Nordisk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intermediate-acting (NPH)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humulin N</td>
<td>1-3 hours</td>
<td>8 hours</td>
<td>20 hours</td>
</tr>
<tr>
<td></td>
<td>Eli Lilly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novolin N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novo Nordisk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humulin L</td>
<td>1-2.5 hours</td>
<td>7-15 hours</td>
<td>18-24 hours</td>
</tr>
<tr>
<td></td>
<td>Eli Lilly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novolin L</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novo Nordisk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intermediate- and short-acting mixtures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humulin 50/50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humulin 70/30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humalog Mix 75/25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Humalog Mix 50/50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Eli Lilly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novolin 70/30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novolog Mix 70/30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novo Nordisk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Long-acting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ultralente</td>
<td>4-8 hours</td>
<td>8-12 hours</td>
<td>36 hours</td>
</tr>
<tr>
<td></td>
<td>Eli Lilly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lantus (glargine)</td>
<td>1 hour</td>
<td>none</td>
<td>24 hours</td>
</tr>
<tr>
<td></td>
<td>Aventis</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The onset, peak, and duration of action of these mixtures would reflect a composite of the intermediate and short- or rapid-acting components, with one peak of action.
Nasal Medication Delivery Devices

Photos courtesy of Wolfe-Tory

www.wolfetory.com
Mask that is “too small”

Mask that is “too big”
Mask that is “just right”

Photos courtesy of Joshua DeBoer, my now 14-year old aspiring computer genius son –
Pediatric nasal cannula capnography device
Note the ability to administer supplemental oxygen and monitor end-tidal CO₂ for both “nose & mouth breathers”

Nasal cannula capnography in use
Normal ventilation capnograph

Capnography images courtesy of Oridion Medical - www.oridaon.com
Translations of Wong-Baker FACES Pain Rating Scale

Original Instructions:
Explain to the person that each face is for a person who feels happy because he has no pain (hurt) or sad because he has some or a lot of pain. Face 0 is very happy because he doesn’t hurt at all. Face 1 hurts just a little bit. Face 2 hurts a little more. Face 3 hurts even more. Face 4 hurts a whole lot. Face 5 hurts as much as you can imagine, although you don’t have to be crying to feel this bad. Ask the person to choose the face that best describes how he is feeling.

Rating scale is recommended for persons age 3 years and older.

Brief word instructions: Point to each face using the words to describe the pain intensity. Ask the child to choose the face that best describes their own pain and record the appropriate number.

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African-American boy OUCHER™ scale was developed and copyrighted in 1990 by Mary J. Denyes, PhD,RN (Wayne State University) and Antonia M. Villarruel PhD,RN (University of Michigan) USA. Cornelia P. Porter PhD,RN and Charlotta Marshall RN,MSN contributed to the development of this scale.
Asian girl OUCHER scale were developed and copyrighted in 2003 by C.H. Yeh and C.H. Wang (Chang Gung University), Taiwan.

http://www.oucher.org
First nations girl OUCHER™ scale was developed and copyrighted by Carla Shapiro RN,MN, Canada, 1997.
Hispanic boy OUCHER™ scale was developed and copyrighted in 1990 by Antonia M. Villarruel PhD,RN (University of Michigan) and Mary J. Denyes PhD,RN (Wayne State University), USA.

OUCHER™ scale images courtesy of Judith Beyer RN,PhD - www.OUCHER.org
<table>
<thead>
<tr>
<th>Name</th>
<th>What is it?</th>
<th>Signs and Symptoms</th>
<th>Diagnostics</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Septic arthritis</td>
<td>Infection of the joint space – Bacteria spread from somewhere else, such as otitis, URI, cellulitis, etc.</td>
<td>Fever and/or chills&lt;br&gt;Decreased ROM of joint&lt;br&gt;Limping&lt;br&gt;Palpable effusion</td>
<td>CBC, ESR, blood cultures, arthrocentesis (test of choice), vaginal, rectal, oral cultures to rule out N. gonorrhea infection, X-rays to rule out osteomyelitis</td>
<td>IV antibiotics&lt;br&gt;Oral analgesics</td>
</tr>
<tr>
<td>Osteomyelitis</td>
<td>Bone infection – Bacteria spread from somewhere else, such as trauma, puncture wound, open fractures, etc.</td>
<td>Fever&lt;br&gt;Focal bone pain&lt;br&gt;Unwilling to bear weight or move limb</td>
<td>CBC, ESR, blood cultures, bone and chest X-rays (rule out TB), wound culture, bone scan</td>
<td>IV antibiotics&lt;br&gt;IV analgesics&lt;br&gt;Immobilize the extremity&lt;br&gt;Possible surgery</td>
</tr>
<tr>
<td>Transient Synovitis</td>
<td>Inflammation of the membrane of the hip joint – Not sure why it occurs</td>
<td>Acute groin pain&lt;br&gt;Non-traumatic knee/thigh pain&lt;br&gt;Usually afebrile</td>
<td>CBC, ESR, X-rays, ultrasound, or MRI of hip</td>
<td>NSAIDS&lt;br&gt;Bed rest with no weight bearing until pain free</td>
</tr>
<tr>
<td>Name</td>
<td>What is it?</td>
<td>Signs and Symptoms</td>
<td>Diagnostics</td>
<td>Management</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Slipped femoral capital epiphysis (SCFE)</td>
<td>Spontaneous displacement of the proximal femoral epiphysis which causes displacement of the femoral head relative to the femoral neck – Not sure why it occurs – Most common adolescent hip disorder</td>
<td>Severe hip pain (acute)</td>
<td>Pelvic X-rays</td>
<td>Oral analgesics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>External rotation with shortening (acute)</td>
<td></td>
<td>No weight bearing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Several months of pain, limping, and out-toed gait (chronic is most common type)</td>
<td></td>
<td>Traction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Surgical repair</td>
</tr>
<tr>
<td>Osgood-Schlatter Disease</td>
<td>Microfracture of the tibial tubercle – Running and jumping</td>
<td>Anterior knee pain</td>
<td>Knee X-rays</td>
<td>NSAIDS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Point tenderness at the tibial tubercle</td>
<td></td>
<td>Decreased activity x 2-3 weeks</td>
</tr>
<tr>
<td>Osteogenesis Imperfecta (OI)</td>
<td>“Brittle bone disease” - Most common osteoporosis syndrome in childhood – Genetic cause</td>
<td>Variable fractures, blue sclera, less fractures post-puberty (with most common type of OI)</td>
<td>Genetic testing (not in ED)</td>
<td>Oral or IV analgesics</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>X-rays and history</td>
<td>Fracture care</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rule out abuse</td>
<td>Gentle handling</td>
</tr>
<tr>
<td>Juvenile Rheumatoid Arthritis (JRA) – Now called Juvenile Idiopathic Arthritis (JIA)</td>
<td>Chronic inflammation of joints with eventual erosion, destruction, and fibrosis of the cartilage – Rarely “rheumatoid” type in children</td>
<td>Arthritis symptoms</td>
<td>ESR, rheumatoid factor (only + in 10% of cases), X-rays</td>
<td>NSAIDS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Methotrexate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Steroids</td>
</tr>
<tr>
<td>Childhood Accidental Spiral Tibial (CAST) fracture – aka Toddler’s fracture</td>
<td>Spiral fracture of the lower 1/3 of the tibia caused by twisting/rotating the leg with the foot fixed in place (i.e. foot caught in something)</td>
<td>Limping or unwilling to bear weight</td>
<td>Radiographs</td>
<td>Oral analgesics</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No history of trauma (if unwitnessed) and no fever</td>
<td>Bone scan</td>
<td>Long leg cast for several weeks</td>
</tr>
</tbody>
</table>

CBC – Complete blood count  
ESR – Erythrocyte sedimentation rate  
MRI – Magnetic resonance imaging  
NSAIDS - Non-steroidal anti-inflammatory drugs  
TB – tuberculosis  
URI – Upper respiratory infection
Wong-Baker FACES Pain Rating Scale

0  No hurt
1  Hurts little bit
2  Hurts little more
3  Hurts even more
4  Hurts whole lot
5  Hurts worst

Brief word instructions: Point to each face using the words to describe the pain intensity. Ask the child to choose the face that best describes his/her own pain and record the appropriate number.

Original instructions: Explain to the person that each face is for a person who feels happy because he has no pain (hurt) or sad because he has some or a lot of pain. Face 0 is very happy because he doesn’t hurt at all. Face 1 hurts just a little bit. Face 2 hurts a little more. Face 3 hurts even more. Face 4 hurts a whole lot. Face 5 hurts as much as you can imagine, although you don’t have to be crying to feel this bad. Ask the person to choose the face that best describes how he is feeling.

Rating scale is recommended for person’s age 3 years and older.

## UNIVERSAL PAIN ASSESSMENT TOOL

This pain assessment tool is intended to help patient care providers assess pain according to individual patient needs. Explain and use 0-10 Scale for patient self-assessment. Use the faces or behavioral observations to interpret expressed pain when patient cannot communicate his/her pain intensity.

### WONG-BAKER FACIAL GRIMACE SCALE

- **0**: No pain
- **1-2**: Mild
- **3-4**: Moderate
- **5-6**: Severe
- **7-8**: Worst possible pain

### ACTIVITY TOLERANCE SCALE

<table>
<thead>
<tr>
<th>Scale</th>
<th>Spanish</th>
<th>French</th>
<th>German</th>
<th>Japanese</th>
<th>Tagalog</th>
<th>Hindi</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NO PAIN</strong></td>
<td>NADA DE DOLOR</td>
<td>AUCUNE DOULEUR</td>
<td>KEINE SCHMERZEN</td>
<td>痛みなし</td>
<td>HINDI MASAKIT</td>
<td>DARD NAHI HAI</td>
</tr>
<tr>
<td><strong>CAN BE IGNORED</strong></td>
<td>UN POQUITO DE DOLOR</td>
<td>LÉGÈRE DOULEUR</td>
<td>LEICHTLE SCHMERZEN</td>
<td>軽い痛み</td>
<td>KAUNTIG SAKIT</td>
<td>BAHUT KAM</td>
</tr>
<tr>
<td><strong>INTERFERES WITH TASKS</strong></td>
<td>UN DOLOR LEVE</td>
<td>DOULEUR MODÉRÉE</td>
<td>MÄSSIGE SCHMERZEN</td>
<td>中程度の痛み</td>
<td>MEDYO MASAKIT</td>
<td>HILNE SE TAKLEF HOTI HAI</td>
</tr>
<tr>
<td><strong>INTERFERES WITH CONCENTRATION</strong></td>
<td>DOLOR FUERTE</td>
<td>FORTE DOULEUR</td>
<td>STARKE SCHMERZEN</td>
<td>ひどい痛み</td>
<td>TALAGANG MASAKIT</td>
<td>SOCH NAHIN SAK TE</td>
</tr>
<tr>
<td><strong>INTERFERES WITH BASIC NEEDS</strong></td>
<td>DOLOR DEMASIADO FUERTE</td>
<td>TRÈS FORTE DOULEUR</td>
<td>SEHR STARKE SCHMERZEN</td>
<td>非常にひどい痛み</td>
<td>MASAKIT NA MASAKIT</td>
<td>KUCH NAHIN KAR SAKTE</td>
</tr>
<tr>
<td><strong>BEDREST REQUIRED</strong></td>
<td>UN DOLOR INSOPORTABLE</td>
<td>DOULEUR EXTREME</td>
<td>EXTREME SCHMERZEN</td>
<td>最悪の痛み</td>
<td>PINAKAMASAKIT</td>
<td>DARD BAHUT HAI</td>
</tr>
</tbody>
</table>

http://www.anes.ucla.edu/pain/FacesScale.jpg
## FLACC Scale

<table>
<thead>
<tr>
<th>Categories</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face</td>
<td>No particular expression or smile</td>
<td>Occasional grimace or frown, withdrawn, disinterested.</td>
<td>Frequent to constant quivering chin, clenched jaw.</td>
</tr>
<tr>
<td>Legs</td>
<td>Normal position or relaxed.</td>
<td>Uneasy, restless, tense.</td>
<td>Kicking, or legs drawn up.</td>
</tr>
<tr>
<td>Activity</td>
<td>Lying quietly, normal position moves easily.</td>
<td>Squirming, shifting back and forth, tense.</td>
<td>Arched, rigid or jerking.</td>
</tr>
<tr>
<td>Cry</td>
<td>No cry, (awake or asleep)</td>
<td>Moans or whimpers; occasional complaint</td>
<td>Crying steadily, screams or sobs, frequent complaints.</td>
</tr>
<tr>
<td>Consolability</td>
<td>Content, relaxed.</td>
<td>Reassured by occasional touching hugging or being talked to, distractable.</td>
<td>Difficulty to console or comfort</td>
</tr>
</tbody>
</table>
# Neonatal/Infant Pain Scale (NIPS)

## Pain Assessment Tools

*Neonatal/Infant Pain Scale (NIPS)*

(Recommended for children less than 1 year old) - A score greater than 3 indicates pain

<table>
<thead>
<tr>
<th>Facial Expression</th>
<th>Pain Assessment</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - Relaxed muscles</td>
<td>Restful face, neutral expression</td>
<td></td>
</tr>
<tr>
<td>1 - Grinace</td>
<td>Tight facial muscles; furrowed brow, chin, jaw, (negative facial expression – nose, mouth and brow)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cry</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - No Cry</td>
<td>Quiet, not crying</td>
<td></td>
</tr>
<tr>
<td>1 - Whimper</td>
<td>Mild moaning, intermittent</td>
<td></td>
</tr>
<tr>
<td>2 - Vigorous Cry</td>
<td>Loud scream; rising, shrill, continuous (Note: Silent cry may be scored if baby is intubated as evidenced by obvious mouth and facial movement)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Breathing Patterns</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - Relaxed</td>
<td>Usual pattern for this infant</td>
<td></td>
</tr>
<tr>
<td>1 - Change in Breathing</td>
<td>Infraslow, irregular, faster than usual; gagging, breath holding</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Arms</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - Relaxed/Restrained</td>
<td>No muscular rigidity; occasional random movements of arms</td>
<td></td>
</tr>
<tr>
<td>1 - Flexed/Extended</td>
<td>Tense, straight legs; rigid and/or rapid extension, flexion</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Legs</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - Relaxed/Restrained</td>
<td>No muscular rigidity; occasional random leg movement</td>
<td></td>
</tr>
<tr>
<td>1 - Flexed/Extended</td>
<td>Tense, straight legs; rigid and/or rapid extension, flexion</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>State of Arousal</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - Sleeping/Awake</td>
<td>Quiet, peaceful sleeping or alert random leg movement</td>
<td></td>
</tr>
<tr>
<td>1 - Fussy</td>
<td>Alert, restless, and thrashing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Probable Causes</th>
<th>Examples of Actual Reported Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug-drug interaction - an event that was likely drug-related and for which a combination of drugs had been administered</td>
<td>&quot;The six-week old infant received Demerol, Phenergan, and Thorazine for a circumcision and was found dead six hours later&quot;</td>
</tr>
<tr>
<td>Drug overdose - at least 1 drug was administered in a dose &gt; 1.25 times the maximum recommended dose</td>
<td>&quot;The child received 6000 mg of chloral hydrate&quot;</td>
</tr>
<tr>
<td>Inadequate monitoring - this could have occurred during or after the procedure</td>
<td>&quot;The child was not on any monitors&quot;</td>
</tr>
<tr>
<td>Inadequate resuscitation - the records indicated that the individuals involved did not have the basic life support or advanced life support skills or did not appropriately manage the emergency</td>
<td>&quot;The heart rate decreased from 98 to 80, the nurse anesthetist gave oxygen and atropine, the pulse decreased further into the 60's, the nurse anesthetist gave epinephrine, 4 minutes later the nurse gave Narcan, 3 minutes later the nurse gave Anitirllium, 12 minutes later the ambulance was summoned, 10 minutes later the patient was intubated, the ambulance drivers found the child on no monitors, EKG revealed electromechanical dissociation, the patient was transported from the dental office to a hospital&quot;</td>
</tr>
<tr>
<td>Inadequate medical evaluation - lack of evaluation or appreciation of how underlying medical conditions would alter the patient's response to sedative drugs</td>
<td>&quot;A child was transferred from Mexico and received 60mg/kg of chloral hydrate for a cardiology procedure; respiratory depression and bradycardia were followed by cardiac arrest. Autopsy revealed a ventricular septal defect, pulmonary hypertension, and elevated digoxin levels&quot;</td>
</tr>
<tr>
<td>Premature discharge - the patient developed the problem after leaving a medical facility before meeting recommended discharge criteria</td>
<td>&quot;The child became stridorous and cyanotic on the way back to his hometown&quot;</td>
</tr>
<tr>
<td>Inadequate personnel - either the medication was administered at the direction of a physician who then left the facility, or there were inadequate numbers of individuals to monitor the patient and carry out the procedure at the same time</td>
<td>&quot;The physician administered the medication and left the facility leaving the care to a technician&quot;</td>
</tr>
<tr>
<td>Prescription/transcription error - if patient received incorrect dose either because of a transcription or prescription error (nursing or pharmacy)</td>
<td>&quot;The patient received tablespoons instead of teaspoons&quot;</td>
</tr>
<tr>
<td>Type of Event</td>
<td>Example Scenarios</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Inadequate equipment - if an emergency arose and the equipment to handle it was not age- or size-appropriate or not available</td>
<td>&quot;An oxygen outlet was available, but flow meter was not - only room air for the first 10 minutes&quot;</td>
</tr>
<tr>
<td>Inadequate recovery procedures - this category included cases where there was not a proper recovery period, where no one was observing the patient after the procedure, or if an emergency occurred and the necessary equipment was not available</td>
<td>&quot;If they made nurses stay after 5PM, they would all quit&quot; <em>(my personal favorite - SLD)</em></td>
</tr>
<tr>
<td>Inadequate understanding of a drug or its pharmacodynamics</td>
<td>&quot;The patient was given 175 mcg of Fentanyl by IV push; chest wall/glottic rigidity was followed by full cardiac arrest&quot; - Narcan or muscle relaxant never administered</td>
</tr>
<tr>
<td>Prescription given by parent in an unsupervised medical environment</td>
<td>&quot;The mother gave two prescriptions of chloral hydrate at home&quot;</td>
</tr>
<tr>
<td>Local anesthetic overdose - if child received more than the recommended upper limits or if an intravascular injection occurred</td>
<td>&quot;A 22.7 kg child received 432 mg of mepivacaine for a dental procedure. Seizures were followed by respiratory and cardiac arrests&quot;</td>
</tr>
<tr>
<td>Inadequate fasting for elective procedure</td>
<td>&quot;The child received a bottle of milk prior to a CT scan&quot;</td>
</tr>
<tr>
<td>Unsupervised administration of a drug by a technician</td>
<td>&quot;The drug was administered by a technician; there was no physician or nurse in attendance&quot;</td>
</tr>
</tbody>
</table>

## Analgesia and Sedation Continuum

<table>
<thead>
<tr>
<th></th>
<th>Minimal Sedation (Anxiolysis)</th>
<th>Moderate Sedation/Analgesia “Conscious Sedation”</th>
<th>Deep Sedation/Analgesia</th>
<th>General Anesthesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsiveness</td>
<td>Normal response to verbal or light tactile stimulation</td>
<td>Purposeful response to verbal or light tactile stimulation</td>
<td>Purposeful response following repeated or painful stimulation</td>
<td>Unarousable even with painful stimulation</td>
</tr>
<tr>
<td>Airway</td>
<td>Unaffected</td>
<td>No intervention required</td>
<td>Intervention may be required</td>
<td>Intervention often required</td>
</tr>
<tr>
<td>Spontaneous Ventilation</td>
<td>Unaffected</td>
<td>Adequate</td>
<td>May be inadequate</td>
<td>Frequently inadequate</td>
</tr>
<tr>
<td>Cardiovascular Function</td>
<td>Unaffected</td>
<td>Usually maintained</td>
<td>Usually maintained</td>
<td>May be impaired</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Dose</th>
<th>Onset</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAC</td>
<td>TD</td>
<td>-</td>
<td>15-30 minutes</td>
<td>45-60 minutes</td>
</tr>
<tr>
<td>(tetracaine, adrenaline, and cocaine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOTE: Never near mucous membranes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LET</td>
<td>TD</td>
<td>-</td>
<td>15-30 minutes</td>
<td>45-60 minutes</td>
</tr>
<tr>
<td>(lidocaine, epinephrine, and tetracaine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMLA</td>
<td>TD</td>
<td>-</td>
<td>60 minutes</td>
<td>1-2 hours</td>
</tr>
<tr>
<td>(lidocaine and prilocaine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L-M-X</td>
<td>TD</td>
<td>-</td>
<td>30-60 minutes</td>
<td>2-4 hours</td>
</tr>
<tr>
<td>(lidocaine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synera</td>
<td>TD</td>
<td>-</td>
<td>20-30 minutes</td>
<td>2 hours</td>
</tr>
<tr>
<td>(lidocaine and tetracaine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lidocaine</td>
<td>SQ</td>
<td>5mg/kg max (plain)</td>
<td>1 minute</td>
<td>1-3 hours</td>
</tr>
<tr>
<td>(xylocaine, lignocaine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7mg/kg max (with epinephrine)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marcaine</td>
<td>SQ</td>
<td>2.5mg/kg max (plain)</td>
<td>1 minute</td>
<td>4-12 hours</td>
</tr>
<tr>
<td>(bupivicaine)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.0mg/kg max (with epinephrine)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug</td>
<td>Route</td>
<td>Dose</td>
<td>Onset</td>
<td>Duration</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------</td>
<td>-------------------------------------------</td>
<td>----------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Tylenol (acetaminophen, Panadol)</td>
<td>PO, PR</td>
<td>10-15mg/kg PO or PR</td>
<td>30-60 minutes PO or PR</td>
<td>4-6 hours PO or PR</td>
</tr>
<tr>
<td>Motrin (ibuprofen, Brufen)</td>
<td>PO</td>
<td>10mg/kg PO</td>
<td>30 minutes PO</td>
<td>6 hours PO</td>
</tr>
<tr>
<td>Toradol (ketoralac)</td>
<td>IM, IV</td>
<td>0.5mg/kg IM (max 60mg) 0.5mg/kg IV (max 30mg)</td>
<td>10-20 minutes IM 5-10 minutes IV</td>
<td>6-8 hours IM/IV</td>
</tr>
<tr>
<td>Narcan (naloxone)</td>
<td>IM, IN, IV</td>
<td>0.1mg/kg IM/IN/IV peds 0.4-2.0mg IM/IN/IV adults</td>
<td>5-10 minutes IM 3-10 minutes IN 1-4 minutes IV</td>
<td>60-90 minutes IM 20-40 minutes IN 20-40 minutes IV</td>
</tr>
<tr>
<td>Romazicon (flumazenil, Anexate)</td>
<td>IM, IN, IV</td>
<td>0.02mg/kg IM/IV peds 0.04mg/kg IN ped 0.2mg max single dose 0.2mg IM/IN/IV adults (up to 1mg in 5 divided doses)</td>
<td>5-10 minutes IM 2-4 minutes IN 1-2 minutes IV</td>
<td>60-90 minutes IM 90-120 minutes IN 20-40 minutes IV</td>
</tr>
<tr>
<td>Drug</td>
<td>Route</td>
<td>Dose</td>
<td>Onset</td>
<td>Duration</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------</td>
<td>-------------------------------</td>
<td>------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Zofran (ondansetron)</td>
<td>IV</td>
<td>0.1mg/kg IV (max 4mg)</td>
<td>10 minutes IV</td>
<td>3-4 hours IV</td>
</tr>
<tr>
<td>Morphine</td>
<td>IM, IV</td>
<td>0.1mg/kg IM/IV</td>
<td>10-15 minutes IM</td>
<td>3-4 hours IM/IV</td>
</tr>
<tr>
<td>Demerol (meperidine)</td>
<td>IM, IV</td>
<td>1-2mg/kg IM/IV</td>
<td>10 minutes IM</td>
<td>2-3 hours IM/IV</td>
</tr>
<tr>
<td>Sublimaze (fentanyl)</td>
<td>IN, IV, TM</td>
<td>2mcg/kg IN 1-5mcg/kg IV 5-15mcg/kg “lollipop”</td>
<td>5-10 minutes IN 2-3 minutes IV 20-30 minutes TM</td>
<td>45-60 minutes IN/IV 60 minutes TM</td>
</tr>
<tr>
<td>Succinylcholine (“Sux”, Anectine, Quelicin) For reversal of fentanyl-induced “rigid chest”</td>
<td>IM, IV</td>
<td>4mg/kg IM 2mg/kg IV</td>
<td>1 minute IV and “Be ready to bag”!</td>
<td>10 minutes IV</td>
</tr>
<tr>
<td>Ketalar (ketamine) + with atropine or Robinul (glycopyrrolate) and Versed (midazolam) (adjunctive therapy)</td>
<td>IM, IN, IV, PO, PR</td>
<td>4mg/kg IM 10mg/kg IN 0.5-1.0mg/kg IV 5-10mg/kg PO 5-10mg/kg PR</td>
<td>2-10 minutes IM 1 minute IV 10-30 minutes PO 10-30 minutes PR</td>
<td>60-90 minutes IM 1-2 hours IN 5-10 minutes IV 1-2 hours PO 1-2 hours PR</td>
</tr>
<tr>
<td>Drug</td>
<td>Route</td>
<td>Dose</td>
<td>Onset</td>
<td>Duration</td>
</tr>
<tr>
<td>--------------</td>
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<td>-------------------------------</td>
<td>------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Nitrosox</td>
<td>INHL</td>
<td>50% N2O/50% O2</td>
<td>3-5 minutes INHL</td>
<td>3-5 minutes INHL</td>
</tr>
<tr>
<td>(Nitrous oxide, Entonox)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Versed</td>
<td>IM, IN, IV, PO, PR</td>
<td>For seizures: 0.2-0.3mg/kg IN</td>
<td>10-20 minutes IM</td>
<td>1-2 hours IM</td>
</tr>
<tr>
<td>(midazolam)</td>
<td></td>
<td>0.1mg/kg IV</td>
<td>5 minutes IN</td>
<td>30-60 minutes IN/IV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5mg/kg PR</td>
<td>2-3 minutes IV</td>
<td>60-90 minutes PO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For sedation: 0.1mg/kg IM</td>
<td>10-30 minutes PO</td>
<td>60-90 minutes PR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.4-0.5mg/kg IN</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.1mg/kg IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5mg/kg PO</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.5mg/kg PR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloral hydrate</td>
<td>PO/PR</td>
<td>50-100mg/kg PO/PR</td>
<td>15-60 min PO/PR</td>
<td>1-2+ hours PO/PR</td>
</tr>
<tr>
<td>(Nembutal)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diprivan</td>
<td>IV</td>
<td>100mcg/kg bolus IV</td>
<td>&lt;1 min IV</td>
<td>10-15 min IV</td>
</tr>
<tr>
<td>(Propofol)</td>
<td></td>
<td>(loading dose)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>then 50-100mcg/kg/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(maintenance infusion)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drug</td>
<td>Route</td>
<td>Dose</td>
<td>Onset</td>
<td>Duration</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------</td>
<td>---------------------------</td>
<td>---------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>DPT</td>
<td>IM</td>
<td>Just say no!</td>
<td>Just say no!</td>
<td>Up to 19+ hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Demerol, Phenergan, and</td>
<td></td>
<td>(This is just one</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thorazine – meperidine,</td>
<td></td>
<td>of the many reasons</td>
</tr>
<tr>
<td></td>
<td></td>
<td>promethazine, and</td>
<td></td>
<td>you that you</td>
</tr>
<tr>
<td></td>
<td></td>
<td>chlorpromazine)</td>
<td></td>
<td>should just say</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>no)</td>
</tr>
<tr>
<td>Seconal</td>
<td>IM, IV,</td>
<td>5mg/kg IM</td>
<td>10-20 min IM</td>
<td>1-4 hours IM</td>
</tr>
<tr>
<td>(Pentobarbital)</td>
<td>PR</td>
<td>1-6mg/kg IV</td>
<td>1 min IV</td>
<td>15 min IV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3mg/kg PR</td>
<td>15-60 min PR</td>
<td>1-4 hours PR</td>
</tr>
<tr>
<td>(Amidate)</td>
<td>IV</td>
<td>0.2mg/kg IV</td>
<td>30 seconds IV</td>
<td>10 minutes IV</td>
</tr>
<tr>
<td>Etomidate</td>
<td>IV</td>
<td>1-1.5mcg/kg IN</td>
<td>45 min IN</td>
<td>3 hours IN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1mcg/kg/IV over 10 min</td>
<td>6-10 min IV</td>
<td>2 hours IV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(loading dose)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.2-1.0mcg/kg/HOUR</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(maintenance infusion)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend**

IM – intramuscular, IN – intranasal, INHL – inhalation, IV – intravenous, PO – oral, PR – rectal
SQ - subcutaneous, TD – transdermal, TM - transmucosal

*(Thanks to Madelyn Kahana MD, Tim Wolfe MD, and Michelle Webb RN,MS, CRNA for their invaluable assistance with the creation of this chart)*
SLE "Butterfly Rash"

Courtesy of Nina DeBoer, my now 12-year old aspiring artist/baker daughter
Guidelines for the Management of Uncomplicated Vaso-Occlusive Pain in Children with Sickle Cell Disease in the E.D.

The purpose of these guidelines is to provide an educational resource for clinicians at BMC. Clinicians are encouraged to follow these guidelines. It is recognized however, that at times there will be exceptions to the guidelines that make different medical management appropriate.

Sickle cell disease pain crisis pathway

Courtesy of William Zempsky MD & the New England Pediatric Sickle Cell Consortium

www.nepscc.org
Purpose

This procedure describes a process for nursing and/or pharmacy personnel* to administer lidocaine through an intra-osseous catheter to decrease infusion related pain in a conscious patient. IO insertion may cause mild pain in conscious patients but IO infusions may cause severe discomfort. Lidocaine is meant to be used as an anesthetic and not as analgesia.

<table>
<thead>
<tr>
<th>Broselow Color</th>
<th>Weight (KG)</th>
<th>0.5 mg/kg Lidocaine (mg)</th>
<th>20 mg/ml Lidocaine (ml)</th>
<th>Normal Saline (ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grey</td>
<td>3</td>
<td>1.5</td>
<td>0.08</td>
<td>0.62</td>
</tr>
<tr>
<td>Grey</td>
<td>4</td>
<td>2</td>
<td>0.1</td>
<td>0.9</td>
</tr>
<tr>
<td>Grey</td>
<td>5</td>
<td>2.5</td>
<td>0.13</td>
<td>0.87</td>
</tr>
<tr>
<td>Pink</td>
<td>6-7</td>
<td>3.4</td>
<td>0.17</td>
<td>0.83</td>
</tr>
<tr>
<td>Red</td>
<td>8-9</td>
<td>4.25</td>
<td>0.21</td>
<td>0.79</td>
</tr>
<tr>
<td>Purple</td>
<td>10-11</td>
<td>5.25</td>
<td>0.26</td>
<td>0.74</td>
</tr>
<tr>
<td>Yellow</td>
<td>12-14</td>
<td>6.5</td>
<td>0.33</td>
<td>0.67</td>
</tr>
<tr>
<td>White</td>
<td>15-18</td>
<td>8.25</td>
<td>0.41</td>
<td>0.56</td>
</tr>
<tr>
<td>Blue</td>
<td>19-22</td>
<td>10.37</td>
<td>0.52</td>
<td>0.48</td>
</tr>
<tr>
<td>Orange</td>
<td>24-28</td>
<td>13</td>
<td>0.65</td>
<td>0.35</td>
</tr>
<tr>
<td>Green</td>
<td>30-36</td>
<td>16.5</td>
<td>0.83</td>
<td>0.17</td>
</tr>
</tbody>
</table>

For pediatric patients who may or are able to perceive pain after the IO device is placed and position has been confirmed and secured, CONTRAINDICATED in pediatric patients with acute seizures or history of non-febrile seizures.

1. May give 0.5 mg/kg (max 20 mg) of 2% lidocaine (without preservatives or epinephrine) IO as a slow bolus.
2. Diluted with normal saline to a total volume of 1 ml. (See table below)
3. Wait at least 30 seconds then flush with 5 ml of normal saline.
4. If necessary, step 1 may be repeated as needed to maintain anesthetic effect. (Do NOT exceed 3 mg/kg/24 hr)

This table represents approximate dosing based on Broselow's weight breakpoints.

The volume of lidocaine recommended in pediatric patients is not enough to prime the tubing. A small amount of normal saline is used to ensure the volume is the correct amount to prime the tubing and complete the lidocaine flush. Because of the familiarity and ease-of-use of the Broselow system, we based our lidocaine chart (see chart below) on the weight-based tape recommendations.

Adult patients - For patients who may or are able to perceive pain after the IO device is placed and position has been confirmed and secured.

1. May give 20-40 mg (1-2 mL) of 2% lidocaine (without preservatives or epinephrine) IO as a bolus over 1 minute.
2. Wait at least 30 seconds then flush with 10 mL of normal saline.
3. If necessary, step 1 may be repeated as needed to maintain anesthetic effect. (Do NOT exceed 3 mg/kg/24 hr)

*Medication must be ordered by physician or LIP.

Color-Coded Intraosseous Lidocaine

Chart courtesy of Stacie Hunsaker RN, MSN – Intermountain Healthcare, Provo, UT
<table>
<thead>
<tr>
<th>FLACC Scale</th>
<th>DATE/TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Face</strong></td>
<td></td>
</tr>
<tr>
<td>0 - No particular expression or smile</td>
<td></td>
</tr>
<tr>
<td>1 - Occasional grimace or frown, withdrawn, disinterested</td>
<td></td>
</tr>
<tr>
<td>2 - Frequent to constant quivering chin, clenched jaw</td>
<td></td>
</tr>
<tr>
<td><strong>Legs</strong></td>
<td></td>
</tr>
<tr>
<td>0 – Normal position or relaxed</td>
<td></td>
</tr>
<tr>
<td>1 – Uneasy, restless, tense</td>
<td></td>
</tr>
<tr>
<td>2 – Kicking, or legs drawn up</td>
<td></td>
</tr>
<tr>
<td><strong>Activity</strong></td>
<td></td>
</tr>
<tr>
<td>0 – Lying quietly, normal position, moves easily</td>
<td></td>
</tr>
<tr>
<td>1 – Squirming, shifting back and forth, tense</td>
<td></td>
</tr>
<tr>
<td>2 – Arched, rigid or jerking</td>
<td></td>
</tr>
<tr>
<td><strong>Cry</strong></td>
<td></td>
</tr>
<tr>
<td>0 – No cry (awake or asleep)</td>
<td></td>
</tr>
<tr>
<td>1 – Moans or whimpers; occasional complaint</td>
<td></td>
</tr>
<tr>
<td>2 - Crying steadily, screams or sobs, frequent complaints</td>
<td></td>
</tr>
<tr>
<td><strong>Consolability</strong></td>
<td></td>
</tr>
<tr>
<td>0 – Content, relaxed</td>
<td></td>
</tr>
<tr>
<td>1 – Reassured by occasional touching, hugging or being talked to, distractible</td>
<td></td>
</tr>
<tr>
<td>2 – Difficult to console or comfort</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL SCORE</strong></td>
<td></td>
</tr>
</tbody>
</table>
A Better Pain Chart

Courtesy of Allie Brosh, www.hyperboleandahalf.blogspot.com
Variations of Pupil Sizes

- Midrange
- Anisocoria
- Pinpoint
- Dilated
<table>
<thead>
<tr>
<th>in</th>
<th>.223</th>
<th>.21</th>
<th>.197</th>
<th>.184</th>
<th>.17</th>
<th>.158</th>
<th>.144</th>
<th>.131</th>
<th>.118</th>
<th>.105</th>
<th>.092</th>
<th>.079</th>
<th>.066</th>
<th>.053</th>
<th>.039</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>5.7</td>
<td>5.3</td>
<td>5.0</td>
<td>4.7</td>
<td>4.3</td>
<td>4.0</td>
<td>3.7</td>
<td>3.3</td>
<td>3.0</td>
<td>2.7</td>
<td>2.3</td>
<td>2.0</td>
<td>1.67</td>
<td>1.35</td>
<td>1</td>
</tr>
<tr>
<td>Fr</td>
<td>17</td>
<td>16</td>
<td>15</td>
<td>14</td>
<td>13</td>
<td>12</td>
<td>11</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fr</th>
<th>18</th>
<th>19</th>
<th>20</th>
<th>22</th>
<th>24</th>
<th>26</th>
<th>28</th>
<th>30</th>
<th>32</th>
<th>34</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>6.0</td>
<td>6.3</td>
<td>6.7</td>
<td>7.3</td>
<td>8.0</td>
<td>8.7</td>
<td>9.3</td>
<td>10.0</td>
<td>10.7</td>
<td>11.3</td>
</tr>
<tr>
<td>in</td>
<td>.236</td>
<td>.249</td>
<td>.263</td>
<td>.288</td>
<td>.315</td>
<td>.341</td>
<td>.367</td>
<td>.393</td>
<td>.419</td>
<td>.445</td>
</tr>
</tbody>
</table>

Foley Urinary Catheter Sizes
Courtesy of UrethraGauge.com
Centimeter Markings on an Endotracheal Tube
8f-16f Chest Tubes

Courtesy of Atrium Medical, www.atriummed.com

24f-36f Chest Tubes

Courtesy of Atrium Medical, www.atriummed.com
2.5-5.5 Uncuffed Endotracheal Tubes

Photo courtesy of Julie Bacon RN, BA, CPEN
Microcuff tube is designed for pediatric airway

Microcuff tube seals at a lower pressure than conventional pediatric tubes

Capillary perfusion pressure in adults is 27-40 cm H₂O. Considered lower in pediatrics.

Median cuff pressure to seal the trachea in children aged 2-4 (n=4x20 patients, ID 4.0mm). Sealing pressure assessed by auscultation within 5 minutes after intubation.

Microcuff Cuffed Pediatric Endotracheal Tubes

Images courtesy of Kimberly-Clark Healthcare, www.kchealthcare.com
Radiograph Revealing Battery in the Esophagus
Radiograph Revealing Battery in the Stomach

Images Courtesy of Christopher Straus MD, University of Chicago Medicine
Radiographs Revealing Coin in Right Mainstem Bronchus

Images Courtesy of Christopher Straus MD, University of Chicago Medicine
I Love You in American Sign Language

Image Courtesy of Dr. William Vicars, www.lifeprint.com
WaterBalz

Photo courtesy of DuneCraft, www.dunecraft.com
Obtaining a Nasopharyngeal Specimen for Pertussis Testing

Illustration courtesy of my now 14-year old aspiring baker daughter,
Radiograph Demonstrating Gastrostomy Tube in the Stomach

Image Courtesy of Christopher Speaker RN, MSN, APN, University of Chicago Medicine
Radiograph Demonstrating Intraperitoneal (not stomach) Gastrostomy Tube

Image Courtesy of Christopher Straus MD, University of Chicago Medicine
50% Dextrose, 0.5g/ml

Photo courtesy of Hospira, www.Hospira.com
25% Mannitol Bottle, 12.5g/50ml

Photo courtesy of Pharmaceutical Partners of Canada, www.ppcdrugs.com
20% Mannitol Infusion, 20g/100ml

Photo courtesy of McFarlane Medical Equipment, www.mcfarlanemedical.com.au
5.0 kg

0.5 ml

0.05 mg

\[ 5 \text{ kg} \times \frac{0.01 \text{ mg}}{\text{ kg}} \approx 0.05 \text{ mg} \]

\[ 0.05 \text{ mg} \times \frac{10 \text{ ml}}{1 \text{ mg}} \approx 0.5 \text{ ml} \]
1:10,000 Epinephrine Injection, 0.1mg/ml

Photo courtesy of Hospira, www.Hospira.com
Colormetric End-Tidal CO₂ Detectors Demonstrating Gold and Purple Colors

Images courtesy of Mercury Medical, www.mercurymed.com
Endotracheal Tube Cuff Pressure Monitor

Image courtesy of Posey, www.posey.com
Pneumatosis
(Gas in the bowel wall)

Abdominal Radiograph Demonstrating Pneumatosis Intestinalis

Image courtesy of Terri Russell RN,DNP,NNP
Lap Belt Injuries

Illustrations Courtesy of My Now 14-year Old Aspiring Baker Daughter,
Buzzy

Image courtesy of Amy Baxter MD, FACEP, www.buzzyforshots.com
Hand Bones

Phalanges

Metacarpals

Carpals

Radius

Ulna

Bones of the Hand

Illustration Courtesy of My Now 14-year Old Aspiring Baker Daughter,
Joints of the Hand

Illustration Courtesy of My Now 14-year Old Aspiring Baker Daughter,
Hand Flexor and Extensor Tendons

Illustration Courtesy of My Now 14-year Old Aspiring Baker Daughter,
Areas of Sensation: Radial Nerve

Illustration Courtesy of My Now 14-year Old Aspiring Baker Daughter,
Areas of Sensation: Ulnar Nerve

Illustration Courtesy of My Now 14-year Old Aspiring Baker Daughter,
<table>
<thead>
<tr>
<th>ABG Normal Ranges</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>sPO₂</td>
<td>~95-99%</td>
</tr>
<tr>
<td>pO₂</td>
<td>80-100</td>
</tr>
<tr>
<td>pH</td>
<td>7.35-7.45</td>
</tr>
<tr>
<td>pCO₂</td>
<td>35-45 mmHg</td>
</tr>
<tr>
<td>HCO₃</td>
<td>22-26</td>
</tr>
</tbody>
</table>

Normal Arterial Blood Gas Values
Oxygen-Hemoglobin Dissociation Curve

- Increase in pH shifts the curve to the right.
- Decrease in DPG shifts the curve to the right.
- Decrease in temperature shifts the curve to the right.

Oxyhemoglobin (% Saturation) vs. PO₂ (mmHg)
Vapotherm High-Flow Nasal Cannula Therapy

Options for Defibrillation or Cardioversion Energy in Joules

Image courtesy of Phillips Medical, www.medical.phillips.com
Is the patient stable?

- **Yes** – Age Appropriate Vagal Maneuvers

- **No** – Is there an IV/IO?

  - **Yes** – Adenosine 0.1mg/kg

  - **No** – Synchronized Cardioversion 0.5-1.0 J/kg

**Pediatric SVT Algorithm**

*Image courtesy of Julie Bacon RN,BA,CPEN*
Adenosine 6mg/2ml

Photo courtesy of Pharmaceutical Partners of Canada, www.ppcdrugs.com
Fentanyl 50mcg/ml

Photo courtesy of Emergency Medical Products, www.buyemp.com
<table>
<thead>
<tr>
<th>Type</th>
<th>Usual age of onset</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>I - Infantile</td>
<td>0-6 months</td>
<td>The severe form manifests in the first months of life, usually with a quick and unexpected onset (&quot;floppy baby syndrome.&quot;) Rapid motor neuron death causes inefficiency of the major bodily organs - especially of the respiratory system - and pneumonia-induced respiratory failure is the most frequent cause of death. Babies diagnosed with SMA type I do not generally live past two years of age, with death occurring as early within weeks in the most severe cases (sometimes termed SMA type 0.) With proper respiratory support, those with milder SMA type I phenotypes, which account for around 10% of cases, are known to live into adolescence and adulthood.</td>
</tr>
<tr>
<td>Type</td>
<td>Age</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>--------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>II - Intermediat</td>
<td>6-18 months</td>
<td>The intermediate form affects children who are never able to stand and walk, but who are able to maintain a sitting position at least some time in their life. The onset of weakness is usually noticed some time between 6 and 18 months. The progress is known to vary greatly; some patients gradually grow weaker over time while others, through careful maintenance, avoid any progression. Body muscles are weakened, and the respiratory system is a major concern. Life expectancy is somewhat reduced, but most SMA II patients live well into adulthood.</td>
</tr>
<tr>
<td>III - Juvenile</td>
<td>&gt;18 months</td>
<td>The juvenile form usually manifests after 18-months of age and describes patients who are able to walk without support at some time, although many later lose this ability. Respiratory involvement is less noticeable, and life expectancy is normal or near normal.</td>
</tr>
<tr>
<td>IV - Adult Onset</td>
<td>Adulthood</td>
<td>The adult-onset form (sometimes classified as a late-onset SMA type III) usually manifests after the third decade of life with gradual weakening of muscles – mainly affects proximal muscles of the extremities – frequently rendering the patient wheelchair-bound. Other complications are rare, and life expectancy is unaffected.</td>
</tr>
</tbody>
</table>
Scaphoid Bone Fractures and Spica Splint
Auvi-Q Talking Epi-Pens

Photo courtesy of Sanofi-Aventis, www.auvi-q.com
Broselow Pediatric Emergency Tape

Photo courtesy of Armstrong Medical, www.armstrongmedical.com
Background

Improved vascular access devices, which enable providers to deliver critically needed drugs as quickly as central lines, have ignited a resurgence in the intraosseous (IO) route to vascular access. This, in turn, has led to other uses of the IO vasculature, including drawing IO blood for laboratory analysis.

It has been a number of years since the last published study examining IO blood for laboratory analysis. For this reason, VidaCare conducted and completed this new study to both validate earlier research and address concerns regarding the use of IO-derived blood for laboratory analysis.

Study Methodology & Design

Ten healthy adult volunteers consented to participate in an IRB-approved study involving the following:

- Blood samples were obtained from peripheral veins in the forearm. Within 5 minutes, an IO catheter was placed in the proximal humerus.

- Two sets of IO blood samples were obtained from each participant, one set following 2 ml of marrow/blood waste and one set following 6 ml of waste.

- All sample sets were analyzed at a reference laboratory for complete blood count and chemistry profile.

- Means were compared for each blood test from the drawn samples (Intravenous, IO-1, and IO-2), with intravenous blood values serving as controls for IO blood values.

Results & Conclusions

Intraosseous (IO) and intravenous (IV) laboratory values had statistically significant correlation for many commonly ordered lab studies, with some exceptions as noted. (See Table and Graphs, Page 2.)

The intraosseous space proved to be a reliable source for blood laboratory analysis for several commonly ordered tests, such as hemoglobin and hematocrit, as well as several chemistry values.

Note: Results may not be reliable for CO₂ and platelets, and are unreliable for WBCs.

References

IO vs. IV Comparisons

The graphs and table shown are comparisons of mean laboratory values by sampling method.

IV indicates the typical intravenous phlebotomy sampling. IO-1 indicates first intrasosseous sampling following 2 ml of marrow/blood waste. IO-2 indicates second intrasosseous sampling following 6 ml of waste.

The following lab studies produced a statistically significant correlation between IO and IV values:

Certain laboratory values did not produce a statistically significant correlation. CO2 and platelet count were lower for IO blood than for IV blood, and WBCs were elevated in the IO samples. Potassium, sodium and calcium did not produce statistically significant correlation.

<table>
<thead>
<tr>
<th>VALUE</th>
<th>IV</th>
<th>IV/IO-1 r (p VALUE)</th>
<th>IO-1</th>
<th>IV/IO-2 r (p VALUE)</th>
<th>IO-2</th>
<th>IO-1/IO-2 r (p VALUE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBC1 (1000/µL)</td>
<td>7.6 ± 1.6</td>
<td>-1.91 (ns)</td>
<td>15.0 ± 7.1</td>
<td>.53 (ns)</td>
<td>10.4 ± 4.0</td>
<td>.76 (ns)</td>
</tr>
<tr>
<td>RBC2 (millions/µL)</td>
<td>4.8 ± 0.4</td>
<td>.88 (.004)</td>
<td>4.7 ± 0.4</td>
<td>.99 (&lt;.001)</td>
<td>4.3 ± 0.2</td>
<td>.99 (&lt;.001)</td>
</tr>
<tr>
<td>Hemoglobin (g/dL)</td>
<td>14.3 ± 0.9</td>
<td>.91 (.002)</td>
<td>13.9 ± 1.6</td>
<td>.98 (.004)</td>
<td>13.7 ± 0.8</td>
<td>.95 (.013)</td>
</tr>
<tr>
<td>Hematocrit (%)</td>
<td>42.5 ± 2.8</td>
<td>.85 (.008)</td>
<td>40.6 ± 2.9</td>
<td>.91 (.031)</td>
<td>39.9 ± 1.7</td>
<td>.95 (.013)</td>
</tr>
<tr>
<td>Platelets (1000/µL)</td>
<td>301.9 ± 76.0</td>
<td>.47 (ns)</td>
<td>2011.7 ± 77.0</td>
<td>.91 (ns)</td>
<td>2383.4 ± 34.3</td>
<td>.55 (ns)</td>
</tr>
<tr>
<td>Glucose (mg/dL)</td>
<td>106.8 ± 14.4</td>
<td>.90 (.001)</td>
<td>110.0 ± 16.3</td>
<td>.85 (.003)</td>
<td>108.9 ± 15.9</td>
<td>.95 (.001)</td>
</tr>
<tr>
<td>BUN3 (mg/dL)</td>
<td>13.9 ± 2.5</td>
<td>.98 (&lt;.001)</td>
<td>13.9 ± 2.4</td>
<td>.98 (&lt;.001)</td>
<td>13.9 ± 2.4</td>
<td>.98 (&lt;.001)</td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>1.0 ± 0.2</td>
<td>.97 (&lt;.001)</td>
<td>0.8 ± 0.2</td>
<td>.96 (&lt;.001)</td>
<td>1.0 ± 0.2</td>
<td>.96 (&lt;.001)</td>
</tr>
<tr>
<td>Sodium (mmol/L)</td>
<td>140.3 ± 3.7</td>
<td>.22 (ns)</td>
<td>136.4 ± 1.7</td>
<td>.13 (ns)</td>
<td>136.4 ± 1.5</td>
<td>.23 (ms)</td>
</tr>
<tr>
<td>Potassium (mmol/L)</td>
<td>4.6 ± 0.5</td>
<td>.38 (ns)</td>
<td>5.4 ± 1.0</td>
<td>-.13 (ns)</td>
<td>5.0 ± 1.0</td>
<td>.21 (ms)</td>
</tr>
<tr>
<td>Chloride (mmol/L)</td>
<td>104.8 ± 1.7</td>
<td>.81 (.009)</td>
<td>105.2 ± 1.4</td>
<td>.76 (.018)</td>
<td>105.4 ± 2.0</td>
<td>.76 (.016)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2 (mmol/L)</td>
<td>22.7 ± 3.2</td>
<td>.45 (ns)</td>
<td>17.4 ± 2.5</td>
<td>.64 (ns)</td>
<td>17.3 ± 2.1</td>
<td>.71 (0.033)</td>
</tr>
<tr>
<td>Calcium (mg/dL)</td>
<td>9.9 ± 0.5</td>
<td>.08 (ns)</td>
<td>9.2 ± 0.3</td>
<td>.57 (ns)</td>
<td>9.2 ± 0.3</td>
<td>.48 (ms)</td>
</tr>
<tr>
<td>Total Protein (g/dL)</td>
<td>7.4 ± 0.3</td>
<td>.77 (.016)</td>
<td>7.3 ± 0.4</td>
<td>.90 (.001)</td>
<td>7.3 ± 0.4</td>
<td>.89 (.001)</td>
</tr>
<tr>
<td>Albumin (g/dL)</td>
<td>4.5 ± 0.2</td>
<td>.74 (.002)</td>
<td>4.4 ± 0.2</td>
<td>.89 (ns)</td>
<td>4.4 ± 0.3</td>
<td>.79 (.012)</td>
</tr>
</tbody>
</table>

1 - White blood cells  2 - Red blood cells  3 - Blood urea nitrogen  4 - Carbon dioxide ns = non-significant
## Alternative Methods for Pediatric Pain Management

<table>
<thead>
<tr>
<th>Pain Relief Option</th>
<th>Onset (minutes)</th>
<th>Duration (minutes)</th>
<th>Approved Ages</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1% buffered lidocaine &amp; 25-30g needle (1ml 8.4% bicarb &amp; 9ml 1% lidocaine to “buffer”)</td>
<td>2-5</td>
<td>30-60</td>
<td>All</td>
<td>Remember max dose of lidocaine 4.5mg/kg without epi (max 300mg) &amp; 7mg/kg with epi (max 500mg) 1% lido is 10mg/ml</td>
</tr>
<tr>
<td>EMLA® cream (lidocaine/prilocaine)</td>
<td>60-90</td>
<td>60-120</td>
<td>37+ weeks</td>
<td>Can cause methemoglobinemia Avoid ingestion (as with all topical creams) Dosage &amp; application times differ dependent upon weight</td>
</tr>
<tr>
<td>LMX4® cream (lidocaine)</td>
<td>30</td>
<td>60</td>
<td>2+ years</td>
<td>Avoid ingestion (as with all topical creams)</td>
</tr>
<tr>
<td>Synera® patch (lidocaine/tetracaine)</td>
<td>20-30</td>
<td>60</td>
<td>3+ years</td>
<td>Don’t cut or cover the patch</td>
</tr>
<tr>
<td>J-tip® (buffered lidocaine)</td>
<td>1-3</td>
<td>1-3</td>
<td>6+ months</td>
<td>Don’t point near the face</td>
</tr>
<tr>
<td>“Freeze spray” (ethyl chloride)</td>
<td>Immediate</td>
<td>1</td>
<td>All</td>
<td>Possible frostbite with excess spray</td>
</tr>
</tbody>
</table>

How to use BUZZY®
in healthcare settings
How Does Buzzy® work?

- Uses natural pain relief by confusing your body’s own nerves and distracting away from the poke
  - This dulls or eliminates the pain
- Works in the same way as:
  - Rubbing a bumped elbow stops the hurt
  - Running water soothes a burn
  - Putting a hand in ice water lowers pain everywhere else

What procedures can I use Buzzy® for?

- Insertion of IV’s
- Venipunctures for lab draws
- Finger sticks for obtaining blood samples
- IM injections to the upper arm
- SQ or Intradermal injection
- On shoulders, sternum, or distant body part for distraction from any procedure

Buzzy needs to go "between the brain and the pain" to be effective.
IV placement and Venipuncture procedure

- Apply tourniquet if applicable
  - Through Buzzy slot or
  - Prior to placing Buzzy
- Place Buzzy® 2-5 cm proximal to site
- Place wider end of Buzzy® closest to pain. (Head of Buzzy® closer to patient’s head during procedures)

Best numbing is directly distal from the center of the Buzzy where the motor is.

Venipuncture:

1. Turn Buzzy on at least 30 seconds before procedure
2. Clean site per protocol
3. Leave Buzzy activated until procedure complete
4. Remove Buzzy
5. Clean Buzzy, cold pack and strap with Sani-Wipe

Intramuscular Injections in Upper Arm

- Locate site
- 1) Press Buzzy® directly on site and activate vibration. Leave in place at least 30 seconds; for stinging shots or deeper IM, leave up to 2 minutes for deepest numbing.
- 2) For injection, slide Buzzy® 2-5 cm proximal to site (pressing on bony area if available) for deltoid injections

Parent pressing Buzzy using position of comfort. Shot goes where red dot is located. Nurse can reposition so Buzzy’s motor is directly above shot.
Capillary Collection

Locate site → Place Buzzy in pain → Press wide end against base of finger and activate → Clean site per protocol

Courtesy of Shriners Children's Hospital
Louanne Lunny, MLS(ASCP)cm

Who can use Buzzy®?

- Who can use Buzzy®?
  - Buzzy is an FDA registered Class I device (over the counter)
  - Since Buzzy is over the counter, anyone can use Buzzy.
    - A phlebotomist
    - Child Life
    - A radiology tech
    - A nurse
    - A resident
Nursing Procedure for
Initiating Subcutaneous Fluid Administration with *Hylenex*® recombinant
(hyaluronidase human injection)

“If you want your children to be intelligent, read them fairy tales.”
These draft policies and procedures have been adapted from the Infusion Nurses Society (INS), the Oncology Nursing Society (ONS), and the Hylanex® recombinant (hyaluronic acid human injection) prescribing information. It is the responsibility of the healthcare organization considering the use of this procedure to conduct an independent review and assessment to determine applicability and appropriateness of this document to their institution and to any particular clinical setting. Infusion therapies present risks; it is the responsibility of the healthcare organization to manage these risks, including the skills and competency validation of personnel.

The healthcare organization that uses these guidelines should be aware that an annual review of organizational policies and procedures should continue to occur in accordance and compliance with regulatory and nonregulatory agencies.

**The Purpose of This Guide**

To outline nursing responsibilities in providing symptom control and/or fluid and electrolyte replacement by administering fluids subcutaneously.

**Policy**

Subcutaneous access is utilized to administer fluids via single injection or continuous infusion into the subcutaneous tissue. The fluid is absorbed through both adipose and connective tissue. Hylanex recombinant is used for subcutaneous fluid administration, enabling enzymatically augmented subcutaneous infusion.

In subcutaneous fluid administration, a catheter is placed in the subcutaneous tissue. Skilled and competent nurses knowledgeable in subcutaneous administration and the operation of electronic infusion devices may initiate and manage subcutaneous infusions. Some state and facility regulations allow this procedure to be performed by LVNs/LPNs. Please check your state guidelines in regard to administration regulations. The nurse who is administering subcutaneous isotonic fluids and electrolytes should be knowledgeable about the indications for use, appropriate rates of administration, monitoring parameters, adverse effects, stability of infusate, storage requirements, and potential complications.

Fluids given subcutaneously should be isotonic.
Recommended Equipment

<table>
<thead>
<tr>
<th>Gloves</th>
<th>Tape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriate antiseptic</td>
<td>Subcutaneous access device (see &quot;Device Selection and Insertion&quot; for options)</td>
</tr>
<tr>
<td>Sharps container</td>
<td>Subcutaneous infusion set</td>
</tr>
<tr>
<td>Syringe</td>
<td>Extension tubing (optional)</td>
</tr>
<tr>
<td>Gauze</td>
<td>Fluid</td>
</tr>
<tr>
<td>Transparent semipermeable membrane (TSM)</td>
<td>Electronic infusion device (optional)</td>
</tr>
</tbody>
</table>

**Medication**

*Hylenex recombinant (hyaluronidase human injection)*

(1 vial contains 1 mL of 150 USP units/mL)

**Procedure**

**Assessing and Educating Patient**

1. Verify patient's identity with them or parent/legally authorized guardian.
2. Obtain and review physician's order for type of fluid, amount, rate, route of administration, frequency, duration, and titration parameters if applicable.
3. Plan patient's care,
4. Per institutional protocol, obtain consent of patient or his/her parent or legally authorized guardian before administering therapy.
5. Educate patient (or his/her parent or legally authorized guardian) as to purpose and anticipated outcome of therapy, site placement, type of fluid, route of administration, adverse effects, and recognition of signs and symptoms of complications. Also educate concerned parties on possible alternatives to this method of fluid administration and possible complications of the alternatives. Include device operation instructions, if applicable.
6. Assess patient according to facility guidelines.
7. Place patient in a reclining, comfortable position based on site selected.

**Prior to Beginning Procedure**

1. Assemble equipment.
2. Wash hands and dry thoroughly.
3. Put on gloves.
4. Use aseptic technique and observe standard precautions.
Procedure (Cont'd)

Insertion Site Selection

1. Site selection should be based on patient's anticipated mobility and comfort. 
2. Assess sites for device placement in pediatric and adult patients:
   a. Scapula region
   b. Anterior or lateral aspects of thighs
   c. Dorsal aspect of upper arm
3. Select insertion site with adequate subcutaneous tissue (a fat fold of at least 1 inch or 2.5 cm when forefinger and thumb are gently pinched together). 
4. Avoid areas with compromised integrity, such as, but not limited to:
   a. Edema
   b. Pain
   c. Excoriation
   d. Infection
   e. Bruise or hematoma.
   f. Scar tissue

Insertion Site Preparation

1. (Optional Step) Remove excess hair from intended insertion site with clippers or scissors.
2. Wash insertion site with antiseptic soap and water, if necessary.
3. Disinfect insertion site.
4. Cleanse site and allow site to dry. (Do not blow or blot dry.)
Device Selection and Insertion

1. The recommended catheter is a standard 25-gauge butterfly needle. However, 20- to 24-gauge angiocatheters have also been used. Inspect access set for defects.
2. Prepare equipment and prime infusion set.
3. Lift skin into small mound.
4. Insert infusion set/catheter bevel up into prepared site.
5. Secure device and follow facility protocol for dressing.
6. Observe for negative blood return. If blood return is observed:
   a. Remove device and select new insertion site
   b. Prepare new site
   c. Use new sterile infusion set
7. Secure administration-set tubing to skin to prevent accidental dislodgment.
8. Label dressing per facility guidelines.

Hylenex recombinant Administration

Injection before fluid administration:

After obtaining Sub-Q access, inject Hylenex recombinant via Sub-Q access device before initiation of fluid administration. Once Hylenex recombinant is injected, follow with a 3-5 cc injection of hydration fluid (ie, normal saline or Lactated Ringer's) into the Sub-Q access device to ensure Hylenex recombinant is fully administered into the Sub-Q tissue. 150 USP units of Hylenex recombinant will facilitate absorption of 1000 mL or more of solution.

Please see back cover for Indication and Important Safety Information and accompanying Full Prescribing Information.
Subcutaneous Fluid Administration

The rate and volume of subcutaneous fluid administration should not exceed those employed for intravenous infusion. During subcutaneous fluid administration, special care must be taken in pediatric patients to avoid overhydration by controlling the rate and total volume of the infusion.¹

1. Deliver isotonic solutions subcutaneously.²
2. Inspect fluid container for leaks, cracks, or particulate matter.³
3. Initiate fluid administration per physician's orders and monitor patient response.
4. Monitor patient's response and observe for complications at insertion site at regular intervals per facility guidelines.
5. Rotate site per facility policy.
6. Document subcutaneous administration of fluids per facility guidelines.

For Premature Infants/Neonates

For premature infants or during the neonatal period, the daily dosage should not exceed 25 mL/kg of body weight, and the rate of administration should not be greater than 2 mL per minute.

Site Maintenance⁴

1. Observe site per facility policy.
2. Follow facility policy for catheter/needle replacement.
3. Replace catheter/needle if bruising, erythema, or other signs of local irritation or infection appear or if the site is painful to the patient.
4. Change transparent dressing according to facility protocol.
5. Clients, families, significant others, and assistive personnel should be instructed to report any leakage, erythema, edema, or pain at the injection site as soon as possible. Consult the facility's processes and procedures for specific directions.
Device Removal

1. Obtain and review the physician's order for infusion discontinuance.
2. Wash hands.
3. Assemble equipment.
4. Put on gloves.
5. Use aseptic technique and observe standard precautions.
6. Place patient in comfortable position.
7. Clamp administration and stop infusion device.
8. Remove transparent dressing and securement tapes.
9. Remove administration set, activating safety mechanism (if applicable); discard in Sharps container.
10. Apply manual pressure with sterile gauze to prevent bleeding and fluid leakage.
11. Cover site with dry dressing.
12. Discard expended equipment in appropriate receptacle(s).

Documentation

Document the following in the patient's permanent medical record:

a. Date and time of administration
b. Skin integrity and location of access device
c. Number of insertion attempts and location of infusion set
Indication

Hylene* recombinant is indicated as an adjuvant in subcutaneous fluid administration, and to increase the dispersion and absorption of other injected drugs.

Important Safety Information

- Hypersensitivity to hyaluronidase or any other ingredient in the formulation is a contraindication to the use of this product.
- Discontinue Hylene recombinant (hyaluronidase human injection) if sensitization occurs.
- Hyaluronidase should not be used to enhance the absorption and dispersion of dopamine and/or alpha agonist drugs.
- Hyaluronidase should not be injected into or around an infected or acutely inflamed area because of the danger of spreading a localized infection.
- Hyaluronidase should not be used to reduce the swelling of bites or stings.
- Hyaluronidase should not be used for intravenous injections because the enzyme is rapidly inactivated.
- Furosemide, the benzodiazepines and phenytoin have been found to be incompatible with hyaluronidase.
- Anaphylactic-like reactions following retrobulbar block or intravenous injections have occurred, rarely.

- Hyaluronidase should not be applied directly to the cornea.

The most frequently reported adverse experiences have been local injection site reactions, such as erythema and pain. Hyaluronidase has been reported to enhance the adverse events associated with co-administered drug products.

Patients receiving large doses of salicylates, corticosteroids, ACTH, estrogens or antihistamines may require larger amounts of hyaluronidase for equivalent dispersing effect, since these drugs apparently render tissues partially resistant to the action of hyaluronidase.

Edema has been reported most frequently in association with subcutaneous fluid administration. The rate and volume of subcutaneous fluid administration should not exceed those employed for intravenous infusion. As with all parenteral fluid therapy, use the same precautions for restoring fluid and electrolyte balance. Special care must be taken in pediatric patients to avoid overhydration by controlling the rate and total volume of infusion. When solutions devoid of inorganic electrolytes are given subcutaneously, hypovolemia may occur.

Please see accompanying package insert for Full Prescribing Information.

For product inquiry, please call 855-HYLENEX (855-495-3639) or visit www.hylene.com.

References:
Requests from the Mother of a Catastrophically Injured Child

- My child had a full active life prior to this injury - Please ask them about it.
- Keep our family informed
- Answer questions to the best of your ability
- Whenever possible, provide information about possible outcomes
- Be ready for my child when he arrives on your unit / at your hospital
- I need some attention too - I am frightened and feel so alone
- Let me know how to get in touch with you if I need you
- Allow me to stay with my child whenever possible
- Help my child to not be in pain, please!
- Arrange it so he/she can get some sleep - Even in the ICU
- Try not to ask repeated questions for which there are answers in my child’s chart
- Respect my child’s need for privacy and modesty - Remember he’s only a child
- Introduce yourself, write down your role - Better yet, give me your business card
- Document carefully so I don’t have to clarify things
- Speak directly to my child
- Don’t stand at the foot of his/her bed - Go the side, bend down he/she can see you
- My child is a bright child - Please don’t talk down to him/her
- Notice non-clinical things (a new postcard, a photo of pet, etc)
- Help me to construct letters to my insurance company
- Allow my child to maintain a sense of self-esteem and some control over what is happening by giving my child some choices
- This may be the 100th child you have cared for with this type of injury - It’s our first!

Good care is important - True caring is a gift!
The Miracle Toddler Diet

Over the years you may have noticed that most two year olds are trim. Now the formula to their success is available to all in this new diet... The Miracle Toddler Diet! You may want to consult your doctor before trying this diet. If not, you may be seeing him afterwards. Good luck!

Day One:

Breakfast: One scrambled egg, one piece of toast with grape jelly. Eat 2 bites of egg, using your fingers; dump the rest on the floor. Take 1 bite of toast, then smear the jelly over your face and clothes.

Lunch: Four crayons, any color, a handful of potato chips, and a glass of milk, 3 sips only, then spill the rest.

Dinner: A dry stick, two pennies and a nickel, 4 sips of flat Sprite

Bedtime snack: Throw a piece of toast on the kitchen floor.

Day Two:

Breakfast: Pick up stale toast from kitchen floor and eat it. Drink half bottle of vanilla extract or one vial of vegetable dye.

Lunch: Half tube of “pulsating pink” lipstick and a handful of Purina dog chow, any flavor. One ice cube, if desired.

Afternoon snack: Lick an all-day sucker until sticky, take outside, drop in dirt. Retrieve and continue slurping until it is clean again. Then bring inside and drop on rug.

Dinner: A rock or an uncooked bean, which should be thrust up your left nostril. Pour grape Kool-Aid over mashed potatoes; eat with spoon.

Day Three:

Breakfast: Two pancakes with plenty of syrup, eat one with fingers, rub in hair. Glass of milk; drink half, stuff other pancake in glass. After breakfast, pick up yesterday’s sucker from rug, lick off fuzz, put it on the cushion of best chair.

Lunch: Three matches, peanut butter and jelly sandwich. Spit several bites onto the floor. Pour glass of milk on table and slurp up.

Dinner: Dish of ice cream, handful of potato chips, some red punch. Try to laugh some punch through your nose, if possible.

Final day:

Breakfast: A quarter tube of toothpaste, any flavor, bit of soap, an olive. Pour a glass of milk over bowl of cornflakes, add half a cup of sugar. Once cereal is soggy, drink milk and feed cereal to dog.

Lunch: Eat bread crumbs off kitchen floor and dining room carpet. Find that sucker and finish eating it.

How to Raise Mom and Dad (by Josh Lerman)

Instructions from an older sibling to a younger one

1) Always ask Daddy for candy, cookies, or lemonade. He’ll give it to you; Mommy won’t.

2) If Mommy says you can’t have candy, cookies, or lemonade, do that thing where you change your voice so you’re almost crying but not quite (Mommy calls it “whining.”) Sometimes she’ll give in.

3) If you ask Daddy to be a horse or to carry you or dance with you, and he says maybe later, that means he will really soon. If he says anything about his back hurting, that means he won’t. Don’t worry - His back doesn’t really hurt, I looked once.

4) A lot of the time they’re not listening, so always say things over and over.

5) The whole green-vegetable thing is pretty out of hand. So never admit you like them, keep changing the ones you’ll agree to eat, and every once in a while claim that one of them makes you feel like throwing up.

6) If Daddy says, “Did Mommy say you could do that?” it means he doesn’t want you to do it. Always answer “Yes.”

7) If you wake up and you’re lonely, call Mommy. She’ll come in and might fall asleep next to you. Daddy will just kiss you and leave.

8) If there’s a monster by the window, call Daddy - He can totally kill monsters. I don’t think Mommy knows much about them because she doesn’t even think there are any.

9) If you don’t like your mittens, you can “lose” one and they’ll buy you new ones.

10) When you get a toy with very, very small parts (like Barbie’s shoes, Legos, Playmobil cuffs, collars, and hair thingies), put some in every room of the house. Mommy and Daddy will like finding this stuff because it reminds them of you.

11) Mommy and Daddy aren’t so smart. If you just scribble all over a page, they’ll tell you it’s good. This has probably already happened to you.

12) This is what a minute is: It’s the 200 or so hours between when Mommy says she’ll do something (like come play dolls with you) and when she does it.

13) Mommy and Daddy are very rich - I think they earn like $40 or $100 a year - So if they don’t buy you the toys you ask for, it’s because they’re mean.

14) Whenever Mommy and Daddy hug each other, always go and get in the middle because it’s the best kind when it’s everybody hugging.
To those of us who have children in our lives, whether they are our own, grandchildren, nieces, nephews, or students... here is something to make you chuckle. Whenever your children are out of control, you can take comfort from the thought that even God’s omnipotence did not extend to His own children. After creating Heaven and Earth, God created Adam and Eve... And the first thing he said was “DON’T!”

“Don’t what?” Adam replied.

“Don’t eat the forbidden fruit.” God said.

“Forbidden fruit? We have forbidden fruit? Hey Eve... we have forbidden fruit!!!”

“No Way!”

“Yes way!”

“Do NOT eat the fruit!” said God.

“Why?”

“Because I am your Father and I said so!” God replied, wondering why He hadn’t stopped creation after making the elephants. A few minutes later, God saw his children having an apple break and He was ticked!

“Didn’t I tell you not to eat the fruit?” God asked.

“Uh huh,” Adam replied.

“Then why did you?” said the Father.

“I don’t know,” said Eve.

“She started it!” Adam said.

“Did not!”

“Did too!”

“DID NOT!”

Having had it with the two of them, God’s punishment was that Adam and Eve should have children of their own. Thus the pattern was set and it has never changed!

But there is reassurance in the story! If you have persistently and lovingly tried to give children wisdom and they haven’t taken it, don’t be hard on yourself. If God had trouble raising children, what makes you think it would be a piece of cake for you?
References: CPENIII Review


Medical Research Websites: www.emedicine.com www.pubmed.com
## Domains and Tasks

### 1. Triage Process

<table>
<thead>
<tr>
<th>A. Emergency Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perform visual assessment</td>
</tr>
<tr>
<td>a. Sick vs. not sick</td>
</tr>
<tr>
<td>b. Pediatric Assessment Triangle (PAT)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Emergency Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Intervene for life or limb threatening illnesses or injuries</td>
</tr>
<tr>
<td>b. Identify triage priority</td>
</tr>
<tr>
<td>c. Identify the need for isolation</td>
</tr>
<tr>
<td>d. Identify the need for decontamination (e.g., chemical or biological agents)</td>
</tr>
<tr>
<td>e. Prioritize resource utilization based on volume (e.g., surge, mass casualty)</td>
</tr>
</tbody>
</table>

### B. Perform Triage Interventions

1. Perform initial interventions (e.g., first aid, splint, ice, eyewash)
2. Select and administer medications

### 2. Assessment

<table>
<thead>
<tr>
<th>A. History and Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perform a primary survey</td>
</tr>
<tr>
<td>2. Perform secondary survey</td>
</tr>
<tr>
<td>3. Assess behavioral status and risk for harm (e.g., risk-taking behaviors, self-harm, violence)</td>
</tr>
<tr>
<td>4. Evaluate assessment findings related to developmental milestones</td>
</tr>
<tr>
<td>5. Customize the assessment for children with special needs (i.e., developmental diversity)</td>
</tr>
<tr>
<td>6. Identify caregivers' perception of child's baseline and current status</td>
</tr>
<tr>
<td>7. Identify suspected maltreatment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perform age appropriate assessment of pain</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assess family functioning and dynamics (e.g. coping strategies, support systems, parenting skills, learning style)</td>
</tr>
</tbody>
</table>

### 3. Technical Skills

<table>
<thead>
<tr>
<th>A. Perform or Assist with Technical Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
</tr>
</tbody>
</table>
1. Airway management
2. Capnography
3. Cardioversion
4. 12-lead ECG
5. Defibrillation
6. Cardiac pacing
7. Peripheral IV access
8. Rapid fluid infusers/warmers
9. Intravenous access
10. Central IV access (including PICC, venous access ports)
11. Incision and drainage
12. Dressings
13. Wound closure
14. Chest tubes
15. Specimen collection (e.g., sputum, urine, blood, nasopharyngeal)
16. Splinting
17. Enteral tubes (e.g., nasogastric, orogastric, PEG)
18. Chemical or biological decontamination
19. Spinal stabilization (including safety seat removal)
20. Positioning for procedures (e.g., lumbar puncture, bladder catheterization, IV)
21. Infant warmer
22. Medication administration

4. Medical Conditions

<table>
<thead>
<tr>
<th>A. Manage Airway Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mechanical (e.g., foreign body)</td>
</tr>
<tr>
<td>2. Pathophysiologic (e.g., anaphylaxis, distributive shock, infections)</td>
</tr>
<tr>
<td>3. Congenital (e.g., stenosis, malacia)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Manage Respiratory (Upper and Lower) Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mechanical (e.g., pneumothorax, foreign body, embolism)</td>
</tr>
<tr>
<td>2. Pathophysiologic (e.g., bronchitis, reactive airway disease, pneumonia)</td>
</tr>
<tr>
<td>3. Congenital (e.g., chronic lung disease)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. Manage Cardiovascular Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mechanical (e.g., tamponade, tension pneumothorax)</td>
</tr>
<tr>
<td>2. Pathophysiologic (e.g., cardiogenic and hypovolemic shock, rhythm disturbances, congestive heart failure, infections)</td>
</tr>
<tr>
<td>3. Congenital (e.g., aortic stenosis)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D. Manage Neurological Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mechanical (e.g., shunt malfunction, tumors)</td>
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<tr>
<td>2. Pathophysiologic (e.g., seizures, infections, stroke, headache)</td>
</tr>
<tr>
<td>3. Congenital (e.g., hydrocephalus, arteriovenous malformation)</td>
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</tbody>
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<table>
<thead>
<tr>
<th>E. Manage Gastrointestinal Conditions</th>
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<tbody>
<tr>
<td>1. Mechanical (e.g., obstructions, intussusception)</td>
</tr>
<tr>
<td>2. Pathophysiologic (e.g., infections, necrotizing enterocolitis, fluid-electrolyte balance)</td>
</tr>
</tbody>
</table>
imbalance)
3 Congenital (e.g., tracheoesophageal fistula)
4 Nutrition (e.g., failure to thrive, formula intolerance, obesity)

F. Manage Genitourinary and Reproductive Conditions
1 Mechanical (e.g., stricture, ovarian cyst)
2 Pathophysiologic (e.g., urinary tract infections, renal failure, sexually transmitted infections)

G. Manage Emergent Neonatal Conditions
Pathophysiologic (e.g., infections, necrotizing enterocolitis, fluid-electrolyte imbalance, jaundice, thermoregulation)
1 Congenital (e.g., ductal dependent lesions, tracheoesophageal fistula, obstructive uropathy)
3 Care of the newly born (e.g., resuscitation following delivery)

H. Manage Environmental and Toxicology Conditions
1 Heat and cold
2 Bites and stings
3 Substance exposures (e.g., nuclear, chemical, radiologic, biologic, organophosphates)
4 Poisoning (e.g., medications, alcohol)

I. Manage Other Medical Conditions
1 Hematology (e.g., sickle cell, bleeding or clotting disorders)
2 Oncology (e.g., fever and neutropenia, tumor lysis syndrome)
3 Endocrine (e.g., congenital adrenal disorders, glucose disturbance)
4 Musculoskeletal (e.g., osteogenesis imperfecta, septic arthritis)
5 Eyes, ears, nose, and throat (e.g., strep throat, cleft palate)
6 Dermatology (e.g., rashes, infections)
7 Infectious diseases
8 Sepsis

5. Surgical and Trauma Emergencies, and Procedural Sedation

A. Manage Surgical Emergencies
1 Gastrointestinal (e.g., acute abdomen, appendicitis, malrotation/volvulus, strangulated hernia, pyloric stenosis, intussusception)
2 Genitourinary and reproductive (e.g., testicular torsion, ectopic pregnancy, phimosis, priapism)
3 Musculoskeletal (e.g., compartment syndrome, slipped capital femoral epiphysis (SCFE))
4 Postoperative hemorrhage (e.g., tonsillectomy)
5 Neurological (e.g., shunt failure, herniation syndrome)

B. Manage Trauma Emergencies
1 Burns (e.g., heat, electrical, inhalation)
2 Submersion injuries (e.g., near drowning, positional asphyxia)
3 Neurological trauma (e.g., neurogenic shock, head trauma)
4 Musculoskeletal trauma (e.g., fractures, lacerations, joint dislocations, sprains and strains)
5 Cardiothoracic trauma (e.g., pneumothorax, hemothorax, cardiac tamponade)
6. Abdominal trauma
7. Maxillofacial and dental trauma
8. Multi-system trauma

C. Manage Procedural Sedation
1. Patient monitoring
2. Essential equipment
3. Medications and reversal agents

6. Special Considerations

A. Behavioral and Maltreatment Emergencies
1. Manage behavioral emergencies
   a. Suicidal ideations/attempts
   b. Homicidal ideations/attempts
   c. Acute psychosis
   d. Aggressive behavior
   e. Substance abuse
   f. Post-traumatic stress disorder
2. Manage maltreatment emergencies
   a. Sexual assault (including rape and drug-facilitated rape)
3. Manage abuse emergencies
   a. Emotional abuse
   b. Physical abuse
   c. Sexual abuse
   d. Neglect

B. Legal and Professional Issues
1. Legal Issues
   a. Ensure that informed consent has been obtained
   b. Ensure preservation of forensic evidence and chain of custody
2. Comply with government regulation
   a. EMTALA
   b. HIPAA
   c. Mandatory reportable situations (e.g., gunshot wounds, infectious diseases)
3. Professional Issues
   a. Resolve conflicts with family members
   b. Promote safety and health/wellness in the community
   c. Participate in emergency preparedness activities
   d. Facilitate critical incident stress management (debriefing)

Total Scored Items 150
CPEN® Recertification

Every four years, the Certified Pediatric Emergency Nurse (CPEN) will need to renew or recertify to keep his or her certification active. The PNCB and BCEN believe that your continued growth in the field of pediatric emergency nursing is critical to providing high-quality health care to your patients.

What's required?
There are three options for recertification. CPENs will need to document professional development activities equivalent to 100 contact hours earned over a period of four years or chose a CE plus nursing practice option or re-take the certification exam.

Of the 100 contact hours submitted, 75 (clinical) must show clear and direct application to emergency, pediatric, or pediatric emergency nursing, and up to 25 (other) can be general nursing. One contact hour is equivalent to 60 minutes of instruction.

About Contact Hours
A minimum of 50 contact hours must be from accredited agencies. The remainder may be from non-accredited activities such as those listed in the following chart. All national accrediting agencies are accepted for your recertification. These include but are not limited to American Association of Critical Care Nurses (AACN), American Nurses Credentialing Center (ANCC), Emergency Nurses Association (ENA) and State Nurses Associations/State Boards of Nursing (SNA/SBN). All contact hours for CPEN recertification must have been earned during the past 48 months prior to recertification enrollment.

<table>
<thead>
<tr>
<th>Recertification Options</th>
<th>How it can apply to your CPEN recertification</th>
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</thead>
<tbody>
<tr>
<td><strong>1. Continuing Education Option</strong></td>
<td>Of the 100 contact hours submitted: Minimum of 50 hours from accredited sources. The remaining 50 hours can be from non-accredited sources, and Minimum of 75 clinical and up to 25 other</td>
</tr>
<tr>
<td>The following may be used to fulfill the CE option:</td>
<td>The contact hours have been awarded by a third party accredits</td>
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<tr>
<td>Accredited Contact Hours</td>
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<tr>
<td></td>
<td>Type: Accredited CE</td>
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<td>Category</td>
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</tbody>
</table>
| Academic Credit           | Must have earned a “C” or higher and content must apply to emergency, pediatric or pediatric emergency nursing from an accredited institution. General nursing academic credit is allowable for 25 out of 100 hours.  
1 Academic Credit Semester = 15 Contact Hours  
1 Academic Quarter = 10 Contact Hours  
1 Academic Trimester = 12 Contact Hours  
Type: Accredited CE |
| Preceptorship             | 80 hours of precepting are equivalent to 5 contact hours. A maximum of 5 contact hours will be accepted in a 4 year renewal cycle.  
Type: Non-accredited CE |
| Poster Presentations      | 5 Contact Hours per poster developed. An individual will be allowed to submit a poster only once during the renewal period.  
Posters for which contact hours were awarded count as accredited CE.  
Type: Accredited or Non-accredited CE |
| Item Writing              | This option can be used up to a maximum of 5 non-accredited contact hours per year. This option is for BCEN, CPEN and PNCB item writing. Items writers will count 0.5 contact hours per item written and accepted for review up to a maximum of 10 items.  
Type: Non-accredited CE |
| Authoring | Publication must be peer-reviewed and content must be specific to pediatric, emergency or pediatric emergency nursing. *Co-authorship credit is distributed evenly among all authors. 
Article = 5 Contact Hours 
Chapter/module = 10 Contact Hours 
Textbook regardless of page number = 50 Contact Hours 
Type: Accredited CE |
| Committee Participation | This option is for nursing committee membership in local, regional, state or national level committees and BCEN, CPEN and PNCB committee participation and can be used for a maximum of 5 non-accredited contact hours per year regardless of the number of committees served on. 
Type: Non-accredited CE |
| 2. Clinical Practice Hours plus CE option | 40 Hours of accredited CE with a clear and direct application to pediatric emergency nursing plus 1000 hours of hands-on care with pediatric patients in emergency settings. Nursing practice includes providing direct care, health care facilitation, education and advocacy for patients and families with urgent- care or emergent-care needs. 
Type: Accredited CE |
| 3. Exam as a renewal option | You may elect to re-take the exam again. You will not be required to submit contact hours when choosing this option. |
“Baby Talk”
Communicating Effectively With Your Pediatric Patients
(and other kids)

Lou E. Romig MD, FAAP, FACEP
Miami Children’s Hospital

Developmental Stages
Birth to 6 months

- Infant is learning to regard the environment, especially faces.
- No stranger anxiety until late in this phase.
- Nonverbal communication is key
  - Facial expressions
  - Tone of voice
- Parents warm to medical personnel who treat their children as babies, not patients. Make faces and talk baby talk!

6 – 18 months

- Stranger anxiety! Try to keep the child with a caregiver.
- Communication is still mostly nonverbal, but talk to the child anyway.
- Development in motor skills is often faster than communication skills.
- Use stimulating objects to catch attention for distraction or assessment.
- Use toe to head approach.

18 months – 3 years

- More explorative, but still seek shelter with parents.
- Will understand more words than they can say.
- Constantly moving.
- Play and curiosity are big motivators.
- Use your tools and toys.
- Toe to head approach.
- Try not to hold them down, but don’t wait forever for cooperation with exam.
- Toilet training often includes lessons about modesty and improper touching. Respect these lessons; uncover child selectively for exam.
3 to 6 years

- Usually a great age to work with.
- Learning to explore and be independent. Very curious!
- Can be very talkative and verbally enthusiastic.
- Are starting to understand about being hurt or sick and that people will try to help them.
- Are starting to understand the concept of “the future”.
- May misinterpret words they hear.
- Have “magical thinking.”
- Worry about being in trouble.
- Like to have choices.

3 to 6 years

- “This flashlight’s DEAD.”
- “I’m going to TAKE your pulse.”
- “Don’t CUT OFF the circulation with that strap.”
- “We’re going to have to TIE YOU DOWN on this board.”
- “I didn’t put my seatbelt on, so we got in a crash.”
- “Put a bandaid on it!” (and the boo-boo goes away...)
- “I was bad in school so now I have to get a shot.”

“Would you like your IV in this arm or that arm?”
NOT
“Where would you like your IV?”
6 - 12 years

- Fear failure & inferiority. Want to be treated as “big kids,” but may feel “baby” insecurities.
- Want to be accepted and blend in.
- Body-conscious and modest.
- May feel pain intensely.
- Feel comfort with touching.
- Question the child directly and in simple, but not babyish terms.
- Use common interests to build trust.
  - Sports
  - TV and movie characters
- Treat them with respect.
- Offer limited choices.
- Don’t embarrass them in front of peers.
- Don’t tell them not to cry!
- OK to touch in comfort.
- Respect their modesty.

12 years and up

- Identity and peer relationships are the key issues at this age.
- Body image and future deformities and dysfunctions are very important.
- Reactions can be under- or over-exaggerated.
- Regressive behavior is common.
- Respect modesty and privacy.
- Avoid embarrassing the child.
- Direct yourself to the child as you might to an adult, with an adjustment in language.
- Make eye contact, but don’t force it unless you need to make a point.
- Touch cautiously until you’re sure touch is welcome.
- Don’t lie & don’t be condescending.
• Don’t try to “be one of the group” unless you are. These guys can spot fakes a mile away.
• If drugs, pregnancy or other sensitive issues are involved, assure the child that your job is not to judge or enforce the law (unless it is.)
• Whenever possible, allow close friends to maintain support roles as socially-acceptable parent surrogates.

Cautions

• Don’t ever intentionally lie to a child patient. If you’re caught, it blows the credibility of all medical personnel.
• Always tell a child if something is going to hurt!
• Explain procedures in simple terms, but not until it’s time to do it. Anticipation is often worse than the procedure.

What parents like
The hardest part of taking care of kids is usually dealing with their parents and guardians.

What parents like and want

• Treat children as people.
  — Learn and use their preferred name.
  — At least get the sex right!
• Keep children as physically and emotionally comfortable as possible.
Basic and advanced pain management is important.

Try to relieve fear and anxiety as early and as much as possible.

- Treat every child as if they were the most special, beautiful, smartest child in the world. A compliment to a child is a compliment to their parents.

- Listen to what the child has to say, even if it sounds like nonsense.

- Every child has something you should honestly be able to compliment them on, even if it’s just that they have such good lungs for them to be able to scream so loudly...

What your face and body say are every bit as important as what your mouth says.

Nonverbal communication

- Get to the child’s eye level.

- Try not to make the child look at you at an awkward angle.

- Make eye contact, but don’t hold it in a challenging manner.

- Use your eyebrows to exaggerate your expressions, especially for babies through elementary-age kids.

- Use a soft voice with a moderate pace and interrupt only when necessary.

- Use noises like “um-hmm” and “I see” to encourage children to talk.

- For preverbal children, use a happy voice and bring the tone up at the ends of sentences (inviting a response from the patient.)
• Infants less than about 6 months can be touched anywhere first, but go to the most painful place last.

• For children with stranger anxiety, offer your hand or a tool for them to touch and explore first. Go for their heads and trunks and any painful parts last.

• Touch school-agers in a playful fashion. “High five” is often a good way to start.

• Tickling is good in young school-agers but don’t do it until you’ve gotten your assessment done.

• Once a school-ager trusts your touch, try to maintain some contact while getting info from the parent.

• Touch teens only as needed for your exam, unless further touch is clearly welcome.

• Try to always have a witness when with a teen, especially a teen of the opposite sex, just in case one of your gestures is misinterpreted.

• Watch your facial expressions with teens! If you look like you don’t believe them, you lose them.

**Tools, Toys and Tricks**

![Flashlight](image)

• Test range of motion of joints, mobility, and grip strength.

• Check pulmonary function (“blow out the candle!”)

• Look in mom’s throat or show the child your own.

• Look for Mickey Mouse, SpongeBob, etc. under clothes.

• Make an “ET finger.”
Stethoscope

- Check range of motion, etc...
- Let the child listen to somebody’s heart and stomach.
- Make a “phone call” to the child.

Pager/Cell Phone

- Check range of motion, etc...
- Get a page or call from Mickey, SpongeBob, etc.
- Play with the tones and/or vibration feature.
- Try to keep it from being thrown across the room...

Stuffed Animals

- Check range of motion, etc...
- Check cognition
  - Who/what is this?
  - What color is this?
  - What sound does he make?
- Check gait
  - Will you pick that up for me please?
Dr. Lou’s Bag of Tricks

- Any toy or interesting tool can be used to check the motor exam and mental status of a child.

- If you don’t have a toy and want to check neck flexion (nontraumatic,) ask the child to show you his/her belly button. They almost always look down as they pull up their shirt.

- If they don’t look down, ask dubiously if they’re sure that’s their belly button.

- Demo what you want to do on mom or dad.

- If you want a young school-ager to do something, bet them that they can’t do it as well as you can.

- To improve deep breathing for auscultation, ask the child to act like she’s blowing up a balloon or blowing out a candle, but quietly.

- To check pulmonary function on a school-age or older child, have them see how far they can slowly count out loud on a single breath. Normally, they should get at least into the teens. Repeat to assess effectiveness of treatment.

- Tell a preschool child that you’re going to give their arm a hug when you take their blood pressure.

- Have a child tilt their head back if checking their throat. You get a better view.

- To help palpate a ticklish abdomen, put the child’s hand under yours and palpate with their hand.

- To get your tool or toy back, distract the child with something else while you or the parent retrieves it. Get it out of sight immediately!

Dr. Lou’s Sure-Fire Laugh Lines

When a child’s done a good job at deep breathing for you...

“Wow, you’re a really good breather!
I’ll bet you do it all the time, don’t you?”

“Does your ... hurt?”
Mention normal painful body parts and then start throwing in others...
Hair, eyelashes, fingernails, toenails, freckles?
To a school-aged child:
“My goodness, you’re so cute! How many girl(boy) friends do you have?”
   OR
   “Are you married? Have any kids?”

If no girlfriend, whisper loudly,
“You’re supposed to say your mother’s your girlfriend!”
   OR
If horrified by the thought of a girlfriend,
“That’s OK. Girls are yucky anyway.”

Summary
• Getting along well with your pediatric patients often enhances your communication with their parents.
• Developmental stages influence your communication approach, but you should always talk to your pediatric patients, regardless of age.
• Tell the parents what they want to hear about their child. Then tell them about the medical stuff.
• Smiles are powerful communication tools.
• Sometimes it’s not what you say, but how you say it; With your body as well as your words!
• Never lie.
• Shamelessly use any tools and tricks you have to enhance communications and build trust. This can only make your job easier.
• Make ‘em laugh!

Thanks!
Lou Romig MD

This Baby Talk presentation and others are available for download at: www.jumpstarttriage.com
Summary of Pediatric Developmental Milestones

Adapted from

Pediatric Nursing Certification

Review Course: Unlocking the Door to Success

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Louise Jakubic PhD,CRNP,RN-BC

President and Chief Educational Officer - Nurse Builders

www.NurseBuilders.net

3 Months

Physical/Motor

— Starts coordinating movement of hands and eyes (notices own hands)

— Raises head and chest when lying on stomach

— Stretches legs out and kicks

— Posterior fontanel closes by 2 months

Language/Cognition

— Notices own hands

— Begins to babble

— Turns head toward sound

Social

— Beginnings of instinctual smile at six to eight weeks

— Social smile appears around three months

— More expressive with face

Vision

— Vision is poor at birth; black and white colors are seen best

— Watches faces

— By 3 months, follows objects with eyes 180 degrees
4-6 Months

Physical/Motor

— Reaches for objects
— Transfers objects from hand to hand
— Uses hands to rake objects
— Rolls both directions (front to back first, then back to front)
— When prone, the infant pushes up on knees and hands rocking back and forth and may begin to crawl
— Sits with support and may develop the ability to sit up without support
— Teething begins

Language/Cognition

— Finds partially hidden objects
— Explores hands and mouth
— Responds to own name
— Continuous babbling; babbles in response to sounds

Social

— Enjoys social play (smiles, laughs)
— Responsive to expressions of others
— Stranger anxiety appears
— Comforting habits begin such as thumb sucking or holding a favorite blanket

Vision

— Develops full color vision
— Distance vision improves
— Increased ability to track objects

Weight

— Birth weight doubles at 5 months technically; we teach that it doubles at 6 months because that it when the assessment of weight occurs (at the 6 month primary care visit)

Sleep

— Sleeps through the night with one or two naps per day
7-9 Months

Physical/Motor

— Pincer grasp develops
— Everything is placed in the mouth
— Feeds self bottle or cheerios/cracker
— Sits alone without assistance
— Crawls
— Stands up while holding onto an object for support (table, parent’s hand)

Language/Cognition

— Develops object permanence and searches for objects out of view
— Understands “No” at 9 months
— The infant develops object permanence (a principle from Piaget’s theory) where the infant searches for objects outside the visual field, knowing that even though the object cannot be seen it is still present. Therefore, if an object is hidden while the infant watches, the infant will look for it as the infant understands that the object is not gone just because it is out of sight.

Social

— Imitates expressions of others
— Claps hands
— Enjoys games and play
— Weaning to a cup for fluid intake can begin

10-12 Months (1 Year)

Physical/Motor

— Puts objects into and takes objects out of a container
— Claps hands, waves bye-bye and enjoys rhythm games
— Gets into sitting position unassisted
— Crawls
— Pulls self up to stand
— Cruises (side steps while holding onto furniture) at 10 months
— Walks with support at 11 months
— Takes first steps (walks) beginning at 12 months with variability up until 15-16 months
Language/Cognition

— Finds hidden objects easily
— Looks at correct image when named
— Explores objects in a variety of ways (shaking, hitting, throwing)
— Responds to simple verbal requests
— Uses simple gestures (i.e. shakes head for "no" — shakes head when does not like/want food)
— Says about 5 words, but understands many more words
— Says “da-da” and “ma-ma”
— Tries to imitate words

Social

— Shy/anxious with strangers
— Cries when caregiver leaves
— Prefers certain people and toys (prefers mother over other caregivers)
— Tests parental responses to behavior (i.e. throws bottle or toy when in high chair)
— Repeats sounds and gestures

12-18 Months

Physical/Motor

— Anterior fontanel closes by 18 months
— Walks unassisted
— Climbs steps
— Stacks blocks

Language/Cognition

— Obeys simple commands
— Asserts independence
— Says “No”
— By 12 months, the toddler uses 5 words.
— By 18 months, the toddler use up to 50 words
— Points to objects when asked
Social

— Stranger anxiety decreases
— Extremely curious of environment
— Point to familiar objects when asked
— Demonstrates frustration

18-24 Months

Physical/Motor

— Feeds self with spoon/fork and cup without difficulty
— Turns pages in a book
— Climbs stairs by 21 months
— Runs and jumps by 24 months
— Enjoys push and pull toys
— Begins readiness for toilet training (shows interest)

Language/Cognition

— Puts 2 to 3 words together in a sentence
— Repeats words said by others
— Says own name
— Has understanding of routine and time

Social

— Exhibits temper tantrums
— Defiant behavior begins
— Has difficulty sharing
— Says “mine”
— Exhibits parallel play with other children

24-36 Months

Physical/Motor

— Walks up and down stairs
— Dresses self with assistance
— May begin to use cup without lid
—Rides a tricycle by 3 years

Language/Cognition

—Develops a full vocabulary
—Words are increasingly recognizable to adults other than parents/caregivers
—Speaks three to five word sentences
—By age 2, the toddler uses two-to-three-word sentences and comprehends many more words.
—At age 3, the toddler is a chatterbox, using about 11,000 words a day and three to four word sentences
—Knows first and last name
—Aware of gender and age
—Symbolic thought appears; exhibits pretend play
—Begins magical thinking where wishing, or thinking something will happen, make it happen

Social

—Transitions from parallel play to interactive play
—Imitates behavior of others
—May complete toilet training
—Does not like to share toys but is able to take turns
—Frustration decreases
—Decreased level of asserting independence in favor of more social conformity

3 Years

Physical/Motor

—Dresses and undresses self
—Walks backward up and down stairs
—Uses toilet
—Washes hands
—Draws
—Uses scissors
—Builds a tower of more than six blocks

Language/Cognition

—Develops a sense of body image
—Beginning understanding of causality, but still uses magical thinking

—Develops sexual curiosity

—Understands “mine” and “his/hers”

—Uses three to four-word sentences, but has trouble with pronouns

**Social**

—Exhibits fears of things such as the dark, etc.

—Has a full use of cooperative play; takes turns; plays in a group

—Develops self identity and family identity

—Plays make-believe with dolls, animals, and toys

**4 Years**

**Physical/Motor**

—Hops and stands on one foot for up to 5 seconds

—Throws overhand and catches ball

—Is increasingly agile in body movements

—Begins to copy letters

—Copies shapes

—Draws a person with 2 to 4 body parts

**Language/Cognition**

—Speaks in 4-5 word sentences

—Counts

—Names colors

**Social**

—Cooperates with others

—Increase in pretend play with dolls or other toys

—Negotiates solutions to problems

**5 Years**

**Physical/Motor**

—Dresses and undresses self well; cannot tie shoes

—Runs, jumps, skips
— Hops, somersaults

Language/Cognition

— Speaks sentences of more than 5 words

— The 5 year-old uses sentences of more than five words and tells long stories.

— Preschoolers are concrete thinkers. Communication and explanations should provide concrete ideas and examples; preschoolers are often scared by health care lingo.

— Tells long stories

— Can distinguish fantasy from reality

Social

— Wants to please people, particularly friends

— Likes to play with and be like friends

— Enjoys singing and dancing

6 to 12 Years

Physical/Motor

— Permanent teeth begin at 6 years and are completed by age 12 years

— Vision is matured by age 6 years

Language/Cognition

— Language Development is completed

— The following develop:

— Concept of time and space

— Understanding of cause and effect

— Reversibility

— Conservation (permanence of mass and volume)

— Learns to read and spell

— Learns to do math and understand ratios

— Begins to enjoy games with strategy (cards, board games) and make-believe (video games, toys)

— Child understands rules (cheating in games is common).

— Engages in team play
Social

— School is the focal point of the child’s activities shaping his/her cognitive and social development

— Teacher becomes a major non-parental influence

— Develops first true friend

— Morality develops (6-9 years: right or wrong; 10-12 years: sense of “shades of gray”)

— Becomes aware of social roles

— Fantasy play and daydreaming emerge

13 to 18 Years

Physical/Motor

— Rapid increase in height and weight

— First pubescence changes are development of testicles in boys and breast in girls

Language/Cognition

— Changing body requires adaptation of self-image/concept

— Egocentric

— Can think hypothetically

— Uses past experiences when making decisions

Social

— Intense interest in peer group and perception of others

— Peer contact and involvement becomes increasingly important

— Sexuality emerges and dating begins