PALS Study Guide 2011

See www.heart.org/ecrstudent. The code is found in the PALS Provider Manual page ii.

The PALS Provider exam is 33-multiple choice questions. Passing score is 84%. Student may miss 5 questions. For students taking PALS for the first time or renewing students with a current card, exam remediation is permitted should student miss more than 5 questions on the exam. Viewing the PALS book ahead of time with the online resources is very helpful. The American Heart Association link is www.heart.org/ecrstudent and has a PALS Precourse Self-Assessment, and other helpful tools. The code for the online resources is on the PALS Provider Manual page ii. Basic Dysrhythmias knowledge is required in relation to asystole, ventricular fibrillation, tachycardias in general and bradycardias in general. Student does not need to know the ins and outs of each and every one. For Tachycardias student needs to differentiate wide complex (ventricular tachycardia) and narrow complex (supraventricular tachycardia or SVT).

The PALS Provider course is a series of video segments then skills. The course materials well prepare you for the written exam.

- AED – infant – if pediatric pads are unavailable it is acceptable to use adult pads
- AED – no pulse, CPR initiated – use AED when it arrives
- Airway – Intubated, oxygen saturation decreases. Breath sounds only on right – verify tube placement
- BP – 2 year old 55/40 – hypotensive
- Bradycardia – vagal maneuver for infant – ice to the face
- CPR – Child – 15:2 compression to ventilation
- Defibrillation - Ventricular fibrillation – defibrillation 2 Joules/kg shock after CPR
- Drug – epinephrine 0.01 mg/kg IV or IO. If dose ordered not correct, ask team leader to clarify
- Drug - PEA – Pulseless electrical activity - epinephrine 0.01 mg/kg IV or IO
- Drug – Pulseless, breathless – epinephrine 0.01 mg/kg IV or IO
- IV – best method for immediate vascular access – intraosseous
- IV for Shock – IV fluids 20 ml/kg of isotonic crystalloid over 5 to 10 minutes
- IV with hypovolemic shock – 20 ml/kg normal saline
- Lab – vomiting, diarrhea, lethargic – check glucose
- Oxygen – with suctioning heart rate from tachycardia to sinus rhythm – administer oxygen and ensure adequate ventilation
- Oxygen Saturation – If reading is normal and respiratory assessment shows the patient is not doing well, the Sp02 is unreliable and oxygen should be administered
- Oxygen Saturation – target range 94% to 99%
- PEA – looks like a sinus rhythm, or any other rhythm that should support a pulse, but no pulse
- Pulse check – infant – brachial location
- Pulse check – no more than 10 seconds before starting CPR
- Rescue breaths child – 12 to 20 per minute
- Respiratory – allergy – epinephrine I.M.is the initial medication
- Respiratory – increased work of breathing, color pink, respiratory rate 30 – respiratory distress
- Respiratory – lung tissue disease most likely to have decreased oxygen saturation
- Respiratory – no breath sounds on left, trachea deviated to the right – needle decompression on the left chest
- Respiratory – seizures with respiratory distress most likely disordered control of breathing
- Respiratory – stridor, barking cough – nebulized epinephrine
- Respiratory – wheezing is lower airway obstruction
- Respiratory failure – inadequate oxygen and/or ventilation
- Shock – compensated if blood pressure is ok
- Shock – lethargy, fever, on chemo – septic shock
- SVT – no major symptoms – first attempt vagal maneuvers
- SVT narrow complex tachycardia – symptomatic – synchronized shock 0.5 to 1 J/kg
Systematic Approach to Pediatric Assessment

Initial Impression
- Consciousness
- Breathing
- Color

Evaluate – Identify – Intervene

Identify

A continuous sequence
**Determine if problem is life threatening.

EVALUATE

PRIMARY ASSESSMENT
- Airway
- Breathing
- Circulation
- Disability
- Exposure

SECONDARY ASSESSMENT
Pediatric Assessment Flowchart

SAMPLE History
S – Signs & symptoms (What hurts?)
A – Allergies
M – Medications
P – Past medical history
L – Last meal
E – Events Preceding the Injury
What Happened

DIAGNOSTIC TESTS
- ABG, Venous blood gas, arterial lactate
- Central venous 02 saturation, CVP
- CXR, ECG, Echo
- Peak expiratory flow rate

IDENTIFY

- Categorize Illness by Type and Severity

<table>
<thead>
<tr>
<th>Respiratory</th>
<th>Circulatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory Distress</td>
<td>Compensated Shock Or</td>
</tr>
<tr>
<td>Or</td>
<td>Hypotensive Shock</td>
</tr>
<tr>
<td>Respiratory Failure</td>
<td>Hypovolemic shock</td>
</tr>
<tr>
<td>Upper airway obstruction</td>
<td>Distributive shock</td>
</tr>
<tr>
<td>Lower airway obstruction</td>
<td>Cardiogenic shock</td>
</tr>
<tr>
<td>Lung tissue disease</td>
<td>Obstructive shock</td>
</tr>
<tr>
<td>Disordered control of breathing</td>
<td></td>
</tr>
</tbody>
</table>

Cardiopulmonary Failure
Cardiac Arrest

INTERVENE

- Positioning the child to maintain a patent airway
- Activating emergency response
- Starting CPR
- Obtaining the code cart and monitor
- Placing the child on a cardiac monitor and pulse oximeter
- Administering 02
- Supporting ventilation
- Starting medications and fluids using nebulizer, IV/IO fluid bolus

An intubated patient’s condition deteriorates; consider the following possibilities (DOPE):
- Displacement of the tube from the trachea
- Obstruction of the tube
- Pneumothorax
- Equipment failure

6 Hs and 5 Ts - Search for Reversible Causes
- Hypoxia or ventilation problems
- Hypovolemia
- Hypothermia
- Hypoglycemia
- Hypo/hyper kalemia
- Hydrogen ion (acidosis)

- Tamponade, cardiac
- Tension pneumothorax
- Toxins – poisons, drugs
- Thrombosis – coronary (AMI)
- Thrombosis – pulmonary (PE)
Shock

Shock results from inadequate blood flow and oxygen delivery to meet tissue metabolic demands. Shock progresses over a continuum of severity, from a compensated to a decompensated state. Attempts to compensate include tachycardia and increased systemic vascular resistance (vasoconstriction) in an effort to maintain cardiac output and blood pressure. Although decompensation can occur rapidly, it is usually preceded by a period of inadequate end-organ perfusion.

**Signs of compensated shock include:**
- Tachycardia
- Cool extremities
- Prolonged capillary refill (despite warm ambient temperature)
- Weak peripheral pulses compared with central pulses
- Normal blood pressure

As compensatory mechanisms fail, signs of inadequate end-organ perfusion develop. In addition to the above, these signs include
- Depressed mental status
- Decreased urine output
- Metabolic acidosis
- Tachypnea
- Weak central pulses

**Signs of decompensated shock** include the signs listed above plus hypotension. In the absence of blood pressure measurement, decompensated shock is indicated by the nondetectable distal pulses with weak central pulses in an infant or child with other signs and symptoms consistent with inadequate tissue oxygen delivery.

The most common cause of shock is hypovolemia, one form of which is hemorrhagic shock. Distributive and cardiogenic shock are seen less often.

**Learn to integrate the signs of shock because no single sign confirms the diagnosis. For example:**

- Capillary refill time alone is not a good indicator of circulatory volume, but a capillary refill time of >2 seconds is a useful indicator of moderate dehydration when combined with a decreased urine output, absent tears, dry mucous membranes, and a generally ill appearance (Class IIb; LOE 3). It is influenced by ambient temperature, lighting, site, and age
- Tachycardia also results from other causes (eg, pain, anxiety, fever)
- Pulses may be bounding in anaphylactic, neurogenic, and septic shock

In compensated shock, blood pressure remains normal; it is low in decompensated shock. Hypotension is a systolic blood pressure less than the 5th percentile of normal for age, namely:

- <60 mm Hg in term neonates (0 to 28 days)
- <70 mm Hg in infants (1 month to 12 months)
- <70 mm Hg + (2 x age in years) in children 1 to 10 years
- <90 mm Hg in children ≥10 years of age
# TABLE 1. Medications for Pediatric Resuscitation and Arrhythmias

| Medication               | Dose                                      | Remarks                                                        |
|--------------------------|-------------------------------------------|                                                               |
| Adenosine                | 0.1 mg/kg (maximum 6 mg)                  | Monitor ECG                                                   |
|                          | Repeat: 0.2 mg/kg (maximum 12 mg)         | Rapid IV/IO bolus                                             |
| Amiodarone               | 5 mg/kg IV/IO; repeat up to 15 mg/kg      | Monitor ECG and blood pressure                                |
|                          | Maximum: 300 mg                           | Adjust administration rate to urgency (give more slowly when perfusing rhythm present) |
| Atropine                 | 0.02 mg/kg IV/IO                          | Higher doses may be used with organophosphate poisoning       |
|                          | 0.03 mg/kg ET                             |                                                               |
|                          | Repeat once if needed                     | Minimum dose: 0.1 mg                                          |
|                          | Maximum single dose:                      |                                                               |
|                          | Child 0.5 mg                              |                                                               |
|                          | Adolescent 1 mg                           |                                                               |
| Calcium chloride (10%)   | 20 mg/kg IV/IO (0.2 mL/kg)                | Slowly                                                        |
| Epinephrine              | 0.01 mg/kg (0.1 mL/kg 1:10 000) IV/IO     | May repeat q 3–5 min                                          |
|                          | 0.1 mg/kg (0.1 mL/kg 1:1000) ET           |                                                               |
| Etomidate                | 0.2 to 0.4 mg/kg                         |                                                               |
|                          | Maximum dose 20 mg                        |                                                               |
|                          | Infuse over 30 to 60 seconds. Will produce rapid sedation that lasts 10 to 15 minutes. |
| Glucose                  | 0.5–1 g/kg IV/IO                         |                                                               |
|                          | D<sub>10</sub>W: 5–10 mL/kg, D<sub>50</sub>W: 2–4 mL/kg |
|                          | D<sub>50</sub>W: 1–2 mL/kg                |                                                               |
| Lidocaine                | Bolus: 1 mg/kg IV/IO                      |                                                               |
|                          | Maximum dose: 100 mg                      |                                                               |
|                          | Infusion: 20–50 µg/kg per minute          |                                                               |
|                          | ET: 2–3 mg                                |                                                               |
| Magnesium sulfate        | 25–50 mg/kg IV/IO over 10–20 min; faster in torsades |                                                               |
|                          | Maximum dose: 2g                          |                                                               |
| Milrinone                | Loading 50–75 µg/kg IV/IO over 10 to 60 minutes. |                                                               |
|                          | IV Infusion 0.5–0.75 µg/kg per minute IV/IO |                                                               |
| Naloxone                 | <5 y or ≤20 kg: 0.1 mg/kg IV/IO/ET         | Use lower doses to reverse respiratory depression associated with therapeutic opioid use (1–5 µg/kg) |
|                          | ≥5 y or >20 kg: 2 mg IV/IO/ET              |                                                               |
| Procainamide             | 15 mg/kg IV/IO over 30–60 min             | Monitor ECG and blood pressure                                |
|                          | Use caution when administering with other drugs that prolong QT (consider expert consultation) |
| Sodium bicarbonate       | 1 mEq/kg per dose IV/IO slowly            | After adequate ventilation                                     |
|                          | IV indicates intravenous; IO, intraosseous; and ET, via endotracheal tube. |
| *Flush with 5 mL of normal saline and follow with 5 ventilations.