Welcome to PALS with Medical Education Angels!

For your greatest success, please be aware that the AHA assumes those taking PALS can interpret and determine appropriate treatments for a variety of patient conditions, such as respiratory distress and failure, shock and rhythm disturbances. If this is your first time, consider auditing a class for free to determine if you are ready and what you need to study.

- The test is now open book! This means you can use your 2015 PALS Provider Manual or the ECC handbook. To download either of these to a kindle, e-reader or tablet use https://ebooks.heart.org.

  You can also buy, borrow, rent, check out from the library, check out from your hospital library, etc.

- The AHA has said that the pre-test should be completed with a grade of >70% in each of the areas. We ask full providers to bring their pre-test, but do not collect them from those recertifying. The link for the pre-test can be found on the page ii of the book. www.heart.org/eccstudent and there’s usually a code like pals15. There’s FANTASTIC supplemental learning and practice videos and information on this site; it’s definitely worth checking out.

- If you need to review rhythms, we like www.skillstat.com EKG simulator. Pay careful attention to those heart blocks and life threatening rhythms! There’s also a brief review on page 311 in the PALS Provider book.

Try not to be too nervous! We remember how scared we were the first time we took PALS (extra scared thinking about kids!). We will do our best to empower you and practice with you until you feel strong and confident in your abilities. If you put in the initiative and study, we are sure to be successful.

The remainder of this welcome packet includes the agenda for your course, a reminder of the H’s and T’s, and a copy of the most current PALS algorithms.

Don’t worry, you’ll be great!

Sincerely,

Medical Education Angels
MEA PALS Recertification Course Agenda

- Life is Why
- Science of Resuscitation Video
- Basic Life Support Video
- Systematic Approach Video
- Team Dynamics Video
- Post-Cardiac Arrest Care
- Coping with Death
- Skills Stations: OPA/NPA/Respiratory Arrest
- Skills Stations: CPR and use of the AED
- Skills Stations: Electrical Station*
- Skills Stations: IO Access*
- Cardiac Rhythm Review/Skills Stations
- Mega-Code Skills Testing
- Written Exam- 84% or greater required to pass, allowed 1 hour to complete
  *These can be omitted with recertification courses

MEA PALS Full Provider Course Agenda

- Life is Why and Course Introduction
- Science of Resuscitation Video
- Basic Life Support
- Systematic Approach Video
- Team Dynamics Video
- Management of Respiratory Emergencies
- Management of Shock Emergencies
- Management of Arrhythmia Emergencies
- Post Cardiac Arrest
- Coping with Death
- IO Access Video and Skills Stations
- Cardiac Rhythm Review/Skills Stations
- Skills Stations: OPA/NPA/Respiratory Arrest
- Skills Stations: CPR and use of the AED
- Skills Stations: Electrical Station
- Mega-Code Skills Testing
- Written Exam- 84% or greater required to pass, allowed 1 hour to complete

Breaks are always taken as needed!

Do not hesitate to ask questions or for clarification.

We encourage you to bring a drink or snack! No one tests well when they’re hungry.

Please text or call us if you have additional questions:

661.205.0927
mededangel@gmail.com or www.mededangels.com
**PALS Helpful Hints:** Don’t panic! The test is now open book, but it is timed. Look these up, study and mark the pages in case you need to reference it.

PALS is divided up into 3 sections: respiratory, shock, and dysrhythmias. If you can look for ways to compare and contrast them, that might help you. We will review all of core cases in class as well.

The 4 respiratory cases are: Upper and Lower Airway, Disordered Control of Breathing, and Lung Tissue Disease.

The 4 shock cases are: Hypovolemic, Distributive/Septic, Obstructive, and Cardiogenic.

The cardiac algorithms are: Tachycardia, Bradycardia, PEA/Asystole, Pulseless VT/VF. There are also algorithms for post arrest and sepsis.

**Know your drugs!**
- what they do, how they change your heartrate, and what condition they are used to treat.

Epinephrine
Adenosine
Amiodarone
Lidocaine
Atropine
Magnesium
Procainamide

**Know your rhythms, especially the life-threatening ones!**

**Know your algorithms!**
Bradycardia
Tachycardia
PEA/Asystole
Pulseless Vtach/Vfib
Post Arrest
H’s and T’s
The potentially reversible causes of cardiac arrest and near cardiac arrest.

<table>
<thead>
<tr>
<th>Hypovolemia</th>
<th>Tablets (drug overdose, accidents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypoxia</td>
<td>Tension Pneumothorax</td>
</tr>
<tr>
<td>Hydrogen ion loss – acidosis</td>
<td>Thrombosis – coronary or pulmonary</td>
</tr>
<tr>
<td>Hyperkalemia/Hypokalemia</td>
<td>Trauma (no longer on most lists, usually considered under hypovolemia)</td>
</tr>
<tr>
<td>Hypothermia</td>
<td></td>
</tr>
<tr>
<td>Hypoglycemia &amp; other metabolic disorders (no longer on most lists)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HYPOVOLEMIA</th>
<th>1. look for obvious signs of fluid/blood loss</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. secure IV/IO access</td>
</tr>
<tr>
<td></td>
<td>3. give fluid bolus and reassess</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLETS (drug OD, accidents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. support circulation while you find and administer reversal agent. Narcan reverses opiates/narcotics. Romazicon reverses benzodiazepines.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HYPOXIA</th>
<th>TAMPADE (causes: chest trauma, CABG, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. confirm chest rise bilaterally and lung sounds</td>
<td></td>
</tr>
<tr>
<td>2. check O2 source</td>
<td></td>
</tr>
<tr>
<td>3. SpO2, ABG’s, suction</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HYDROGEN ION LOSS</th>
<th>TENSION PNEUMOTHORAX (s/s: chest asymmetry, tympani, decreased BS, high peak pressures, JVD, tracheal deviation, severe respiratory distress)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. respiratory – ensure adequate ventilation</td>
<td></td>
</tr>
<tr>
<td>2. metabolic – give NaHCO3 (sodium bicarbonate)</td>
<td></td>
</tr>
<tr>
<td>3. draw/evaluate CO2 in serum or pH on ABG</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HYPOTHERMIA</th>
<th>2. CXR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3. support ventilation and oxygenation with BVM, intubate if necessary</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HYPOGLYCEMIA</th>
<th>THROMBOSIS (coronary or pulmonary)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. accu-check and administer reg insulin PRN</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HYPOKALEMIA</th>
<th>1. look for flat T waves and U waves</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. administer potassium and consider checking and infusing Magnesium</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HYPERKALEMIS</th>
<th>TRAUMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. look for peaked T waves, tall ST or widening QRS</td>
<td></td>
</tr>
<tr>
<td>2. To move K intracellular:</td>
<td></td>
</tr>
<tr>
<td>CaCl 10%, 5-10ml/onset 1-5 min</td>
<td></td>
</tr>
<tr>
<td>Sod. Bicarb give 1 amp up to 1mEq/kg can repeat in 15 min./onset 5-10 min</td>
<td></td>
</tr>
<tr>
<td>Insulin &amp; Dextrose: 10u regular insulin/1 amp D50 (25gms) /onset 30 min</td>
<td></td>
</tr>
<tr>
<td>Nebulized Albuterol 10-20mg/15 minutes, may repeat /onset 15 min</td>
<td></td>
</tr>
<tr>
<td>Lasix 40-80mg IV /onset with diuresis</td>
<td></td>
</tr>
<tr>
<td>Kayexalate 15-50gm PO or rectal /onset 1-2 hours Pg 64, 65 ECC 2005, 2015 handbook</td>
<td></td>
</tr>
<tr>
<td>1. inspect body completely; remove clothing</td>
<td></td>
</tr>
<tr>
<td>2. secure airway</td>
<td></td>
</tr>
<tr>
<td>3. control external bleeding by applying pressure while concurrently giving crystalloids and blood products</td>
<td></td>
</tr>
<tr>
<td>4. look for s/s of internal bleeding: send lab work, do diagnostic tests as long as patient stable enough for exam, tap belly if suspicious for internal bleeding, call OR to be on call</td>
<td></td>
</tr>
</tbody>
</table>
# PALS

## Vital Signs in Children

### Normal Heart Rates* (beats/min)

<table>
<thead>
<tr>
<th>Age</th>
<th>Awake Rate</th>
<th>Sleeping Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neonate</td>
<td>100-205</td>
<td>90-160</td>
</tr>
<tr>
<td>Infant</td>
<td>100-180</td>
<td>90-160</td>
</tr>
<tr>
<td>Toddler</td>
<td>98-140</td>
<td>80-120</td>
</tr>
<tr>
<td>Preschooler</td>
<td>80-120</td>
<td>65-100</td>
</tr>
<tr>
<td>School-aged child</td>
<td>75-118</td>
<td>58-90</td>
</tr>
<tr>
<td>Adolescent</td>
<td>60-100</td>
<td>50-90</td>
</tr>
</tbody>
</table>

### Normal Respiratory Rates (breaths/min)

<table>
<thead>
<tr>
<th>Age</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant</td>
<td>30-53</td>
</tr>
<tr>
<td>Toddler</td>
<td>22-37</td>
</tr>
<tr>
<td>Preschooler</td>
<td>20-28</td>
</tr>
<tr>
<td>School-aged child</td>
<td>18-25</td>
</tr>
<tr>
<td>Adolescent</td>
<td>12-20</td>
</tr>
</tbody>
</table>

### Normal Blood Pressures

<table>
<thead>
<tr>
<th>Age</th>
<th>Systolic Pressure (mm Hg)</th>
<th>Diastolic Pressure (mm Hg)</th>
<th>Mean Arterial Pressure (mm Hg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth (12 h, &lt;1000 g)</td>
<td>39-59</td>
<td>16-36</td>
<td>28-42</td>
</tr>
<tr>
<td>Birth (12 h, 3 kg)</td>
<td>60-76</td>
<td>31-45</td>
<td>48-57</td>
</tr>
<tr>
<td>Neonate (96 h)</td>
<td>67-84</td>
<td>35-53</td>
<td>45-60</td>
</tr>
<tr>
<td>Infant (1-12 mo)</td>
<td>72-104</td>
<td>37-56</td>
<td>50-62</td>
</tr>
<tr>
<td>Toddler (1-2 y)</td>
<td>86-106</td>
<td>42-63</td>
<td>49-62</td>
</tr>
<tr>
<td>Preschooler (3-5 y)</td>
<td>89-112</td>
<td>46-76</td>
<td>58-69</td>
</tr>
<tr>
<td>School-aged child (6-7 y)</td>
<td>97-115</td>
<td>57-76</td>
<td>66-72</td>
</tr>
<tr>
<td>Preadolescent (10-12 y)</td>
<td>102-120</td>
<td>61-80</td>
<td>71-79</td>
</tr>
<tr>
<td>Adolescent (12-15 y)</td>
<td>110-131</td>
<td>64-83</td>
<td>73-84</td>
</tr>
</tbody>
</table>

*Always consider the patient's normal range and clinical condition. Heart rate will normally increase with fever or stress.

1. Systolic and diastolic blood pressure ranges assume 50th percentile for height for children 1 year and older; assuming 50th percentile for height.

2. Mean arterial pressure (diastolic pressure + [difference between systolic and diastolic pressure/3]) for 1 year and older; assuming 50th percentile for height.

3. Approximately equal to postconception age in weeks (may add 5 mm Hg).


NIH publication 05-5287.
Pediatric Cardiac Arrest Algorithm—2015 Update

1. Start CPR
   - Give oxygen
   - Attach monitor/defibrillator

2. Rhythm shockable?
   - Yes
     - VF/pVT
     - Shock
     - CPR 2 min
       - IO/IV access
     - Rhythm shockable?
       - Yes
         - Shock
         - CPR 2 min
           - Epinephrine every 3-5 min
           - Consider advanced airway
         - Rhythm shockable?
         - Yes
           - Shock
           - CPR 2 min
             - Amiodarone or lidocaine
             - Treat reversible causes
         - CPR 2 min
       - Asystole/PEA

3. Asystole/PEA
   - CPR 2 min
     - IO/IV access
     - Epinephrine every 3-5 min
     - Consider advanced airway

4. CPR 2 min

5. Rhythm shockable?
   - Yes
     - Shock
     - CPR 2 min

6. CPR 2 min

7. Rhythm shockable?
   - Yes
     - Shock
     - CPR 2 min

8. CPR 2 min

9. Rhythm shockable?
   - Yes
     - Shock
     - CPR 2 min

10. CPR 2 min

11. CPR 2 min

12. Asystole/PEA
    - CPR 2 min
    - Organized rhythm → check pulse
    - Pulse present (ROSC) → post-cardiac arrest care
    - Go to 5 or 7
Pediatric Tachycardia With a Pulse and Poor Perfusion Algorithm

**Identify and treat underlying cause**
- Maintain patent airway; assist breathing as necessary
- Oxygen
- Cardiac monitor to identify rhythm; monitor blood pressure and oximetry
- IO/IV access
- 12-Lead ECG if available; don’t delay therapy

**Narrow (<0.09 sec)**
- Evaluate QRS duration

**Wide (>0.09 sec)**
- Evaluate rhythm with 12-lead ECG or monitor

**Probable sinus tachycardia**
- Compatible history consistent with known cause
- P waves present/normal
- Variable R-R; constant PR
- Infants: rate usually <220/min
- Children: rate usually <180/min

**Probable supraventricular tachycardia**
- Compatible history (vague, nonspecific; history of abrupt rate changes
- P waves absent/abnormal
- HR not variable
- Infants: rate usually ≥220/min
- Children: rate usually ≥180/min

**Possible ventricular tachycardia**

**Cardiopulmonary compromise?**
- Hypotension
- Acutely altered mental status
- Signs of shock

**Search for and treat cause**

**Consider vagal maneuvers**
(No delays)

**Synchronized cardioversion**
- If IO/IV access present, give adenosine or
- If IO/IV access not available, or if adenosine ineffective, synchronized cardioversion

**Consider adenosine if rhythm regular and QRS monomorphic**

**Doses/Details**

**Synchronized Cardioversion**
- Begin with 0.5-1 J/kg; if not effective, increase to 2 J/kg. Sedate if needed, but don’t delay cardioversion.

**Drug Therapy**

**Adenosine**
- IO/IV dose: First dose: 0.1 mg/kg rapid bolus (maximum: 6 mg).
- Second dose: 0.2 mg/kg rapid bolus (maximum second dose: 12 mg).

**Amiodarone**
- IO/IV dose: 5 mg/kg over 20-60 minutes or
- Procaainamide
- IO/IV dose: 15 mg/kg over 30-60 minutes

**Expert consultation advised**
- Amiodarone
- Procaainamide
Pediatric Bradycardia With a Pulse and Poor Perfusion Algorithm

Identify and treat underlying cause
- Maintain patent airway; assist breathing as necessary
- Oxygen
- Cardiac monitor to identify rhythm; monitor blood pressure and oximetry
- IO/IV access
- 12-Lead ECG if available; don’t delay therapy

Cardiopulmonary compromise?
- Hypotension
- Acutely altered mental status
- Signs of shock

No

CPR if HR <60/min with poor perfusion despite oxygenation and ventilation

Support ABCs
- Give oxygen
- Observe
- Consider expert consultation

No

Bradycardia persists?
- Epinephrine
- Atropine for increased vagal tone or primary AV block
- Consider transthoracic pacing/transvenous pacing
- Treat underlying causes

Yes

If pulseless arrest develops, go to Cardiac Arrest Algorithm

Doses/Details
Epinephrine IO/IV dose: 0.01 mg/kg (0.1 mL/kg of the 0.1 mg/mL concentration). Repeat every 3-5 minutes. If IO/IV access not available but endotracheal (ET) tube in place, may give ET dose: 0.1 mg/kg (0.1 mL/kg of the 1 mg/mL concentration).

Atropine IO/IV dose: 0.02 mg/kg. May repeat once. Minimum dose 0.1 mg and maximum single dose 0.5 mg.