



PALS Study Guide

The American Heart Association released new resuscitation science and treatment guidelines on October 19, 2010.

Please read the below information carefully

This letter is to confirm your registration in the American Heart Association Pediatric Advanced Life Support (PALS) course.

Please plan to be on time. All classes start at 9:00 am sharp. If you are more than 15 minutes late, you may be turned away as required by the American Heart Association (AHA). Students are expected to attend and participate in the entire course.

Be prepared to pass the pediatric CPR with AED skills test. Please note that we do not renew your BLS card based on this CPR test, which is a requirement of the PALS course itself. However you can however purchase and complete the AHA Online eLearning BLS for Health Care Provider Program through our website prior to the PALS course. We will verify your skills in BLS CPR and issue a PALS and BLS for Health Care Provider certificate at the end of the course.

All PALS renewal/recertification (1-day) participants **MUST** bring their current American Heart Association-issued PALS card to class. There are no exceptions for expired cards. If you forget your card you will be able to participate in the course but will not be issued your card until you show proof of your current AHA PALS Card. Refunds will not be given if you attempt to take the PALS renewal/recertification course with an expired certification.

PALS certification cards and Continuing Education Units (CEU's) will be issued at the end of class.

HOW TO GET READY

The PALS Course is designed to teach you the lifesaving skills required to be both a team member and a team leader in either an in-hospital or an out-of-hospital setting. The PALS Course covers extensive material in a short time, **you will need to study and prepare for the course beforehand.**

*The PALS Course **DOES NOT** teach CPR, ECG rhythm identification, pharmacology, or PALS algorithms.*

The course format requires all students to be fully prepared prior to coming to class. If you do not review CPR, learn and understand ECG's or the pharmacology information in the Pre-course Self-Assessment, it is unlikely that you can successfully complete the PALS Course.



PRE-COURSE REQUIREMENTS

You should prepare for the course by doing the following:

1. Complete the pre-course preparation checklist that came with your PALS Provider Manual. (ALL STUDENTS MUST HAVE THE CURRENT AHA PALS MANUAL PRIOR TO ATTENDING CLASS) Bring the checklist with you to the course.
2. Review the PALS Course Agenda.
3. Review and understand the information in your PALS Provider Manual.
4. The resuscitation scenarios require that your BLS skills and knowledge are current. Review and understand all BLS 2010 guidelines. You will be tested on pediatric CPR and AED skills at the beginning of the PALS Provider Course. You must know this in advance, since you will not be taught how to do CPR or how to use an AED during the course.
5. Go to the AHA PALS Website at www.heart.org/eccstudent and enter the code **PALSPROVIDER**. (students are expected to know how to perform BLS CPR, use an AED, read and interpret ECG's, and all PALS Pharmacology prior to the course. **YOU WILL NOT BE TAUGHT THIS INFORMATION IN CLASS**)
6. Print your PALS Pre-course Completion Certificate with test score and bring it with you to class.
7. Test your knowledge and recognition of ECG rhythms on the website http://www.skillstat.com/ECG_Sim_demo.html
8. Visit my download page at www.lifesavercpr.net/downloads to see all of the PALS Course Material and Skills Check Off Sheets used during the course.

WHAT TO BRING AND WHAT TO WEAR

Bring your PALS Provider Manual to the class. You will need it during each lesson in the course. You may wish to purchase the AHA's 2010 Handbook of Emergency Cardiovascular Care for Healthcare Providers (optional), which you may bring to the course to use as a reference guide during some of the stations in the course.

Please wear loose, comfortable clothing to class. You will be practicing skills that require you to work on your hands and knees, and the course requires bending, standing, and lifting. If you have any physical condition that might prevent you from engaging in these activities, please tell an instructor. The instructor may be able to adjust the equipment if you have back, knee, or hip problems.



RESCHEDULE POLICY

- **No refunds will be issued. All registrations are final.**
- You may reschedule your course by calling us at least 7 business days prior to your scheduled course date. You will be charged a rescheduling fee of \$50.00
- We understand that emergencies do come up. If you have to cancel less than 7 days before the class you will be charged a rescheduling fee of 50% of the course cost.
- If you cancel within 24 hours or do not attend your scheduled class, you will forfeit all class tuition.
- Courses must be rescheduled and attended within 40 days from the original start date. No additional rescheduling requests will be honored.

REQUIREMENTS FOR SUCCESSFUL COMPLETION OF PALS COURSE:

Required Tests and Skill Check Off Sheets

- Completed PALS Pre-test is required for admission to the course.
- Successfully complete the Pediatric CPR and AED Skills Check Off Test Sheet
- Successfully complete the Respiratory Core Case Skills Check Off Test Sheet
- Successfully complete the Shock Core Case Skills Check Off Test Sheet
- Successfully complete the Cardiac Core Case Skills Check Off Test Sheet
- Score 84% or better on the multiple choice PALS posttest.

You may be allowed to use your PALS Provider Manual & notes.

Skills to be performed:

1. Use the PALS rapid cardiopulmonary assessment
2. Demonstrate effective infant and child CPR
3. Use an AED on a child
4. Provide safe defibrillation with a manual defibrillator
5. Maintain an open airway
6. Confirmation effective ventilation
7. Address vascular access
8. State rhythm appropriate drugs, route, and dose
9. Understand the consideration of reversible causes



You will need to know:

1. Pediatric CPR and AED (foundation for PALS)
2. Arrhythmias (identify):
 - a. Sinus Rhythm (SR)
 - b. Sinus Bradycardia (SB)
 - c. Sinus Tachycardia (ST)
 - d. Supraventricular Tachycardia (SVT)
 - e. Ventricular Tachycardia (VT)
 - f. Ventricular Fibrillation (VF)
 - g. Pulseless Electrical Activity (PEA)
 - h. Asystole
3. Normal Respiratory Rate (PALS Provider Manual p. 13)

Age	Rate
Infant	30 to 60
Toddler	24 to 40
Preschooler	22 to 34
School-aged child	18 to 30
Adolescent	12 to 16

4. Normal Heart Rate (HR) (PALS Provider Manual p. 18)

AGE	Awake Rate	Sleeping Rate
Newborn to 3 months	85 to 205	80 to 160
3 months to 2 years	100 to 190	75 to 160
2 to 10 years	60 to 140	60 to 90
More than 10 years	60 to 100	50 to 90

5. Hypotension by Systolic Blood Pressure (SBP) (PALS Provider Manual p. 74)

AGE	Systolic Blood Pressure
Term Neonates (0 to 28 days)	Less than 60
Infants (1 to 12 months)	Less than 70
Children 1 to 10 years (5 th BP percentile)	Less than 70 + (age in years X 2)
Children less than 10 years	Less than 90



6. Modified Glasgow Coma Scale

ACT	CHILD	INFANT	SCORE
EYE OPENING	Spontaneous	Spontaneous	4
	To Speech	To Speech	3
	To Pain	To Pain	2
	None	None	1
Verbal Response	Orientated, Appropriate	Coos and Babbles	5
	Confused	Irritable, Cries	4
	Inappropriate words	Cries in response to pain	3
	Incomprehensible sounds	Moans in response to pain	2
	None	None	1
Motor Response	Obeys Commands	Moves Spontaneously	6
	Localizes painful stimulus	Withdraws in response to touch	5
	Withdraws in response to pain	Withdraws in response to pain	4
	Flexion in response to pain	Abnormal flexion posture to pain	3
	Extension in response to pain	Abnormal extension posture to pain	2
	None	None	1



HELPFUL STUDENT INFORMATION:

RAPID CARDIOPULMONARY ASSESSMENT AND ALGORITHMS

- This is a systematic head-to-toe assessment used to identify pediatric patients in cardiac and respiratory distress and failure, shock, and pulseless arrest.
- Algorithms are “menus” that guide you through recommended treatment interventions.
- Know the following assessment because it begins all PALS case scenarios. The information you gather during the assessment will determine which algorithm you choose for the patient’s treatment.

After each intervention you will reassess the patient again using the head-to-toe assessment.

General Appearance:

1. Level of consciousness:
 - a. A= awake
 - b. V= responds to verbal
 - c. P= responds to pain
 - d. U= unresponsive
2. Skin Tone:
 - a. Warm, pink, and dry to cool, pale/cyanotic, diaphoretic
3. Muscle tone:
 - a. Good to flaccid

Assess ABC’s:

(Stop and give immediate support when needed, and then continue with assessment)

1. Airway
 - a. Open and hold with head tilt-chin lift
2. Breathing
 - a. Present or absent
 - b. Rate = normal, slow, fast
 - c. Pattern = regular, irregular, gasping
 - d. Depth = normal, shallow, deep
 - e. Sound = stridor, grunting, wheezing
 - f. Exertion = nasal flaring, sternal retractions, accessory muscle use
3. Circulation
 - a. Central pulse = present or absent
 - b. Rate = normal, slow, fast
 - c. Rhythm = regular or irregular
 - d. QRS = narrow or wide

**Perfusion:**

1. Central pulse versus peripheral pulse strength: equal or unequal
2. Skin color, pattern and temperature: normal or abnormal
3. Capillary refill: normal or abnormal (greater than 2 seconds)
4. Liver edge palpated at the costal margin: normal or dry
 - a. below costal margin (fluid overload)

Check:

1. Systolic Blood Pressure (normal or compensated): acceptable for age or hypotensive
2. Urine output: normal=
 - a. Infants and Children = 1– 2cc/kg/hr.
 - b. Adolescents = 30cc/hr.

Classify the physiologic status:

1. Stable: needs little support; reassess frequently
2. Unstable: needs immediate support and intervention
3. Respiratory distress: increased rate, effort and noise of breathing; requires much energy
4. Respiratory failure: slow or absent rate, weak or no effort and is very quiet

SHOCK:

1. Compensated shock:
 - a. SBP is acceptable but perfusion is poor: central vs. peripheral pulse strength is unequal; peripheral color is poor and skin is cool, capillary refill is prolonged
2. Decompensated shock:
 - a. Systolic hypotension with poor or absent pulses, poor color, weak compensatory effort
3. Apply Appropriate Shock Treatment Algorithm:
 - a. Bradycardia with a Pulse
 - b. Tachycardia with Adequate Perfusion
 - c. Tachycardia with Poor Perfusion
 - d. Pulseless Arrest: VF/VT
 - e. Asystole/PEA



ADVANCED AIRWAY

A cuffed or uncuffed Endotracheal Tube (ET) may be used on Infants and children.
(PALS Provider Manual p. 87)

1. To estimate tube size:
 - a. Uncuffed: $(\text{Age in years} \div 4) + 4$ Example: $(4 \text{ years} \div 4) = 1 + 4 = 5$
 - b. Cuffed: $(\text{Age in years} \div 4) + 3$ Example: $(4 \text{ years} \div 4) = 1 + 3 = 4$

Immediately confirm tube placement by clinical assessment and a device:

► Clinical assessment:

1. Look for bilateral chest rise.
2. Look for water vapor in the tube (this is helpful but not definitive).
3. Listen for breath sounds over stomach and the 4 lung fields (left and right anterior and mid-axillary).

► Devices:

1. End-Tidal CO₂ Detector (ETD): if weight > 2 kg
 - a. Attach between the ETT and BVM
 - i. Litmus paper center should change color with each inhalation and each exhalation.
 - ii. Original color on inhalation = O₂ is being inhaled: expected.
 - iii. Color change on exhalation = Tube is in trachea.
 - iv. Original color on exhalation = Litmus paper is wet: replace ETD.
2. Esophageal Detector (EDD): if weight > 20 kg and in a perfusing rhythm (Resembles turkey baster)
 - a. Compress the bulb and attach to end of ETT:
 - i. Bulb inflates quickly= Tube is in the trachea.
 - ii. Bulb inflates poorly= Tube is in the esophagus.

* No recommendation for its use in cardiac arrest.

► Device Failure:

1. When sudden deterioration of an intubated patient occurs, immediately check:
 - b. Displaced: ET tube is not in trachea or has moved into a bronchus (right main stem most common)
 - c. Obstruction: Consider secretions or kinking of the tube
 - d. Pneumothorax: Consider chest trauma, barotrauma, or non-compliant lung disease
 - e. Equipment: Check oxygen source, BVM, and ventilator



MEDICATIONS

During Arrest:

1. **Epinephrine:** catecholamine
 - a. Increases heart rate, peripheral vascular resistance and cardiac output; during CPR increases myocardial and cerebral blood flow.
 - b. Dosage:
 - i. IV/IO: 0.01 mg/kg of 1:10 000 solution (equals 0.1 mL/kg of the 1:10 000 solution); repeat q. 3–5 min

Antiarrhythmic:

1. **Amiodarone:** atrial and ventricular antiarrhythmic
 - a. Slows AV nodal and ventricular conduction, increases the QT interval and may cause vasodilation.
 - b. Dosage:
 - i. VF/PVT: IV/IO: 5 mg/kg bolus
 - ii. Perfusing VT: IV/IO: 5 mg/kg over 20-60 min
 - iii. Perfusing SVT: IV/IO: 5 mg/kg over 20-60 min
 - iv. Max: 15 mg/kg per 24 hours

Caution: hypotension, Torsade; half-life is up to 40 days
2. **Lidocaine:** ventricular antiarrhythmic to consider when Amiodarone is unavailable
 - a. Decreases ventricular automaticity, conduction and repolarization.
 - b. Dosage:
 - i. VF/PVT: IV/IO: 1 mg/kg bolus q. 5-15 min
 - ii. Perfusing VT: IV/IO: 1 mg/kg bolus q. 5-15 min
 - iii. Infusion: 20-50 mcg/kg/min
 - c. Caution: neurological toxicity → seizures
3. **Magnesium:** ventricular antiarrhythmic for Torsade and hypomagnesemia
 - a. Dosage:
 - i. IV/IO: 25-50 mg/kg over 10–20 min; give faster in Torsade
 - ii. Max: 2 gm
 - b. Caution: hypotension, bradycardia
4. **Procainamide:** atrial and ventricular antiarrhythmic to consider for perfusing rhythms
 - a. Dosage:
 - i. Perfusing recurrent VT: IV/IO: 15 mg/kg infused over 30–60 min
 - ii. Recurrent SVT: IV/IO: 15 mg/kg infused over 30–60 min
 - b. Caution: hypotension; use it with extreme caution with Amiodarone as it can cause AV block



Increase Heart Rate:

1. **Epinephrine:** Drug of choice for pediatric bradycardia after oxygen and ventilation
 - a. Dose is the same as listed above.
2. **Atropine:** Vagolytic to consider after oxygen, ventilation and epinephrine
 - a. Blocks vagal input therefore increases SA node activity and improves AV conduction.
 - b. Dosage:
 - i. IV/IO: 0.02 mg/kg; may double amount for second dose
 - ii. Child max: 1 mg
 - iii. Adolescent max: 2 mg
 - c. Caution: Do not give less than 0.1 mg, or may worsen the bradycardia

Decrease Heart Rate:

1. **Adenosine:** Drug of choice for symptomatic SVT
 - a. For injection technique Blocks AV node conduction for a few seconds to interrupt AV node re-entry.
 - b. Dosage:
 - i. IV/IO: first dose: 0.1 mg/kg max: 6 mg
 - ii. 2nd dose: 0.2 mg/kg max: 12 mg
 - c. Caution: transient AV block or asystole; has very short half-life

Increase Blood Pressure:

1. **Dobutamine:** Synthetic catecholamine
 - a. Increases force of contraction and heart rate; causes mild peripheral dilation; may be used to treat shock.
 - b. Dosage:
 - i. IV/IO infusion: 2- 20 mcg/kg/min infusion
 - c. Caution: Tachycardia
2. **Dopamine:** Catecholamine
 - a. May be used to treat shock; effects are dose dependent.
 - i. Low dose: increases force of contraction and cardiac output.
 - ii. Moderate: increases peripheral vascular resistance, BP and cardiac output.
 - iii. High dose: higher increase in peripheral vascular resistance, BP, cardiac work and oxygen demand.
 - b. Dosage:
 - i. V/IO infusion: 2–20 mcg/kg/min
 - c. Caution: tachycardia



Miscellaneous:

1. **Glucose:**
 - a. Increases blood glucose in hypoglycemia
 - b. Prevents hypoglycemia when insulin is used to treat hyperkalemia.
 - c. Dosage:
 - i. IV/IO: 0.5–1 g/kg; this equals: 2–4 mL/kg of D25 **or** 5–10 mL/kg of D10 **or** 10–20 mL/kg of D5
 - d. Caution: max recommended: should not exceed D25%; hyperglycemia may worsen neurological outcome.
2. **Naloxone:** Opiate antagonist
 - a. Reverses respiratory depression effects of narcotics.
 - b. Dosage:
 - i. < 5 yrs or 20 kg: IV/IO: 0.1 mg/kg
 - ii. >5yrs or 20kg: IV/IO: up to 2mg
 - c. Caution: half-life is usually less than the half-life of narcotic, so repeat dosing is often required.
3. **Sodium bicarbonate:** PH buffer for prolonged arrest, hyperkalemia, tricyclic overdose:
 - a. Increases blood pH helping to correct metabolic acidosis.
 - b. Dosage:
 - i. IV/IO: 1mEq/kg slow bolus; give only after effective ventilation is established
 - c. Caution: causes other drugs to precipitate so flush IV tubing before and after.



PALS Course Agenda (Initial Course)

Day 1		
8:00-8:10 Welcome, Introductions, and Course Administration		
8:10-8:15 Lesson 1: PALS Course Overview		
8:15-8:30 Lesson 2: Overview of PALS Science		
Divide class into 2 groups	Lesson 3 BLS Practice and Competency Testing	Lesson 4 Management of Respiratory Emergencies
8:30-9:30	Group 1	Group 2
9:30-9:40	Break	Break
9:40-10:40	Group 2	Group 1
Divide class into 2 groups	Lesson 5 Rhythm Disturbances/ Electrical Therapy	Lesson 6 Vascular Access
10:40-11:10	Group 2	Group 1
11:10-11:40	Group 1	Group 2
11:40-12:30	Lunch	Lunch
One large group		
12:30-1:00 Lesson 7: Resuscitation Team Concept		
1:00-1:10 Lesson 8: Overview of Pediatric Assessment		
1:10-1:20 Lesson 9A-C: Overview of Learning Stations		
1:20-1:40 Lesson 9D: Core Case Discussion: Respiratory Cases 1 and 2		
1:40-1:50 Break		
Divide class into 2 groups	Lesson 9D Core Case Simulations Respiratory Cases 1 and 2	Lesson 9D Core Case Simulations Respiratory Cases 1 and 2
1:50-2:30	Group 1	Group 2
One large group		
2:30-2:50 Lesson 9D: Core Case Discussion: Respiratory Cases 3 and 4		
Divide class into 2 groups	Lesson 9D Core Case Simulations Respiratory Cases 3 and 4	Lesson 9D Core Case Simulations Respiratory Cases 3 and 4
2:50-3:30	Group 1	Group 2
One large group		
3:30-3:50 Lesson 9E: Core Case Discussion: Shock Cases 5 and 6		
Divide class into 2 groups	Lesson 9E Core Case Simulations Shock Cases 5 and 6	Lesson 9E Core Case Simulations Shock Cases 5 and 6
3:50-4:30	Group 1	Group 2
4:30 End of Day 1		



PALS Course Agenda (Recertification/Renewal Course)

8:00-8:10 Welcome, Introductions, and Course Administration		
8:10-8:15 Lesson 1: PALS Update Course Overview		
8:15-8:30 Lesson 2: Overview of PALS Science		
Divide class into 2 groups	Lesson 3 BLS Practice and Competency Testing	Lesson 3 BLS Practice and Competency Testing
8:30-9:30	Group 1	Group 2
9:30-9:40 Break (Lessons 4, 5, and 6 are optional and are not included in this agenda)		
One large group		
9:40-10:10 Lesson 7: Resuscitation Team Concept		
10:10-10:30 Lesson 8: Coping With Death		
10:30-10:40 Lesson 9: Overview of Pediatric Assessment		
Divide class into 2 groups	Lesson 10 Putting It All Together	Lesson 10 Putting It All Together
10:40-11:40	Group 1	Group 2
One large group		
11:40-11:45 Lesson 11: Course Summary and Testing Details		
11:45-12:30 Lunch		
One large group		
12:30-1:30 Lesson 12: Written Exam		
Divide class into 2 groups	Lesson 13 PALS Core Case Test 1 Cardiac Cases 9-12	Lesson 14 PALS Core Case Test 2 Respiratory Cases 1-4 Shock Cases 5-8
1:15-2:15	Group 1	Group 2
2:15-3:15	Group 2	Group 1
3:15 Course Ends		
3:15 Remediation		