


American Academy
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™

American Heart
Association 
Learn and Live

S
T
A
L
S



The official AHA
Self-directed PALS
eLearning Program

PALS

HeartCode™ PALS

Student Guide

Learning Technology by Laerdal

Preface

The goal of HeartCode PALS is to improve the quality of care provided to the infant and child victims of cardiac arrest or other cardiopulmonary emergencies.

HeartCode PALS, the official AHA eLearning program, offers an alternative to the classroom-based AHA PALS course.

HeartCode PALS offers a convenient method for obtaining an American Heart Association PALS course completion card, while practicing critical thinking skills and team dynamics to help improve the quality of patient care.

Providers can complete the course at their own pace, on their own schedule, and improving the utilization of a limited pool of instructor resources.

This specific program is designed to educate clinicians about treatments for pediatric cardiovascular and pulmonary emergencies.

Target Audience

This course is targeted for active healthcare providers who initiate and direct advanced life support beyond the first few minutes through the stabilization or transport phases of a pediatric emergency. PALS providers may include physicians, physician assistants, pharmacists, registered nurses, nurse practitioners, and paramedics. Other healthcare workers who care directly for infant and child patients may also benefit.

Content

Introduction	4
Profiles.....	6
Patients	8
Anna York <i>Hypovolemic Shock</i>	9
Donna Hurst <i>SVT</i>	10
Felicia Sunderland <i>Laryngitis</i>	11
Irene Eton <i>Hypoxemic bradycardia</i>	12
Julia Radcliff <i>Severe Asthma</i>	13
Maria Engel <i>Pneumothorax</i>	14
Mona Hope <i>Bacterial Sepsis</i>	15
Olivia Mills <i>PEA</i>	16
Paula Walton <i>VF</i>	17
Rosa Preston <i>Pneumonia</i>	18
Teri Ashley <i>Increased ICP</i>	19
Vicky Bloom <i>Cardiogenic Shock</i>	20
Special Features.....	21
Accreditation / Disclosure Statements.....	25

Introduction

The HeartCode PALS program includes all of the exams required for successful completion of the cognitive portion of the American Heart Association's PALS Course:

- Team Dynamics Lesson (team principles)
- 12 PALS Cases (realistic patient-simulation cases)
- PALS Online Exam

Also included in the program:

Precourse self-assessment

The objective of the HeartCode PALS precourse self-assessment is to evaluate the provider's ability to integrate both rhythm interpretation and the use of pharmacologic agents. There is no passing score in the self-assessment, but a score of 84% or higher will help the learner to participate effectively in the lessons and testing sections.

Electronic versions of the entire AHA textbooks

- PALS Provider Manual
- 2005 American Heart Association Guidelines for Pediatric Advanced Life Support

Supplementary AHA material

- PALS Course Guide
- ACDA Worksheet
- PALS Core Drugs
- PEARS Video
- Vascular Access Video
- CPR Video
- Airway Management Video

HeartCode PALS includes micro-simulation technology that improves both the educational content and user-friendliness of the program. Providers are presented with realistic patient cases and are required to interact with the program to assess the patient, and formulate a treatment plan based on the PALS algorithms. The advanced technology allows the simulated patient to react accordingly to the treatment provided (positively or negatively) in order to improve the learning experience.

In addition to standard drop-down menus, the on-screen simulations allow the provider to interact directly with the scene images to increase the realism of the case.

Upon completion of a given case, the provider is presented with a detailed debriefing screen. This debriefing is more than just a list of events ending with a score. Providers are presented with an account of their actions, pointing out both correct and incorrect actions. Suggestions for improvement are offered, and all appropriate AHA reference material is hyperlinked to the debriefing, allowing immediate remediation at the conclusion of the case.

To claim the HeartCode PALS course completion card, the learner needs to:

- Review the background material to the extent desired
- Successfully complete:
 - Team Dynamics Lesson
 - 12 Patient Scenarios
 - PALS Online Exam
 - Claim the HeartCode PALS Part 1 Certificate
- Perform a skills practice and test with an AHA PALS Instructor

Upon successful completion of the cognitive and skills test portions, the student will receive an AHA PALS Course Completion Card. The required skills tests must be completed within 60 days of completing HeartCode PALS Part 1.

Profiles

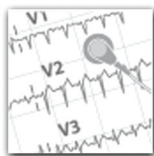
HeartCode PALS can be completed using one of three different profiles. The profiles are not based on the user's profession. Instead they should be selected based on how often the learner cares for critically ill pediatric patients:



Advanced

My clinical setting requires that I care for critically ill pediatric patients on a daily basis.

At this level, you will have full access to all labs, medications, and procedures available in the typical emergency department or critical care setting. Examples of this type of provider include, but are not limited to, pediatric intensivist, providers in advanced pediatric care settings, pediatric critical care transport, pediatric tertiary care emergency department, and other providers who specialize in pediatric emergency or critical care. These providers are expected to provide pre-arrest care, initiate or direct resuscitation, and provide complete post-resuscitation stabilization care.



Intermediate

My clinical setting requires that I care for critically ill pediatric patients on a routine basis.

At this level, you will have access to most labs, medications, and procedures that are available in the typical emergency department or critical care setting. Examples of this type of provider include, but are not limited to, providers in an emergency department who do not specialize in pediatric care or critical care transport settings, providers of care in tertiary care

facilities that specialize in emergency or critical care, and advanced practice nurses involved in primary care. These providers are expected to direct, provide, initiate, or assist pre-arrest care or resuscitation or post-resuscitation stabilization care.



Core

My clinical setting requires that I care for critically ill pediatric patients on an infrequent basis.

At this level, you will not be able to access lab values, 12-Lead ECGs, or vasoactive infusions. Examples of this type of provider include, but are not limited to, providers who do not specialize in pediatric emergency or critical care, or EMT-Intermediates. These providers are expected to provide pre-arrest care and initiate and direct resuscitation prior to the arrival of pediatric experts.

PALS Cases (Patients)

Description and Learning Objectives

The 12 PALS cases in HeartCode provide learners with an opportunity to test their ability to manage a range of important cardiovascular and pulmonary emergencies in a realistic simulation setting while working toward PALS certification. The intelligent debriefing gives learners optimal chances to learn from and improve performance.

Patient: Anna York

A 6-month-old infant is brought to the emergency department with a history of vomiting and diarrhea and has been eating and drinking poorly. The infant is not responding appropriately.

Diagnosis: Hypovolemic Shock

Difficulty: Beginner

Learning Objectives:

- Explains the implications of the initial appearance
- Summarizes how to assess patency of the airway
- Summarizes how to assess breathing
- Summarizes how to assess circulation
- Recalls that a focused history (SAMPLE) is a component of the secondary assessment
- Recalls that effective shock therapy depends on targeting therapy based on the type of shock and the etiology of shock
- Recognizes hypovolemic shock
- Summarizes the mainstays of general shock management
- Summarizes the mainstay of acute management of hypovolemic shock
- Recalls indications for fluid therapy
- Recalls recommended fluid administration regimes
- Explains the goals of therapy when managing shock
- Summarizes the goals of post-resuscitation stabilization
- Explains the principles of ongoing assessment

Descriptions and Learning Objectives

Patient: Donna Hurst

A 3-month-old infant was brought to the emergency department because the mother noted breathing difficulty, poor feeding, and vomiting today. She appears irritable and is not consoled by her mother.

Diagnosis: SVT

Difficulty: Intermediate

Learning Objectives:

- Explains the implications of the initial appearance
- Summarizes initial management of a symptomatic patient with a rhythm disturbance and a pulse
- Explains the advantages of continuous monitoring
- Distinguishes between wide complex (WC) and narrow complex (NC) tachycardias
- Distinguishes between a stable and unstable symptomatic patient (adequate and poor perfusion)
- Summarizes signs of poor circulation
- Implements the pediatric tachycardia algorithm for infants and children with poor perfusion
- Recalls indications for vagal stimulation
- Explains how to induce vagal stimulation in infants and young children
- Summarizes drug therapy relevant for SVT
- Executes rapid administration of adenosine
- Summarizes the goals of post-resuscitation stabilization

Patient: Felicia Sunderland

A 1-year-old is brought to the emergency department with a history of labored breathing for the past 2 days that has progressively worsened. The infant has increased effort of breathing and an occasional harsh, barking cough.

Diagnosis: Laryngitis

Difficulty: Beginner

Learning Objectives:

- Summarizes the components of the primary assessment
- Summarizes how to assess patency of the airway
- Summarizes how to assess breathing
- Recalls that pulse oximetry is used to supplement clinical assessment
- Summarizes initial approach to management of an infant or child with respiratory distress
- Recalls that any life-threatening abnormality detected during the ABC assessment must be treated and stabilized prior to completing the remainder of the assessment
- Recalls the common causes of upper airway obstruction based on patient's age
- Recalls that agitation increases upper airway obstruction
- Explains why racemic epinephrine is preferred over albuterol in an infant or child with UAO
- Recalls that a focused history (SAMPLE) is a component of the secondary assessment
- Summarizes the goals of post-resuscitation stabilization
- Explains the principles of ongoing assessment

Descriptions and Learning Objectives

Patient: Irene Eton

A 3-month-old is brought to the ED with respiratory distress following a 2-day history of cold-like symptoms. The infant is unconscious and has a mottled skin color.

Diagnosis: Hypoxemic bradycardia

Difficulty: Advanced

Learning Objectives:

- Summarizes the components of the primary assessment
- Summarizes how to assess breathing
- Summarizes how to assess circulation
- Explains the advantages of continuous monitoring
- Summarizes initial management of a symptomatic patient with a rhythm disturbance and a pulse
- Recalls that the most frequent cause of slow rhythms associated with instability is hypoxemia
- Implements the pediatric bradycardia algorithm for the unstable patient
- Recalls indications for CPR in a bradycardic infant or child
- Summarizes the goals of post-resuscitation stabilization
- Explains the principles of ongoing assessment

Patient: Julia Radcliff

A 7-year-old child is having difficulty breathing. Her mother says the child has had a cold for the last 2 days with increasing coughing. She appears anxious and is short of breath.

Diagnosis: Severe Asthma

Difficulty: Intermediate

Learning Objectives:

- Summarizes the components of the primary assessment
- Summarizes how to assess patency of the airway
- Summarizes how to assess breathing
- Recalls that pulse oximetry is used to supplement clinical assessment
- Summarizes how to assess circulation
- Summarizes initial approach to management of an infant or child with respiratory distress
- Recalls that any life-threatening abnormality detected during the ABC assessment must be treated and stabilized prior to completing the remainder of the assessment
- Recalls the common causes of lower airway obstruction based on patient's age
- Summarizes how to manage asthma
- Recalls indications for use of relevant drugs in asthma
- Summarizes the goals of post-resuscitation stabilization
- Explains the principles of ongoing assessment

Descriptions and Learning Objectives

Patient: Maria Engel

A 7-year-old patient in the pediatric emergency room has developed acute onset of respiratory distress and chest pain after she fell on her bicycle and the handle struck her chest. The child appears anxious and has difficulty breathing.

Diagnosis: Pneumothorax

Difficulty: Intermediate

Learning Objectives:

- Explains the implications of the initial appearance
- Summarizes how to assess patency of the airway
- Summarizes how to assess breathing
- Summarizes how to assess circulation
- Recalls that a focused history (SAMPLE) is a component of the secondary assessment
- Recalls that effective shock therapy depends on targeting therapy based on the type of shock and the etiology of shock
- Recalls major causes of obstructive shock
- Summarizes the main objective of the management of obstructive (mechanical) shock
- Summarizes the treatment for a tension Pneumothorax
- Summarizes the goals of post-resuscitation stabilization
- Explains the principles of ongoing assessment

Patient: Mona Hope

A 9-month-old infant presents with a 2-day history of low-grade fevers, runny nose and increasing fussiness. She has also developed a rash and vomiting. The infant is unconscious and has developed multiple red-purple lesions on her legs.

Diagnosis: Bacterial Sepsis

Difficulty: Advanced

Learning Objectives:

- Explains the implications of the initial appearance
- Summarizes how to assess patency of the airway
- Summarizes how to assess breathing
- Summarizes how to assess circulation
- Recalls that a focused history (SAMPLE) is a component of the secondary assessment
- Recalls that effective shock therapy depends on targeting therapy based on the type of shock and the etiology of shock
- Implements the algorithm for treatment of septic shock in children
- Summarizes ways to restore perfusion
- Summarizes the importance of rapid, adequate fluid resuscitation on outcome
- Summarizes how to assess the effectiveness of fluid resuscitation
- Summarizes how to manage fluid refractory distributive shock
- Recalls that early administration of antimicrobials (within one hour) is crucial in septic shock

Descriptions and Learning Objectives

Patient: Olivia Mills

Parent brings a 9-month-old infant to the emergency department. The infant was found in the backyard pool after being out of sight. The infant is cyanotic and is not moving.

Diagnosis: PEA

Difficulty: Intermediate

Learning Objectives:

- Implements the pediatric pulseless arrest algorithm
- Implements the ABC approach
- Recalls that rhythm assessment is the next step after ABC
- Recognizes a patient in cardiac arrest
- Recalls recommended CPR compression:ventilation ratio for one and two-persons (healthcare provider)
- Recalls which drugs may be relevant during a pulseless arrest
- Recalls that there are reversible causes of cardiac arrest
- Summarizes the criteria for ROSC
- Summarizes the goals of post-resuscitation stabilization
- Explains the principles of ongoing assessment

Patient: Paula Walton

A 6-year-old child is brought to the emergency department. The child suddenly collapsed on the playground. The child is pale and lifeless.

Diagnosis: VF

Difficulty: Beginner

Learning Objectives:

- Implements the pediatric pulseless arrest algorithm
- Implements the ABC approach
- Recalls that rhythm assessment is the next step after ABC
- Recognizes a patient in cardiac arrest
- Recalls recommended CPR compression:ventilation ratio for one and two-persons (healthcare provider)
- Uses a manual defibrillator correctly
- Recalls recommended defibrillation doses
- Summarizes safety procedures regarding defibrillation
- Recalls which drugs may be relevant during a pulseless arrest
- Summarizes the criteria for ROSC
- Summarizes the goals of post-resuscitation stabilization
- Explains the principles of ongoing assessment

Patient: Rosa Preston

A 5-year-old child is brought to the emergency room with difficulty in breathing. She was found at home with a bottle of lamp oil that she had opened. The child appears anxious and has signs of increased respiratory effort.

Diagnosis: Pneumonia

Difficulty: Advanced

Learning Objectives:

- Summarizes the components of the primary assessment
- Summarizes how to assess patency of the airway
- Summarizes how to assess breathing
- Recalls that pulse oximetry is used to supplement clinical assessment
- Recalls that any life-threatening abnormality detected during the ABC assessment must be treated and stabilized prior to completing the remainder of the assessment
- Recalls the common causes of lung tissue (parenchymal) disease
- Summarizes the management of chemical pneumonia
- Recalls the definition of respiratory failure
- Recalls indications for endotracheal intubation
- Executes ventilation through the tube
- Summarizes the goals of post-resuscitation stabilization
- Explains the principles of ongoing assessment

Patient: Teri Ashley

A 7-year-old child pending surgical resection of a newly diagnosed brain tumor has been brought to the emergency department. She has impaired consciousness, slow breathing and pale skin color.

Diagnosis: Increased ICP

Difficulty: Beginner

Learning Objectives:

- Summarizes the components of the primary assessment
- Summarizes how to assess patency of the airway
- Summarizes how to assess breathing
- Recalls the age appropriate normals of respiratory rate
- Recalls that any life-threatening abnormality detected during the ABC assessment must be treated and stabilized prior to completing the remainder of the assessment
- Recognizes signs and symptoms of disordered control of ventilation
- Summarizes the management of a patient with disordered control of breathing
- Summarizes indications for supported ventilation
- Summarizes how to determine that effective BMV is being delivered
- Summarizes therapy of patient with suspected increased intracranial pressure
- Summarizes the goals of post-resuscitation stabilization
- Explains the principles of ongoing assessment

Patient: Vicky Bloom

A 3-month-old girl is brought to the emergency department because of poor feeding and lethargic behavior that has worsened over the past hours. The infant has increased work of breathing and a pale skin color. The local physician obtained an echocardiogram that showed an enlarged heart with decreased ejection fraction.

Diagnosis: Cardiogenic shock

Difficulty: Advanced

Learning Objectives:

- Explains the implications of the initial appearance
- Summarizes how to assess patency of the airway
- Summarizes how to assess breathing
- Summarizes how to assess circulation
- Recalls that a focused history (SAMPLE) is a component of the secondary assessment
- Recalls that effective shock therapy depends on targeting therapy based on the type of shock and the etiology of shock
- Recalls the definition of cardiogenic shock
- Summarizes the main objectives of the management of cardiogenic shock
- Summarizes how to obtain normovolemia
- Implements ways to improve perfusion
- Recalls inotropes that may be used to treat cardiogenic shock
- Summarizes the goals of post-resuscitation stabilization
- Explains the principles of ongoing assessment

Special Features

Special features in HeartCode PALS

Special Features in HeartCode PALS



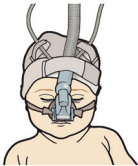
Blood culture

A blood culture is a relevant procedure if bacteremia is suspected and should if possible, be obtained before any antibiotic treatment is initiated.



Capillary blood gas

Since arterial blood gas analysis can be difficult to obtain and cause unwanted agitation in infant and child victims, a capillary blood gas is often preferred.



CPAP

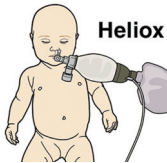
Supplementary oxygen with continuous positive airway pressure (CPAP) should be considered to maximize oxygenation in a wide range of cardiopulmonary emergencies including upper airway obstruction, lung tissue disease and shock.



Examine ears

Examining the ears with an otoscopic procedure might reveal relevant information about possible etiology of an infection.

Special Features in HeartCode PALS



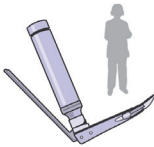
Heliox

Using a mixture of oxygen and helium can decrease airway resistance and work of breathing. This can be considered in a wide range of pulmonary emergencies including croup, asthma and bronchiolitis.



Ice to face

Covering the victim's forehead and eyes without obstructing the airway elicit a vagal response that might terminate a supraventricular tachycardia.



Intubation by airway expert

The program contains patients that require aggressive airway handling but not all providers are expected to perform this. Therefore all profiles enable the learner to have this procedure performed by an airway expert.



Phone cardiology expert

This allows the student to phone the cardiology expert for help. This gives the learner the option to emphasize the need to consult relevant expertise; however there will be no response to this action during the simulation.

Special features in HeartCode PALS



Phone neurosurgical expert

This allows the student to phone the neurosurgical expert for help, giving the learner the option to emphasize the need to consult relevant expertise; however there will be no response to this action during the simulation.



Question the parent

Questioning the parent is of vital importance during the treatment of infant and child victims as they will not be able to provide adequate medical history themselves.



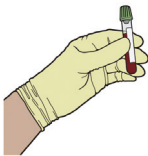
Urine dipstick and culture

A dipstick reveals the presence of nitrite, leukocytes, hemoglobin and glucose in the urine. Subsequently a urine culture is often performed to rule out or diagnose a urinary tract infection.



Use defibrillator with pediatric energies

The defibrillator in the program now supports the selection of energies from 1 to 10 Joules in 1 Joule increments. This allows the selection of energies that are matched to the victim's specific weight.



Venous blood gas

Since arterial blood gas analysis can be difficult to obtain and may cause unwanted agitation in infant and child victims, a venous blood gas test has been added as an alternative.

ACCREDITATION TERMS:

- ACCME/AMA (Physicians) – February 18, 2010 – February 17, 2013
- ANCC (Nurses) – February 18, 2010 – February 17, 2013
- CECBEMS (EMS Practitioners) - February 18, 2010 – February 17, 2013

ACCREDITATION STATEMENTS:

Continuing Medical Education Accreditation - Physicians

The American Heart Association is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

The American Heart Association designates this educational activity for a maximum of 12.00 AMA PRA Category 1 Credits™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

- All faculty participating in CME/CE activities sponsored by The American Heart Association will disclose to the audience (1) significant financial relationships with the manufacturer(s) of products from the commercial supporter(s) and /or the manufacturer(s) of products or devices discussed in their presentation, and (2) unlabeled/unapproved uses of drugs or devices discussed in their presentation. Such disclosures will be made in writing in course presentation materials.

Continuing Medical Education Accreditation – Physician Assistants

AAPA accepts Category I credit from AOACCME, Prescribed credit from AAFP, and AMA PRA Category 1 Credit™ from organizations accredited by ACCME.

Continuing Education Accreditation - Nurses

The American Heart Association is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

The maximum number of hours awarded for this CE activity is 11.74 contact hours.

Continuing Education Accreditation – Emergency Medical Services

This continuing education activity is approved by the American Heart Association, an organization accredited by the Continuing Education Coordinating Board for Emergency Medical Services (CECBEMS), for 12.00 Advanced CEHs, activity number 10-AMHA-F3-0083.

Disclosures for HeartCode PALS:

I. Instructions for Independent Study

Successful completion of this CE activity includes the following:

- (1) Complete the program and the test.
- (2) Complete the course Evaluation form.
- (3) Print Certificate/Statement of Credit.

Accreditation / Disclosure Statements

Disclosure Statement

The American Heart Association must ensure fair balance, independence, objectivity, and scientific rigor in all of its individually sponsored or jointly sponsored educational activities.

Accreditation / Disclosure Statements

Therefore, all faculty and authors participating in continuing education activities sponsored by the American Heart Association must disclose to the audience: (1) any significant financial relationships with the manufacturer(s) of products from the commercial supporter(s) and/or the manufacturer(s) of products or devices discussed in the activity, and (2) unlabeled/unapproved uses of drugs or devices discussed in the activity. The intent of this disclosure is not to prevent an author with a significant financial or other relationship from contributing but rather to provide participants with information with which they can make their own judgments. It remains for the participants to determine whether the author's interests or relationships may influence the content.

I. The following authors have declared NO financial interest(s) and / or affiliations:

Marc Berg, MD
Monica Kleinman, MD
Mark Terry, EMT-P

II. The following faculty have declared NO financial interest(s) and or affiliations:

Mary Fran Hazinski, RN, MSN
Jennifer Ashcraft, RN, BSN, EMT

Unlabeled/unapproved uses of drugs or devices included in this activity

None

Note on Medication Doses

Emergency cardiovascular care is a dynamic science. Advances in treatment and drug therapies occur rapidly. Readers are advised to check for changes in recommended dose, indications, and contraindications in the following sources: Future editions of the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care, and AHA PALS Textbooks as well as the package insert product information sheet for each drug. Clinical condition and pharmacokinetics may require drug dose or interval dosing adjustments. Specific parameters may require monitoring, for example, creatinine clearance or QT interval. Some medications listed in this handbook were scientifically reviewed by the Guidelines evidence-based evaluation process. They may not be available in all countries and may not be specifically approved by the FDA for a particular treatment or application.



American Heart
Association 
Learn and Live

7272 Greenville Avenue
Dallas, Texas 75231-4596
americanheart.org

©2010 American Heart Association and Laerdal Medical AS.
All Rights Reserved. Produced in Denmark. 06/10



Laerdal
helping save lives

Laerdal Medical Corporation
167 Myers Corners Road
Wappingers Falls, New York 12590
Phone: (800) 594-9259
Fax: (800) 227-1143
customerservice@laerdal.com
www.laerdal.com