

2015 Guidelines Summary

HeartSine samaritan® PAD Automated External Defibrillators

This document provides a summary of the 2015 guidelines and how the HeartSine® samaritan® PAD range of products complies with each section of the guidance.

Introduction

Publication of the 2015 American Heart Association (AHA) Guidelines Update for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC) marks 49 years since the first CPR guidelines were published in 1966 by an Ad Hoc Committee on Cardiopulmonary Resuscitation established by the National Academy of Sciences of the National Research Council. Since that time, periodic revisions to the Guidelines have been published by the AHA in 1974, 1980, 1986, 1992, 2000, 2005, 2010, and now 2015.

The 2010 AHA Guidelines for CPR and ECC provided a comprehensive review of evidence-based recommendations for resuscitation, ECC, and first aid. The 2015 AHA Guidelines Update for CPR and ECC focuses on topics with significant new science or ongoing controversy, and so serves as an update to the 2010 AHA Guidelines for CPR and ECC rather than a complete revision of the Guidelines. Updates to Part 5: Adult Basic Life Support and Cardiopulmonary Resuscitation Quality: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care have been minimal but are summarized below. HeartSine's compliance status is also noted where applicable and **Table 1** summarizes the relevant components for adult and pediatric patients.

Trained versus Untrained Users

Untrained Lay Rescuer

Bystander CPR, which may prevent VF from deteriorating to asystole and increases the chance of defibrillation, contributes to preservation of heart and brain function, and improves survival from OHCA. Bystander CPR rates remain unacceptably low in many communities. Because compression-only CPR is easier to teach, remember, and perform, it is preferred for “just-in-time” teaching for untrained lay rescuers. Untrained lay rescuers should provide compression-only CPR, with or without dispatcher assistance. The rescuer should continue compression-only CPR until the arrival of an AED or rescuers with additional training. ***The HeartSine samaritan PAD devices actively encourage bystander CPR and provide metronome and audio-visual feedback to assist a minimally trained operator.***

Trained Lay Rescuer

The 2010 Guidelines recommended that trained rescuers ***should provide rescue breaths*** in addition to chest compressions because they may encounter victims with asphyxial causes of cardiac arrest or they may be providing CPR for prolonged periods of time before additional help arrives. ***The HeartSine samaritan PAD devices allow sufficient time during CPR mode for the user to administer rescue breaths.***

Cardiopulmonary Resuscitation

Early CPR

Begin chest compressions as quickly as possible after recognition of cardiac arrest. The 2010 Guidelines included a major change for trained rescuers, who were instructed to begin the CPR sequence with chest compressions rather than breaths (C-A-B versus A-B-C) to minimize the time to initiation of chest compressions. The 2015 ILCOR BLS Task Force reviewed the most recent evidence evaluating the impact of this change in sequence on resuscitation.

As in the 2010 Guidelines, minimizing interruptions in chest compressions remains a point of emphasis. The 2015 ILCOR systematic review addressed whether shorter compared with longer interruptions in chest compressions influenced physiologic or clinical outcomes. Interruptions in chest compressions can be

intended as part of required care (ie, rhythm analysis and ventilation) or unintended (ie, rescuer distraction). Chest compression fraction is a measurement of the proportion of time that compressions are performed during a cardiac arrest. An increase in chest compression fraction can be achieved by minimizing pauses in chest compressions. The optimal goal for chest compression fraction has not been defined. The AHA expert consensus is that a **chest compression fraction of 80%** is achievable in a variety of settings. **HeartSine devices are compliant with this component of the 2015 guidelines and results from the samaritan PAD 450P Usability Study should be noted as it scored highly on compression fraction and CPR rate compliance as well as time to first shock.**

Components of high-quality CPR include:

- Ensuring chest compressions of adequate rate
- Ensuring chest compressions of adequate depth
- Allowing full chest recoil between compressions
- Minimizing interruptions in chest compressions
- Avoiding excessive ventilation

Many studies have documented inadequate compression rate and depth as the most common errors of resuscitation; both errors may reduce survival. New to this 2015 Guidelines Update are upper limits of recommended compression rate based on preliminary data suggesting that **excessive rate may be associated with lower rate of return of spontaneous circulation (ROSC)**. In addition, an upper limit of compression depth is introduced based on a report associating increased non-life-threatening injuries with excessive compression depth. **HeartSine devices are compliant with this component of the 2015 guidelines as the samaritan PAD 450P and 500P ensure adequate rate is maintained.**

CPR Rate

In adult victims of cardiac arrest, it is reasonable for rescuers to perform chest compressions at a rate of **100 to 120/min**. The addition of an upper limit of compression rate is the result of one large registry study associating extremely rapid compression rates with inadequate compression depth. **HeartSine devices are compliant with this component of the 2015 guidelines.**

CPR Depth

During manual CPR, rescuers should perform chest compressions at a depth of **at least 2 inches or 5 cm** for an average adult, while avoiding excessive chest compression depths (**greater than 2.4 inches [6 cm]**). The addition of an upper limit of compression depth followed review of one publication suggesting potential harm from excessive chest compression depth (greater than 6 cm, or 2.4 inches). Compression depth may be difficult to judge without use of feedback devices, and identification of upper limits of compression depth may be challenging. **HeartSine devices are compliant with this component of the 2015 guidelines and use a different method of determining adequacy of compressions.**

It is reasonable for rescuers to avoid leaning on the chest between compressions to allow full chest wall recoil for adults in cardiac arrest.

Pre-Shock and Post-Shock Pauses

In adult cardiac arrest, total pre-shock and post-shock pauses in chest compressions should be as short as possible. For adults in cardiac arrest receiving CPR without an advanced airway, it is reasonable to pause compressions for **less than 10 seconds to deliver 2 breaths**. In adult cardiac arrest with an unprotected airway, it may be reasonable to perform CPR with the goal of a chest compression fraction as high as possible, with a target of at least 60%. The ERC guidelines state specifically that pre- and post-shock interruptions should be **less than 10 seconds between rounds of CPR**. **HeartSine devices are compliant with this component of the 2015 guidelines as the SAM AED algorithm will re-analyze if CPR is continued during the initial phase of the "analysis period". As the HeartSine samaritan PAD analysis period is less than 15**

seconds for all devices, once CPR is discontinued approximately only a 10 second analysis time will remain and between round of CPR is even lower than 10 seconds.

Use of CPR Feedback Devices

It may be reasonable ***to use audio-visual feedback devices during CPR*** for real-time optimization of CPR performance. ***HeartSine markets both the samaritan PAD 500P and samaritan PAD 450P which provide both metronome and AV feedback.***

AEDs/Defibrillation

Ideally, all BLS providers are trained on use of an AED given that VF and pVT are treatable cardiac arrest rhythms with outcomes closely related to the rapidity of recognition and treatment. Survival in victims of VF/pVT is highest when bystanders deliver CPR and defibrillation is attempted ***within 3 to 5 minutes*** of collapse. Accordingly, in 2010, the AHA recommended that BLS providers immediately apply an AED in witnessed OHCA or for monitored patients who develop IHCA. In 2015, the review focused on (1) the evidence surrounding the clinical benefit of automatic external defibrillators in the out-of-hospital setting by laypeople and healthcare providers, and (2) the complex choreography of care needed to ensure high-quality CPR and effective defibrillation. ***Not only are HeartSine devices compliant with this component of the 2015 guidelines, one of HeartSine's aims in public access environment is to ensure a fast shock delivery time.***

For witnessed adult cardiac arrest when an AED is immediately available, it is reasonable that the defibrillator be used as soon as possible. For adults with unmonitored cardiac arrest or for whom an AED is not immediately available, it is reasonable that CPR be initiated while the defibrillator equipment is being retrieved and applied and that defibrillation, if indicated, be attempted as soon as the device is ready for use.

Analysis of Rhythm during Compressions

The 2015 ILCOR systematic review addressed whether analysis of cardiac rhythm during chest compressions compared with analysis of cardiac rhythm during pauses in chest compressions affected resuscitation outcomes. Although the performance of chest compressions during AED rhythm analysis would reduce the time that CPR is paused, motion artifacts currently preclude reliable AED assessment of heart rhythm during chest compressions and may delay VF/pVT identification and defibrillation. There is ***insufficient evidence to recommend the use of artifact-filtering algorithms*** for analysis of ECG rhythm during CPR. Their use may be considered as part of a research protocol or if an EMS system, hospital, or other entity has already incorporated ECG artifact-filtering algorithms in its resuscitation protocols. ***HeartSine devices are compliant with this component of the 2015 guidelines as currently no artifact-filtering algorithms are enabled using the ECG.***

Chest Compression Resumption Following a Shock

It may be reasonable to ***immediately resume chest compressions*** after shock delivery for adults in cardiac arrest in any setting. ***HeartSine devices are compliant with this component of the 2015 guidelines as all samaritan PAD models encourage immediate resumption of CPR following shock delivery.***

Defibrillation on Aircraft

The special circumstances chapter provides the evidence under-pinning the ERC recommendation that AEDs should be ***mandatory on board all commercial aircraft in Europe***, including regional and low-cost carriers. ***HeartSine is in full support of this component of the 2015 guidelines and supply a number of airlines.***

Table 1 – Summary of High-Quality CPR Components for BLS Providers

Component	Adults and Adolescents	Children (Age 1 Year to Puberty)	Infants (Age Less than 1 Year Excluding Newborns)
Scene Safety	Make sure the environment is safe for rescuers and victim		
Recognition of Cardiac Arrest	<ul style="list-style-type: none"> • Check for responsiveness • No breathing or only gasping • No definite pulse felt within 10 seconds 		
Activation of Emergency Response	<p>If you are alone with no mobile phone, leave the victim to activate emergency response system and get the AED before beginning CPR</p> <p>Otherwise send someone and begin CPR immediately; use the AED as soon as it is available</p>	<p>Witnessed Collapse</p> <ul style="list-style-type: none"> • Follow steps for adults and adolescents <p>Unwitnessed Collapse</p> <ul style="list-style-type: none"> • Give 2 minutes of CPR • Leave the victim to activate emergency response system and get the AED • Return to the child or infant and resume CPR use the AED as soon as it is available 	
Compression-Ventilation Ratio without Advanced Airway	1 or 2 rescuers 30:2	1 rescuers 30:2 2 or more rescuers 15:2	
Compression-Ventilation Ratio with Advanced Airway	<ul style="list-style-type: none"> • Continuous compressions at a rate of 100-120/min • Give 1 breath every 6 seconds (10 breaths/min) 		
Compression Rate	100-120/min		
Compression Depth	At least 2 inches (5 cm)	At least 1/3 AP diameter of chest about 2 inches (5 cm)	At least 1/3 AP diameter of chest about 1.5 inches (4 cm)
Hand Placement	2 hands on the lower half of the sternum	2 hands or 1 hand (optional for very small child) on the lower half of the sternum	1 rescuer 2 fingers in the center of the chest, just below the nipple line 2 or more rescuers 2 thumb-encircling hands in the center of the chest, just below the nipple line
Chest Recoil	Allow full recoil of chest after each compression, do not lean on the chest after each compression		
Minimizing Interruptions	Limit interruptions in chest compressions to less than 10 seconds		

Conclusion

HeartSine can therefore conclude that its AEDs are fully compliant with the 2015 ERC and AHA guidelines.