

## CPR Advisor™ ICG technology

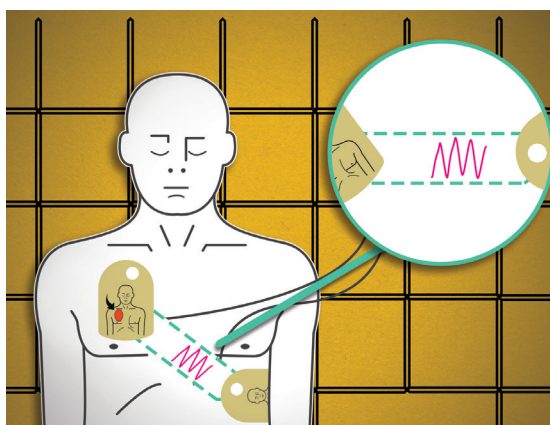
### Overview

When CPR treatment is provided to a victim of sudden cardiac arrest, it is vital the chest compressions are of a good quality. If the quality of the CPR provided is good, the chances of successfully resuscitating a patient are greatly increased.<sup>1</sup>

Research has demonstrated that non-professional responders regularly provide ineffective CPR due to inexperience.<sup>2,3</sup>

HeartSine samaritan PAD 500P (SAM 500P) with CPR Advisor provides real-time feedback to the rescuer on the force and rate of the CPR they are providing to the victim during a sudden cardiac arrest (SCA) resuscitation. The SAM 500P uses both audible and visual feedback to provide instructions to the rescuer.

CPR Advisor provides feedback to the rescuer on the force and rate of compressions the rescuer is providing to the victim via the defibrillator electrodes, without the addition of accelerometers (or pucks).



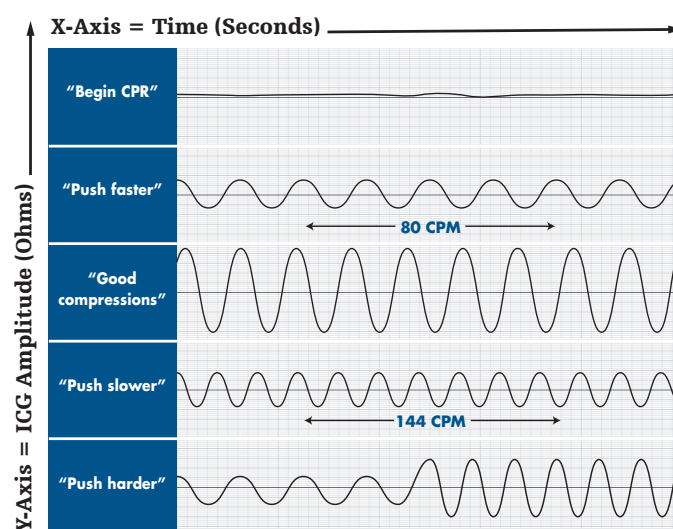
**Figure 1.** HeartSine's defibrillator detects changes in patient impedance.

### How CPR Advisor works

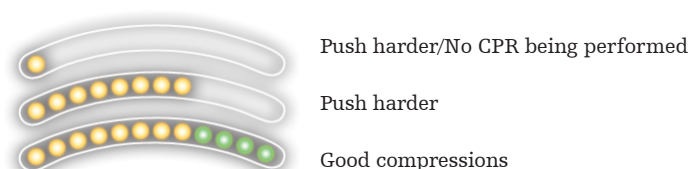
When a patient collapses and a rescuer performs CPR, the compressions applied by the rescuer cause the patient's chest to change shape and result in a change to the patient's ICG (impedance cardiogram) waveform.<sup>4</sup> CPR Advisor captures the change in the ICG waveform which it uses to count the number of compressions a rescuer administers and identify the quality of the compressions being applied.

By counting deflections in the ICG waveform, CPR Advisor determines the compression rate and advises the rescuer to "Push faster" if the compression per minute (CPM) rate is below that recommended by the ERC/AHA guidelines. Likewise, if the rescuer's CPM rate is greater than that recommended by the ERC/AHA guidelines, CPR Advisor will tell the rescuer to "Push slower" (see Figure 2).

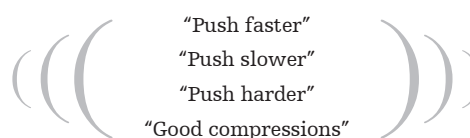
When the rescuer compresses the patient's chest, the amplitude of the deflection is reflected on the ICG waveform. The greater the amplitude, the greater the deflection. CPR Advisor measures the change in impedance and uses this to determine the appropriate feedback to the rescuer; advising the rescuer to "Push harder" or acknowledging "Good compressions" (see Figures 3 and 4).



**Figure 2.** CPR Advisor determines compression quality to advise rescuer.



**Figure 3.** Visual indicators let the user know if effective CPR is administered.



**Figure 4.** Voice prompts let the user know if chest compressions are being given correctly. Aural "clicks" help the user keep time.

This real-time feedback is important as even though most trained rescuers understand the need to push hard and push fast, rescuer fatigue may set in after as little as one minute, resulting in slower compression rates.<sup>5,6</sup> The SAM 500P provides feedback to the rescuer via both visual indicators on the SAM 500P user interface and audible voice prompts.

A widely accepted standard for measuring efficacy, or effectiveness, of CPR is End Tidal CO<sub>2</sub>; that is, measuring the amount of carbon dioxide (CO<sub>2</sub>) exhaled by the patient. CPR Advisor has been demonstrated to correlate very well with the End Tidal CO<sub>2</sub> measurement, as well as other vital signs, demonstrating that this technology is a strong indicator of CPR efficacy.<sup>[4,7-11]</sup>

## Improved CPR efficacy

Effective CPR, provided alone or together with a lifesaving shock, can increase the chance of survival.<sup>12</sup> CPR Advisor, in conjunction with the metronome, is intended to help rescuers perform CPR in line with the ERC/AHA guidelines by monitoring their real-time CPR performance and providing feedback to guide them to perform quality CPR.

Integrated CPR Advisor helps improve compliance with resuscitation guidelines. And because CPR Advisor is integrated within HeartSine SAM 500P, a lifesaving shock can be delivered if needed.

## References

1. Christenson J, Andrusiek D, Everson-Stewart S, et al. Chest compression fraction determines survival in patients with out-of-hospital ventricular fibrillation. *Circulation*. 2009;120:1241-1247.
2. Gyllenborg T, Granfeldt A, Lippert F, et al. Quality of bystander cardiopulmonary resuscitation during real-life out-of-hospital cardiac arrest. *Resuscitation*. 2017;120:63-70.
3. White AE, Ng H, Ng W, et al. Measuring the effectiveness of a novel CPRcard feedback device during simulated chest compressions by non-healthcare workers. *Singapore Med J*. 2017;58:438-445.
4. Howe A, O'Hare P, Crawford P, et al. An investigation of thrust, depth and the impedance cardiogram as measures of cardiopulmonary resuscitation efficacy in a porcine model of cardiac arrest. *Resuscitation*. 2015;96:114-120.
5. Heidenreich JW, Berg RA, Higdon TA, et al. Rescuer fatigue: standard versus continuous chest-compression cardiopulmonary resuscitation. *Academic Emergency Medicine*. 2006;13(10):1020-1026.
6. Ochoa FJ, Ramalle-Gómara E, Lisa V, et al. The effect of rescuer fatigue on the quality of chest compressions. *Resuscitation*. 1998;37:149-152.
7. Di Maio R, O'Hare P, McAlister O, et al. The correlation between the impedance cardiogram and end-tidal carbon dioxide during cardiopulmonary resuscitation in a porcine model of cardiac arrest. *Resuscitation*. 2014;85:1:S6.
8. Di Maio R, Howe A, McCann P, et al. Is the impedance cardiogram a potential indicator of effective external cardiac massage in a human model? A study to establish if there is a linear correlation between the impedance cardiogram and depth in a cardiac arrest setting. *Resuscitation*. 2012;83:62.
9. Di Maio R. The impedance cardiogram is an indicator of CPR effectiveness for out-of-hospital cardiac arrest victims. *Am J Cardiol*. 2010;55:A217.E2062.22.
10. Brody D, Di Maio R, Crawford P, et al. The impedance cardiogram amplitude as an indicator of cardiopulmonary resuscitation efficacy in a porcine model of cardiac arrest. *Am J Cardiol*. 2011;57:E1134.
11. Cromie NA, Allen JD, Navarro C, et al. Assessment of the impedance cardiogram recorded by an automated external defibrillator during clinical cardiac arrest. *Crit Care Med*. 2010;38(2):510-7.
12. Meaney PA, Bobrow BJ, Mancini ME, et al. Written on behalf of the CPR Quality Summit Investigators, the American Heart Association Emergency Cardiovascular Care Committee, and the Council on Cardiopulmonary, Critical Care, Perioperative and Resuscitation. CPR quality: improving cardiac resuscitation outcomes both inside and outside the hospital: a consensus statement from the American Heart Association. *Circulation*. 2013;128:1-19.

All claims valid as 01/2025.

For further information, please contact your Stryker representative or visit our website at [stryker.com](http://stryker.com)

## Emergency Care Public Access

AED users should be trained in CPR and in the use of the AED. Although not everyone can be saved, studies show that early defibrillation can dramatically improve survival rates. AEDs are indicated for use on adults and children. AEDs may be used on children weighing less than 25 kg (55 lb) but some models require separate defibrillation electrodes.

The information presented is intended to demonstrate Stryker's product offerings. Refer to operating instructions for complete directions for use indications, contraindications, warnings, cautions, and potential adverse events, before using any of Stryker's products. Products may not be available in all markets because product availability is subject to the regulatory and/or medical practices in individual markets. Please contact your representative if you have questions about the availability of Stryker's products in your area. Specifications subject to change without notice.

Stryker or its affiliated entities own, use, or have applied for the following trademarks or service marks: CPR Advisor, HeartSine, samaritan, Stryker. All other trademarks are trademarks of their respective owners or holders.



HeartSine samaritan PAD is a class III – 0123 device in accordance with EU MDR.

0123



HeartSine samaritan PAD: UL Classified. See complete marking on product.

Date of issue: 01/2025

EN-UK

Made in U.K.

HeartSine SAM 500P is not available for sale in the U.S.

EC-HS-FACT-1551200\_REV-0\_en\_gb

Copyright © 2025 Stryker.



HeartSine Technologies, Ltd.  
207 Airport Road West  
Belfast  
Northern Ireland  
BT3 9ED  
United Kingdom  
Tel +44 28 9093 9400  
[heartlinesupport@stryker.com](mailto:heartlinesupport@stryker.com)  
[heartline.com](http://heartline.com)