



ICPR FACT SHEET

Intelligent Technology, Effective CPR



2015 ERC / AHA Guidelines for CPR

The European Resuscitation Council (ERC) and American Heart Association (AHA) determined that "... high quality CPR improves survival from cardiac arrest"¹ and highlights the following important criteria to define high quality CPR for patients 8 years and older.

- ✓ **Ensuring compressions of adequate rate:** between 100 – 120 compressions per minute
- ✓ **Ensuring compressions of adequate depth:** between 5 - 6 cm (2 – 2.4 inches)
- ✓ **Allowing full chest recoil during compressions**

Why do I need the Powerheart® G5 AED with ICPR?

Delivering high quality CPR in accordance with these ERC / AHA guidelines can be difficult, especially in stressful rescue situations. To help both professional and lay rescuers deliver the best quality CPR, the Cardiac Science Powerheart® G5 AED can be equipped with the ICPR system. The ICPR system is a unique motion sensor and a proprietary algorithm that, when placed on the chest, monitors the rescuer's CPR compressions. If the compressions deviate from ERC / AHA guidelines, the AED will provide voice and text corrective prompts to help the rescuer correct errors and provide the best CPR possible.



The Cardiac Science Powerheart® G5 AED with ICPR is the only AED that provides active coaching on all three criterias of the ERC / AHA guidelines for effective CPR!

Rate of Compressions

Voice and text prompts provide rescuers with CPR instruction that helps achieve compression rate targets. With the G5 ICPR sensor, corrections are provided when compressions are outside the critical criteria. This powerful combination of coaching and feedback ensures compressions are performed at the correct rate.

- Text and loud voice prompt coach the rescuer to **“press, press, press...”** at the target rate.
- The word **“press”** can be replaced by a loud tone, if desired.
- If the ICPR system detects an error in the rate of CPR, a text prompt and loud voice from the AED will prompt **“Press Faster”** or **“Press Slower.”**

This easy-to-understand approach helps to ensure compressions are delivered at the right pace without the rescuer having to rely solely on the AED display, or keep pace with flashing LEDs to determine the proper pace, as with some other devices. During CPR, the rescuer should be focused on the victim; not the AED.

Competitive Devices²

Defibtech AEDs (Lifeline, View and Reviver):

No corrective prompts.

HeartSine 500P: Provides compression rate via flashing LED and voice prompts.

Philips AEDs: No corrective prompts.

Physio Control CR Plus: Metronome only, no corrective prompts.

Zoll AED Plus: Metronome only, no corrective prompts.

Powerheart® G5 ICPR Feedback: Rescuer providing slow compressions



Depth of Compressions

The ICPR system utilises a non-slip, motion-sensing disc, placed in the centre of the chest, to monitor the depth of compressions.

- If the rescuer is not pressing hard enough, a text prompt and loud voice from the AED will prompt **“Press harder and fully release”**.
- If the rescuer is pressing too hard, they will hear the prompt **“Press softer.”**

Pressing too hard? Not pressing hard enough? This feedback system helps the rescuer achieve the required 5 - 6 cm (2 inch - 2.4 inch) compression depth, and ensures the rescuer can receive important corrective prompts without having to monitor the movement of a metre on an AED as with some other devices. Again, focus on the victim; not on the AED.

Competitive Devices²

Defibtech AEDs (Lifeline, View and Reviver): No corrective prompts.

HeartSine 500P: ‘Push harder’ prompts for depth only, no corrective prompts if pressing too hard.

Philips FRx: No corrective prompts for compression depth.

Physio Control CR Plus: No corrective prompts for compression depth.

Zoll AED Plus: “Press harder” prompts only. Compression metre on AED (rescuer must look at AED to monitor).

Powerheart® G5 ICPR Feedback: Compressions that are too deep



Chest Recoil

The ICPR system also monitors if the rescuer does not fully release the compression.

- If the ICPR system detects this error, the rescuer will receive a text prompt and loud voice prompt to **“Press harder, and fully release.”**

ERC / AHA point out in their 2015 guidelines³, “Observational studies indicate that leaning (on the chest wall) is common during CPR in adults and children.”¹ It is critical to prevent this common error in CPR, since the ERC / AHA also reports “Leaning on the chest wall between compressions precludes full chest wall recoil. . .and could potentially influence resuscitation outcomes.”¹

Competitive Devices²

Defibtech AEDs (Lifeline, View and Reviver): No corrective prompts to allow proper chest wall recoil.

HeartSine AEDs: No corrective prompts to allow proper chest wall recoil.

Philips AEDs: No corrective prompts to allow proper chest wall recoil.

Physio Control AEDs: No corrective prompts to allow proper chest wall recoil.

Zoll AED Plus: may be configured to display the FULLY RELEASE text prompt to remind the user to lift the hands off the chest.

Powerheart® G5 ICPR Feedback: Chest recoil



Why is depth, rate and recoil important when performing CPR?¹

Chest Compression Rate

In adult victims of cardiac arrest, it is reasonable for rescuers to perform chest compressions at a rate of **100 to 120/min**.

Why Does it Matter?⁴

- Number of chest compressions delivered per minute during CPR is an important determinant of return of spontaneous circulation (ROSC) and survival with good neurologic function.
- More compressions are associated with **higher survival rates**, and fewer compressions are associated with lower survival rates.
- Excessive compression rate and depth adversely affect outcomes.

Chest Compression Depth and Recoil

Rescuers should perform chest compressions to a depth of at least **5 cm (2 inches)** for an average adult, while avoiding excessive chest compression depths (**greater than 6 cm [2.4 inches]**). And, allowing complete chest recoil after each compression.

Why Does it Matter?⁵

- Compressions create blood flow primarily by increasing intrathoracic pressure and directly compressing the heart, which in turn results in critical blood flow and oxygen delivery to the heart and brain. Rescuers often do not compress the chest deeply enough despite the recommendation to “push hard.”
- Compression depth may be difficult to judge without use of feedback devices.
- To allow full chest wall recoil after each compression, rescuers must avoid leaning on the chest between compressions.

Rescuers Should⁶

Perform chest compressions at a rate of 100-120/min

Compress to a depth of at least 5 cm (2 inches)

Allow full recoil after each compression

Minimise pauses in compressions

Ventilate adequately (2 breaths after 30 compressions, each breath delivered over 1 second, each causing chest rise)

Rescuers Should **Not**

Compress at a rate slower than 100/min or faster than 120/min

Compress to a depth of less than 5 cm (2 inches) or greater than 6 cm (2.4 inches)

Lean on the chest between compressions

Interrupt compressions for greater than 10 seconds

Provide excessive ventilation (ie, too many breaths or breaths with excessive force)



Conclusion:

The ICPR system, available on the Cardiac Science Powerheart® G5 AED, provides important corrective prompts in all three key dimensions of effective CPR as defined by the ERC and AHA: rate, depth, and recoil of chest compressions. It's the only AED to identify and correct errors in all three of these dimensions, and as such is the most comprehensive CPR monitoring and correction system available on an AED today.

You can learn more by visiting cardiacscience.co.uk/cpr, or contacting your Cardiac Science sales representative.

Resources:

1. Kleinman et al. Part 5: adult basic life support and cardiopulmonary resuscitation quality: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation*. 2015;132(suppl 2):S414–S435.
European Resuscitation Council Guidelines for Resuscitation 2015 Section 2. Adult basic life support and automated external defibrillation
2. Defibtech: Lifeline DDU-100-120, DAC-A581-EN-DF, Reviver DDU-100-120, DAC-A581-EN-DF, VIEW DDU-2000 Series DAC-A2510EN-BG, , Heartsine: H032-019-600-2 US SAM 350P 360P 450P User Manual 2017, Philips: Philips HeartStart OnSite Defibrillator - Owners Manual M5066A Edition 14 & Philips HeartStart FRx Defibrillator Owners Manual 861304 Edition 13, Physio Control: LifePak CRPlus_Express Operating Instructions PN3201686-015 07-14, Zoll AED Plus: ZOLL Operators Manual - 9650-0301-01-SF_YA
3. Hazinski, M.F. et. al., (2015). Highlights of the 2015 American Heart Association Guidelines Update for CPR and ECC. The American Heart Association, (1), Chest Recoil, p. 7
4. Hazinski, M.F. et. al., (2015). Highlights of the 2015 American Heart Association Guidelines Update for CPR and ECC. The American Heart Association, (1), Chest Compression Rate, p. 7
5. Hazinski, M.F. et. al., (2015). Highlights of the 2015 American Heart Association Guidelines Update for CPR and ECC. The American Heart Association, (1), Chest Compression Depth, p. 7
6. Hazinski, M.F. et. al., (2015). Highlights of the 2015 American Heart Association Guidelines Update for CPR and ECC. The American Heart Association, (1), Emphasis on Chest Compressions, p. 8



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