

The HeartStart OnSite* Defibrillator

Unsurpassed Ease of Use for Better Rescue Success

For a lay-responder, helping save the life of a victim of cardiac arrest depends on performing a number of complex “Chain of Survival” tasks effectively and efficiently under stress. Success requires:

- Summoning EMS
- Using an AED correctly (particularly pad placement and the delivery of a shock with minimal delay)
- Performing CPR

The best chance for successful resuscitation depends on effectively performing all these tasks. Failure to perform any can reduce the chance of survival. The goal, then, is to competently and consistently complete all the steps of the chain of survival, not just fast first shock delivery.

Yet in an unexpected and stressful emergency, an inexperienced lay responder’s ability to reason, recall training, make decisions, and perform can be impaired. Laypeople may hesitate to respond for fear of making mistakes.

Published studies show that the human factors designed into an AED can either help or hinder a stressed responder in performing the above success-determining tasks.

What does the data show?

The results of several studies indicate that the Philips HeartStart OnSite Defibrillator is best-in-class at helping lay-responders perform all of the above tasks, enabling a consistently successful rescue effort. This may lead to improved survival. Below is a summary of results from those studies.

Fleischhackl, et al. Differing Operational Outcomes with Six Commercially Available Automated External Defibrillators. Resuscitation 62 (2004) 167-174.

Six AEDs were assessed for ease of use using 90 untrained test responders simulating rescues on manikins. Time to shock, CPR execution, pad placement, and clarity of instruction were evaluated. Data suggests that among the AEDs studied, the OnSite offers lay-responders the best chance for overall success. OnSite demonstrated:

- The highest percentage of cases where responders actually provided CPR (14 out of 15; almost 3x that of Medtronic CR+). Authors point out a 90% risk reduction for OnSite, compared to CR+!
- The highest rate of correct pad placement @100%.
- A rapid time-to-first-shock.
- Evidence of clarity in human factors, leading to consistently more effective responder behavior.
- Better rescue effort success when weighing *all* the success factors as a whole, not just simply time to shock.

For every defibrillator tested *except the OnSite*, there were instances of catastrophic mistakes or confusion that prevented the delivery of an effective shock. In some cases, no shocks were delivered at all. Such mishaps would likely prevent patient resuscitation. Mishaps with the other defibrillators included:

- Responders uncertain of proper pad placement (Cardiac Science Powerheart, Access Cardio AED, CR+, Schiller Fred Easy, Zoll AED+)
- Pads placed in incorrect positions (CR+, Powerheart, Access Cardio)
- Pads left in the package (Powerheart)
- Liners left on pads (Powerheart, AED+)
- Pads placed over clothing (AED+)
- Inadvertent powering off of the defibrillator (Fred Easy)
- User confusion to the point of giving up (AED+)

In contrast, the authors say this about the OnSite: “All users...did exactly what the device prompted. The recommended heart compression rate given by the metronome was appreciated by the volunteers. Mouth to mouth ventilation was explained precisely as well as chest compression.”

Snyder. Time to Shock vs Voice Prompt Duration: Optimization of Defibrillators for Public Access and Home Deployment. 6th Scientific Congress of the European Resuscitation Council, Oct 2002

This study showed that refinements in AED human factors can improve survival. Specifically, more detailed instructions regarding pad placement, given at a deliberate pace, may result in more successful resuscitations even with a somewhat longer time to first shock. OnSite design reflects this approach and reinforces the results of the above Fleischhackl study, where the CR+ was faster, but the OnSite was more successful.

Andre, et al. Automated External Defibrillator Use by Untrained Bystanders: Can the Public-use Model Work? Prehospital Emergency Care 2004;8:284-291

This study, assessing ease of use of the Philips OnSite, Zoll AED Plus, Cardiac Science Powerheart, and Medtronic CR+, showed:

- Superior pad placement for OnSite responders, impacting the ability to successfully defibrillate.
 - Half the Zoll responders and almost half the Cardiac Science responders (7 of 16) did not apply the pads directly on the skin, including pads packages not opened, liners not removed, or pads placed over clothing. There were no such occurrences with the OnSite.
 - 56% of CR+ responders placed the pads side by side on the chest. This can reduce defibrillation efficacy. Only one OnSite responder did this.
- Almost a third of CR+ responders (5 of 16) inadvertently pulled the pads cable connector from the socket when opening the pads package handle. Some of those who did were not sure how to re-insert the connector into the socket, thereby ending the rescue attempt.
- Over half of Zoll responders (9 of 16) and a quarter of Cardiac Science responders were never able to shock the manikin.
- In contrast, all of the OnSite responders successfully delivered a shock.
- Three of four Cardiac Science responders who failed to remove the pads liner were still instructed to deliver a shock, though the energy delivered would likely be impaired.

- Time to shock was similar for OnSite and CR+, both significantly faster than Zoll and Cardiac Science.
 - The Zoll took on average 3.5 minutes to deliver a shock, much of that time spent simply trying to turn the device on.
- 14% of CR+ responders were touching the patient at time of shock, raising safety questions about the fully automatic version of this product.
- The authors noted the OnSite's ability to sense the responder's actions and adjust instruction accordingly. With the other devices, instructions were sometimes out of sync with the rescue.

Eames et al. Comparison of Ease of Use of Three Automated External Defibrillators by Untrained Lay People. Resuscitation 58 (2003) 25-30

This study evaluated ease of use for the Medtronic CR+, Zoll AED+, and the OnSite among 24 test users, each trying all the devices.

The OnSite was unsurpassed, with:

- Correct pad placement a leading 96% of the time (Zoll was last, with only 58% correct placement)
- Delivery of therapy in all cases (Zoll was last with therapy delivered by only 75% of responders)
- Top rated user preference (Zoll was rated most difficult)

Some of the same kinds of pad placement errors seen in the above Fleischhackl study were also observed in this study.

It was apparent that there is a learning effect where users with a first experience with one device subsequently perform better when using another device for the first time. And this learning effect is most pronounced among users who started with the OnSite. This may have implications when PAD programs decide which device to train lay responders on, knowing that a responder may be faced with a different device in a rescue situation.

How the OnSite facilitates consistently successful responder performance.

- SMART Pad technology senses where the responder is in the rescue sequence and automatically adjusts the pace and content of voice instructions to match each responder's needs at any given moment.
- Voice instructions like "look carefully at the pictures on the white adhesive pads" and "place pads exactly as shown in the picture", are designed to leave no uncertainty in the responder's mind.
- Step-by-step chain of survival and CPR coaching provides a helping hand for CPR and EMS notification.
- Voice instructions are designed to calm, to give sufficient detail to guide responders smoothly through the response at a deliberate pace, and to not over-stimulate responders beyond their ability to absorb information.

These studies, most of which are peer-reviewed and published in major scientific journals, demonstrate unsurpassed ease of use for the Philips HeartStart OnSite, which could mean better survival.

**The Philips OnSite Defibrillator is also sold as the HeartStart Home Defibrillator and the HeartStart Defibrillator.*

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