

HeartSine® samaritan® PAD

Competitive advantage

Overview

The staff at HeartSine Technologies (HST) have been involved in the field of portable defibrillation since 1967. In fact the world's first portable defibrillator was created in Belfast in 1967 by Professor John Anderson, a founder of HeartSine Technologies. The concept of taking the defibrillator to the patient rather than bringing the patient to the defibrillator is still referred to as the Belfast protocol in many countries today.

The HeartSine samaritan PAD has been designed from the bottom up specifically for use in a public access environment. Many alternative technologies are "scaled down" versions of high end defibrillators used in hospitals by medically trained professionals. Those devices can be large, cumbersome and difficult to use by lay rescuers.

The samaritan PAD has some unique features and class leading performance that make it particularly appropriate for use by lay rescuers in a public access environment. In the high stress environment that exists during a rescue it is very important that the AED is very **easy to quickly use and deploy**. The AED must also be fast in every respect; fast to analyse, fast to charge combining to make it **fast to shock**.

AED maintenance is also an important aspect of the public access environment. The HeartSine samaritan PAD features a unique **Pad-Pak** cartridge that combines the battery and pads in one unit. A study by *Lotfi et al* (1) indicates the low level of usage of AEDs in a school environment and highlights the need for a simple, low maintenance solution while keeping maintenance costs at a minimum.

The samaritan PAD is the most robust AED on the market with an ingress protection rating of **IP56**. Although the AEDs may generally be stored in clean, dry conditions the SCA may occur outside in environmentally challenging environments (dusty and or rainy). The IP56 rating is an indication of the level of protection of the HeartSine product against the ingress of particles (dust, IP5x) and liquid (Powerful water jets, IPx6).

The samaritan PAD is also the **smallest and lightest** fully functional AED on the market. The AED will often have to be taken out of its storage conditions and carried to the site of the Sudden Cardiac Arrest (SCA) quickly. The smaller and lighter devices will make that process much easier. Size and weight is particularly important to many customers and the samaritan PAD is a favoured device with schools (easily lifted and carried by small children), airlines (takes little space in overhead bin and saves fuel) and military (easily transported) customers.

The samaritan PAD 500P also features HeartSine's patented **CPR Advisor®**. CPR Advisor is a fully integrated CPR feedback system offering force and rate feedback using only the defibrillator electrodes and without the limitations of accelerometer based devices.

These features are described in more detail below.

Ease and Speed of Deployment

The HeartSine samaritan PAD has been specifically designed to be easy to use by minimally trained, lay, rescuers. The visual interface of the device is of particular importance in providing clear instruction on how to provide CPR, especially in locations where there may be excessive noise or distractions. The samaritan PAD features three simple illuminated icons to support the comprehensive voice prompts. The three icons give very clear indication of the three main steps performed during a sudden cardiac arrest (SCA) rescue attempt.

An independent study *Andre et al* (2) tested the time to shock for untrained rescuers using a Philips Heartstart Onsite, Zoll AED Plus, Cardiac Science Powerheart and Physio-Control (Medtronic) CR Plus. To complete the study and provide comparative data, HeartSine, in conjunction with an independent referee (*Crispino-O'Connell G*), completed the same testing protocol under the same conditions with a HeartSine samaritan PAD (3). The average time from deployment to shock from the original study was 122 seconds. In the HeartSine device the average time to shock was 77 seconds.

It is worth noting that in the first study the worst case was 210 seconds (Zoll AED plus, the only other device with CPR Advisor function) and the best time to shock was 93 seconds (Physio Control CR Plus). This would indicate that the HeartSine device is easier to use than all the other devices included in the test, and hence more effective. Full details of the studies are attached (2) (3).

Fastest to Shock

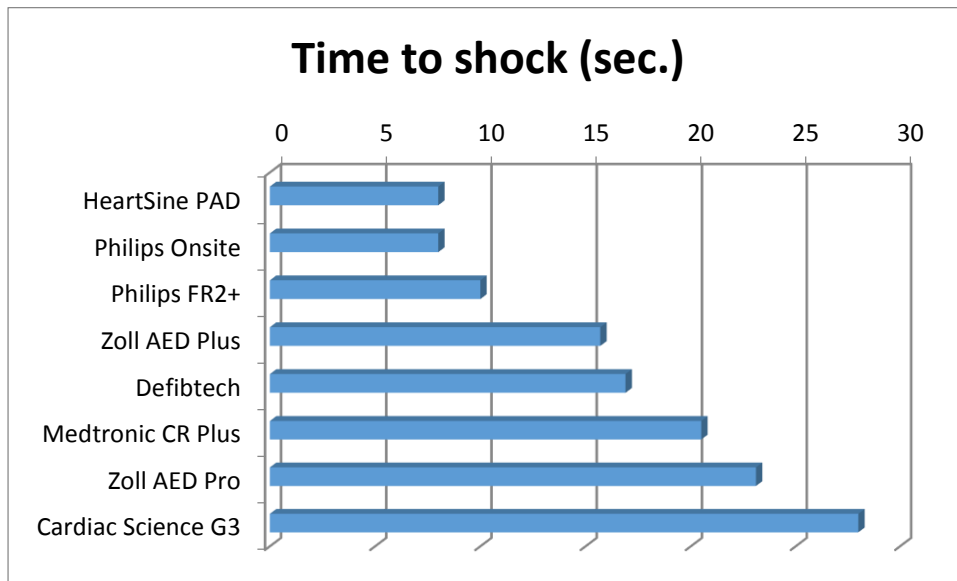
The samaritan PAD uses an intelligent pre-charging mechanism that minimises the time required to analyse the ECG, detect and confirm the presence of a shockable rhythm and to charge the AED in readiness for a life-saving defibrillation shock. This is important both for the first shock and for the peri-shock pause i.e. the pause between stopping CPR and ready to restart CPR.

An independent study by *Yu et al* demonstrated how important it is to minimise interruptions to CPR. (4).

In addition, AHA guidelines 2010 note that *"Defibrillation outcome is improved if interruptions (for rhythm assessment, defibrillation, or advanced care) in chest compressions are kept to a minimum"* and that *"Healthcare providers should interrupt chest compressions as infrequently as possible and try to limit interruptions to no longer than 10 seconds"*.

The peri-shock pause on the HeartSine PADs is typically just 8 seconds. Even from Power-on the HeartSine PADs are ready to shock in typically 12 seconds. Both times are well below the 15 second threshold indicated by *Yu et al* (4).

The graph below shows how HeartSine PADs compare with other technologies.



The unique combination of CPR Advisor and Fast Charge technology makes the HeartSine samaritan PAD 500P a real life saving device.

Combined Pad-Pak

HeartSine's unique Pad-Pak combines the battery and electrode pads into a single cartridge. There are many benefits to the single cartridge including:

- Easy change to special paediatric cartridge for younger children (< 8 years) as optional accessory.
- Instant one-click change of battery during stressful conditions. (Some other AEDs require a screwdriver to replace battery packs)
- Easy maintenance due to the single expiry date means less to manage, inventory and order.
- Automatic detection of the inserted PAD PAK type with adjusted energy levels (50J max for paediatrics according to ERC/AHA)
- Longest life time for electrodes and combined batteries. 4 years for both.
- Lowest costs if the device is not used.

IP56

Ingress protection is a worldwide standard that has been established by the International Electrotechnical Commission (IEC) for rating the ability of electronic devices to withstand exposure to solids and liquids. These IP values are specified in the IEC 60529 standard.

The HeartSine samaritan PAD has the highest rating in the AED industry giving it unparalleled performance in the potentially adverse conditions such as on sports fields or in swimming pools.

CPR Advisor®

Many lay rescuers have little experience with CPR, and even professionals benefit from CPR feedback systems. HeartSine's CPR Advisor, based on revolutionary ICG technology, offers integrated CPR feedback. Using the defibrillation electrodes already attached, the HeartSine system assesses the rate and force of compressions and provides feedback to the rescuer. More importantly the ICG technology is unaffected by flexible or moving surfaces (e.g mattress) that impact the efficacy of accelerometer based CPR feedback systems. AHA guidelines 2010 notes that *"Other CPR feedback devices with accelerometers may overestimate compression depth when compressions are performed on a soft surface such as a mattress because the depth of sternal movement may be partly due to movement of the mattress rather than anterior-posterior (AP) compression of the chest"*

Additional information has been provided to support the efficacy and effectiveness of HeartSine's CPR Advisor feature.

The samaritan PAD is provided with CPR duration according to Singapore guidelines (1 minute CPR between analysis)

Supplementary

In addition to all of the above unique or class leading features and performance the HeartSine samaritan PAD also includes:

- Automatic self-check and ready for use indicator
- Adjustable speaker volume via Saver EVO software
- Integrated memory and very easy data management program, 90 minutes data capacity
- Voice prompt customised for Singapore guidelines (*"If necessary begin CPR"*)
- 10 years warranty
- Accessories
 - Soft case for storage of additional rescue equipment
 - Multi purpose soft case (Can also be used as head support during CPR)
 - User manual and short introduction (Singapore)
 - Data transfer cable for possible guideline updates and data transfer
 - FOC software update and Saver EVO

References

1. *Health Services and Outcomes Research, Cardiac Arrest in Schools.* **Katayoun Lotfi, BS, et al.** 2007, *Circulation*, pp. 1374-1379.
2. *Automated external defibrillator use by untrained bystanders: can the public-use model work?* **Anthony D Andre, Dawn B Jorgenson, Jamie A Froman, David E Snyder, Jeanne E Poole.** 2004, *Prehospital emergency care*, pp. 284-291.

3. *Usability study to assess the ability of randomly selected untrained target users to operate public access defibrillators in the United States.* **P. O'Hare, P. McCanny, H. Torney, G. Crispino, L. Crawford, A. McIntyre, C. McIntyre, DiR. Maio.**

4. *Adverse outcomes of interrupted precordial compression during automated defibrillation.* **Yu T, Weil MH, Tang W, Sun S, Klouche K, Povoas H, Bisera J.** 2002, *Circulation*, pp. 368-372.