Effects of AED Device Features on Performance by Untrained Laypersons

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Device features associated with increased performance rate were not always associated with shorter times to shock. This may reflect benefit of more detailed instructions for untrained users.

Objective

The study evaluates human factors of various AED models. It assesses how these features affect the ease and speed with which a layperson performs a simulated cardiac arrest rescue.

Methodology

A prospective, randomized observational evaluation of six AED models in a simulated rescue, using devices or AED trainers on manikins. Models include Cardiac Science G3, Heartsine PAD, Philips HS1 (OnSite), Physio-Control CR+, WelchAllyn AED 10, and Zoll AED Pro.

Subjects had no previous AED training. Though subjects were instructed to attempt to use a device to "rescue" a manikin simulating a Sudden Cardiac Arrest (SCA) victim, they were not provided with instructions on how to use the device. Each subject used only one device. There were twenty subjects per device.

A scenario was stopped when the subject started performing CPR or 5 minutes had elapsed or the subject expressed a desire to stop. The subject then completed a questionnaire about device operation clarity.

Primary endpoints were success rate at delivering a shock and elapsed time to shock. Secondary endpoints were pad placement accuracy, time to perform other rescue milestones, and user survey responses.

Results

- Philips led all devices in observed device operation success (Figure 1)
  - Only Philips users demonstrated 100% success in turning the device on, attaching the pads on the chest, placing them accurately, and delivering a shock
  - Only Philips achieved a 90% success rate in starting CPR
- Devices that do not provide detailed CPR instructions (Heartsine, Welch Allyn, and Zoll) had lower success rates at starting CPR. Approximately half the responders using those devices did not perform that critical step (26/51)
- Cardiac Science and Zoll subjects were significantly slower to deliver a shock
- Device features associated with rescue success were not always associated with faster time-to-shock. This may be indicative of the benefits of more detailed instructions for untrained users

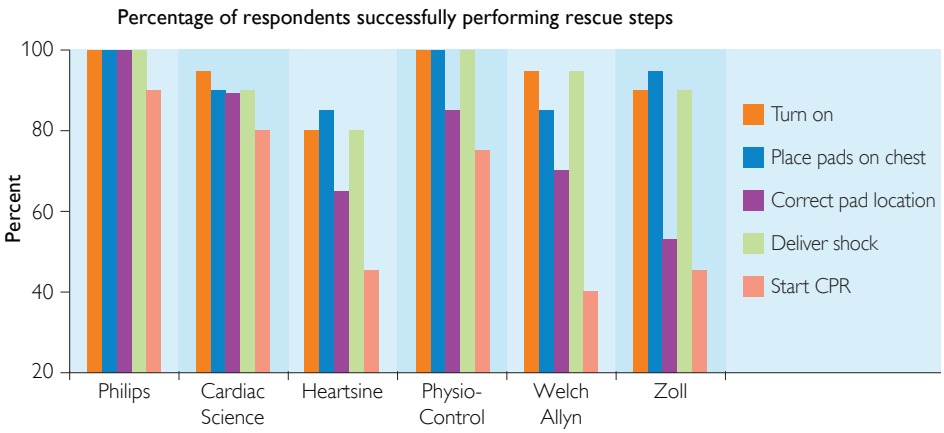

Figure 1: Many SCA patients can be saved if lay persons can perform clinically critical rescue steps effectively. Note that Philips led in observed performance in all categories. Note also the wide variability in pad placement accuracy and starting CPR. Based on table 3 of the manuscript.

PHILIPS

Conclusion

In a simulated cardiac arrest, most untrained users can successfully deliver a shock within three minutes, however pad placement is often inadequate, and CPR is often not started. Device ergonomic features have the most impact on time-to-power-on, pad placement accuracy, and initiation of CPR.

Philips Commentary

These results are consistent with those of three other AED ease-of-use studies,[1,2,3] in which the Philips device also led in observed mission success. These studies demonstrate Philips outstanding ease of use compared to other manufacturers.

The authors point out that inexperienced lay-responders benefit from device features that better ensure that rescuers actually perform steps critical to survival. Philips detailed instructions, paced to the responder's speed, are helpful in ensuring consistent and correct execution of the rescue. This is important for stressed, inexperienced responders because a shock not delivered or CPR not performed seriously compromises survival. And pads placed inaccurately compromises the effectiveness of the shock.

References

1 Andre et al, Prehospital Emergency Care 2004; 8:284-291.
2 Eames et al, Resuscitation 58 (2003); 25-30.
3 Fleischhackl et al, Resuscitation 62 (2004); 167-174.

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www.philips.com/healthcare
healthcare@philips.com
fax: +31 40 27 64 887

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Philips Healthcare
Global Information Center
P.O. Box 1286
5602 BG Eindhoven
The Netherlands