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Emergency Care and Resuscitation

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Effects of AED Device Features on Performance by Untrained Laypersons

Mosesso Jr, V.N. et al. *Resuscitation* 2009.07.016

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 the impact of features of automated external defibrillators (AEDs) on the performance and speed of untrained laypersons to deliver a shock and initiate CPR after a shock. 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 different AED models in a simulated cardiac arrest using trainer AEDs on manikins. Models include Cardiac Science PowerHeart AED G3, Heartsine Samaratan PAD, Medtronic CR Plus, Philips HeartStart Onsite, Welch Allyn AED 10 and ZOLL AED Pro. Subjects had no previous AED or advanced medical training.

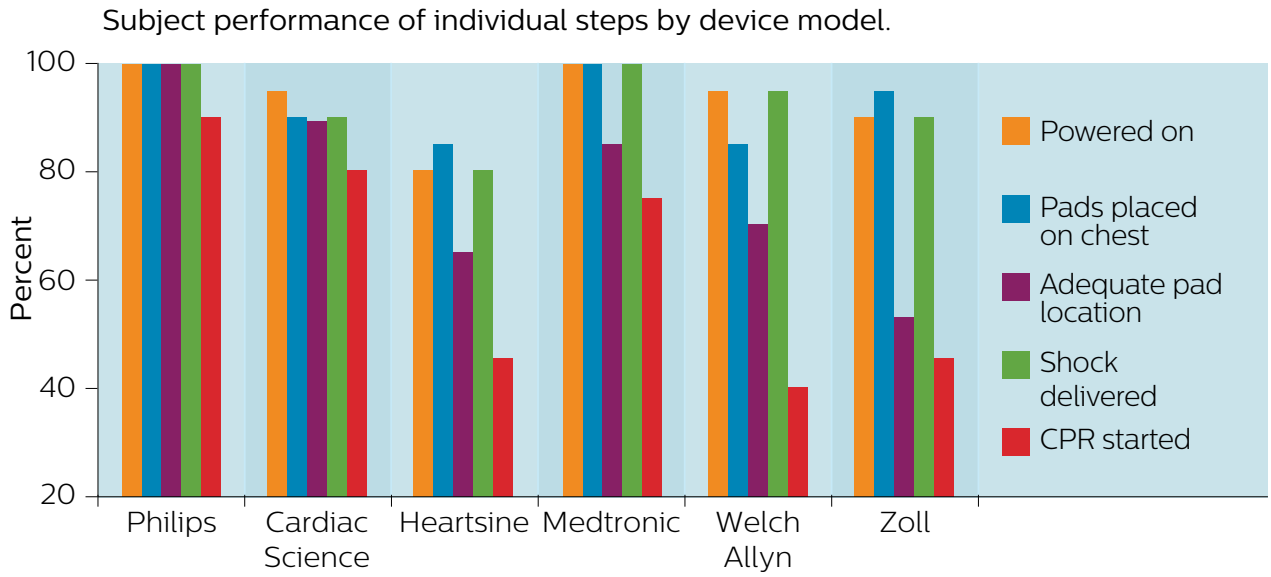

Figure 1: Many cardiac arrest victims who now die can be saved with prompt defibrillation.[1] Note that Philips led in observed performance in all categories. Note also the wide variability in pad placement accuracy and starting CPR. Based on table 3 of the manuscript.

Though subjects were instructed to attempt to use a device to "rescue" a manakin 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, ability to locate and place pads, and voice, text and graphic prompts.

Primary endpoints were shock delivery and elapsed time from start of scenario to shock. Secondary endpoints included time to power-on, time from second rhythm analysis to initiation of CPR, adequacy of pad placement and subject survey responses.

References

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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

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 greatest impact on three actions: powering on device, proper pad placement, and starting CPR after shock.

Philips Commentary

These results are consistent with those of three other AED ease-of-use studies,[2,3,4] in which the Philips device also led in observed mission success. These studies demonstrate Philips 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.[5]

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