Treatment of out-of-hospital cardiac arrest with a low-energy impedance-compensating biphasic waveform automatic external defibrillator.


Purpose
To evaluate defibrillation efficacy of the low-energy, impedance-compensated 150 Joule (J) SMART Biphasic truncated exponential external defibrillation waveform (Philips Medical Heartstream) with long duration VF.

Methods
- Measurement of defibrillation efficacy for the 150 J SMART Biphasic waveform in a multicenter trial of 286 (VF = 100) consecutive out-of-hospital sudden cardiac arrest patients.
- Average time from emergency call to first shock was 9.1 minutes.
- Defibrillation success was defined as termination of VF into either an organized rhythm or asystole, measured 5 seconds after the shock.

Findings
SMART Biphasic performance compared favorably with the body of peer-reviewed literature on high-energy monophasic waveforms, which reported first shock efficacy in the range 63%. With SMART Biphasic:

- 86% of VF episodes were terminated with a single biphasic shock.
- 94% of VF episodes were terminated with < two shocks.
- 97% of VF episodes were terminated with < three shocks.
- 65% of patients had an organized heart rhythm at hand-off to Advanced Life Support or Emergency Department personnel.
- The rapid 44-second interval from power-on to first shock among a wide variety of first responders in this study was substantially faster than the average power-on to first shock time of 1.1 minutes for experienced Emergency Medical Technician responders.

Conclusions
The authors concluded: "the impedance-compensating, low-energy BTE waveform employed in this study's AED consistently terminated long-duration VF as encountered in out-of-hospital SCA. The observed defibrillation rates exceed those of published studies of higher-energy monophasic waveforms. Higher energy is not clinically warranted with this BTE waveform."

*Heartstream ForeRunner; Heartstart FR