

Biphasic versus Monophasic Defibrillators

Implications of American Heart Association Guidelines 2005¹ and the recent ECRI Update²

BIPHASIC IS SUPERIOR TO MONOPHASIC

The 2005 American Heart Association (AHA) Guidelines state that lower energy biphasic shock "...has equivalent or higher efficacy for termination of VF than monophasic waveform shocks..."¹ Because of discrepancies in efficacy between biphasic and monophasic defibrillation waveforms, the AHA also now recommends starting with a first shock energy of 360 joules (J) with monophasic defibrillators.

These determinations on the part of AHA, as well as the growing weight of clinical evidence on which they are based, provide substantial reason to convert to biphasic defibrillator/monitors throughout the hospital.

NEW IMPETUS FOR CONVERTING TO BIPHASIC

Because the AHA now recommends a 360J first shock with monophasic defibrillators, monophasic dosing protocols are now inconsistent with biphasic therapy dosing protocols, which may cause confusion among responders in a mixed monophasic/biphasic environment. Furthermore, biphasic external defibrillation is associated with a superior rate of return of an organized cardiac rhythm following shock administration.³ For reasons of Guidelines consistency and patient care, it is therefore now more advisable than ever to convert to all-biphasic technology.

Exclusive use of biphasic defibrillator/monitors throughout the hospital is the best way to maintain a single, standardized defibrillation protocol that also complies with AHA Guidelines. This strategy provides continuity of care across all hospital settings, using the technology recognized in the Guidelines as most effective (biphasic shock). At equal energy doses biphasic shock provides demonstrably greater efficacy than monophasic⁴ while exposing the heart to about 40% less peak current.⁵

REPLACE AND CONSOLIDATE REMAINING MONOPHASIC DEFIBRILLATORS

In light of such recommendations from the AHA, as well as a growing body of clinical evidence, ECRI (a leading non-profit health services research agency) is now recommending a phased replacement plan for monophasic devices "... so that staff aren't regularly using both kinds of units."² During the phase-out period, monophasic defibrillators may be best concentrated away from areas with a higher risk of sudden cardiac arrest. Conversely, biphasic defibrillators may be most suitable in acute areas or for crash-cart use.

FOCUS ON EASE OF USE AND STANDARDIZATION

ECRI recommends that hospitals standardize on a single manufacturer's biphasic product line.² It recommends choosing a manufacturer based on ease of use, and on whether there is a consistent user interface between different devices in the product line. In order to standardize across an entire health care system, compatibility with the local EMS market is also an important consideration.

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1 Guidelines 2005 for Cardiovascular Resuscitation and Emergency Cardiovascular Care. 2005. *Circulation* 112 (24): IV-37

2 HEALTH DEVICES, ECRI. May 2005; 34 (5): 161-67.

3 van Alem AP, et al. 2003. A prospective, randomized and blinded comparison of first shock success of monophasic and biphasic waveforms in out-of-hospital cardiac arrest. *Resuscitation* 2003; 58: 17-24.

4 Neumann T, et al. Ambulatory electrocardioversion of atrial fibrillation by means of biphasic versus monophasic shock delivery. A prospective randomized study. *Z Kardiol* 2004; 93(5):381-7.

5 Niemann JT, et al. 2005. Intracardiac Voltage Gradients during Transthoracic Defibrillation: Implications for Postshock Myocardial Injury. *Academy Emergency Medicine*. February 2005, Vol 12, No. 2



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