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The new AHA CPR Guidelines address mechanical CPR devices specifically in Part 7 CPR: Techniques and Devices. “Mechanical piston devices” consist of a compressed gas or electric-powered plunger mounted on a backboard used to depress the sternum. Three studies cited in the Guidelines (Dickinson et al., 1998; McDonald, 1982; and Ward et al., 1993) demonstrate improved mean arterial pressure and end-tidal CO₂ during adult cardiac arrest resuscitation using Michigan Instruments, Inc. (MII) piston Thumpers. References cited indicate the addition of a suction cup to the mechanical piston device using FDA-required limited upward force has not demonstrated benefit over manual CPR.

The Guidelines state mechanical piston devices can be considered for use by properly trained personnel in specific settings for treatment of adult cardiac arrest in circumstances that make manual resuscitation difficult. Since 1964, MII customers identified difficult manual CPR circumstances, including:

- Limited physically fit persons available;
- While moving the patient on a spineboard, stretcher, sling, etc;
- While in moving emergency vehicles;
- For large patients;
- When rescuers become fatigued; and
- For long-term CPR, e.g. hypothermia, drug overdose, etc.

Recent studies demonstrate that manual CPR which followed the AHA 2005 CPR Guidelines improves outcomes somewhat (Olasveengen et al., 2009), but studies also show that manual CPR often has serious quality problems, including excessive hands-off fraction and technique drift (Wik et al., 2005; Sugerman et al., 2009). In addition, EMS staff often over-ventilate, and that can reduce survival (Aufderheide et al., 2004).

New requirements for CPR include:

- At least 2” (5 cm) compression depth for adults and children and 1.5” (4 cm) for infants ;
- Compression rate of at least 100/min;
- 50% compression;
- Complete recoil;
- Oxygen inhalation phase of one second;
- 30:2 compression-to-ventilation or continuous compressions with 8 to 10 oxygen ventilations/min.;
- and
- Hands-off time less than 5 seconds.

Life-Stat[®] mechanical piston CPR was introduced in February 2008 as an electronically controlled oxygen-powered system with a built-in automated transport ventilator (ATV). The Life-Stat[®] can deliver 2 inches and more compression depth up to 3.2 inches—always with complete recoil. The compression depth can also be set precisely to 1.5 inches. Adjustable tidal volume pressure-relief oxygen ventilation is coordinated with compressions using a one-second inhalation phase in either 30:2 or continuous compression modes and will not over ventilate.

New rapid deployment and setup methods of the Life-Stat[®] at the patient site include a one-time transfer from manual to mechanical CPR in less than 5 seconds. Thereafter, Life-Stat[®] utilization doesn’t require any interruption. As such, the current Life-Stat[®] is fully compliant with the new 2010 AHA CPR: Techniques and Devices Guidelines.