A TALE OF SEVEN EMS SYSTEMS: AN IMPEDANCE THRESHOLD DEVICE AND IMPROVED CPR TECHNIQUES DOUBLE SURVIVAL RATES AFTER OUT-OF-HOSPITAL CARDIAC ARREST

Tom P Aufderheide, Medical Coll of Wisconsin, Milwaukee, WI; Marvin Birnbaum, Madison Fire Dept, Madison, WI; Charles Lick, Allina Medical Transportation, Anoka County, MN; Brent Myers, Wake County EMS, Raleigh, NC; Laurie Romig, Pinellas County EMS, Largo, FL; Joseph Stothert, Omaha Fire Dept, Omaha, NE; Levon Vartanian, Cypress Creek and Harris County EMS, Cypress Creek, FL

Introduction: Maximizing outcomes after cardiac arrest depends on optimizing a sequence of interventions from collapse to hospital discharge. The 2005 American Heart Association (AHA) Guidelines recommended many new interventions during CPR ('New CPR') including use of an Impedance Threshold Device (ITD).

Hypothesis: The combination of the ITD and 'New CPR' will increase return of spontaneous circulation (ROSC) and hospital discharge (HD) rates in patients with an out-of-hospital cardiac arrest.

Methods: Quality assurance data were pooled from 7 emergency medical services (EMS) systems (Anoka Co., MN; Harris Co., TX; Madison, WI; Milwaukee, WI; Omaha, NE; Pinellas Co., FL; and Wake Co., NC) where the ITD (ResQPOD®, Advanced Circulatory Systems; Minneapolis, MN) was deployed for >3 months. Historical or concurrent control data were used for comparison. The EMS systems simultaneously implemented 'New CPR' including compression/ventilation strategies to provide more compressions/min and continuous compressions during Advanced Life Support. All sites stressed the importance of full chest wall recoil. The sites have a combined population of ~ 3.2 M. ROSC data were available from all sites; HD data were available as of June 2007 from 5 sites (MN, TX, Milwaukee, NE, NC).

Results: A total of 893 patients treated with 'New CPR' + ITD were compared with 1424 control patients. The average age of both study populations was 64 years; 65% were male. Comparison of the ITD vs controls (all patients) for ROSC and HD [Odds ratios (OR), (95% confidence intervals), and Fisher's Exact Test] were: 37.9% vs 33.8% [1.2, (1.02, 1.40), $p=0.022$] and 15.7% vs 7.9% [2.2, (1.53, 3.07), $p<0.001$], respectively. Patients with ventricular fibrillation had the best outcomes in both groups. Neurological outcome data are pending. Therapeutic hypothermia was used in some patients (MN, NC) after ROSC.

Conclusion: Adoption of the ITD + 'New CPR' resulted in only a >10% increase in ROSC rates but a doubling of hospital discharge rates, from 7.9% to 15.7%, ($p<0.001$). These data represent a currently optimized sequence of therapeutic interventions during the performance of CPR for patients in cardiac arrest and support the widespread use of the 2005 AHA CPR Guidelines including use of the ITD.

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