DELIVERY OF CARDIOPULMONARY RESUSCITATION IN THE MICRO-
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INTRODUCTION. The microgravity environment presents several challenges for delivering effective cardiopulmonary resuscitation (CPR). Chest compressions may be driven by muscular force rather than by the weight of the rescuer’s upper torso. Airway stabilization is influenced by the neutral body position, and rescuers will consist of crewmembers of varying sizes and degrees of physical deconditioning from space-flight. Several ACLS CPR designed to accommodate these factors were tested in the one g environment, in parabolic flight, and on a recent shuttle flight.

METHODS. Utilizing study participants of varying sizes, different techniques of CPR delivery were evaluated during a recording CPR manikin to assess adequacy of compressive force and frequency. Under conditions of parabolic flight, methods tested included conventional positioning of rescuer and victim, free-floating “aircraft.” The layperson CPR was adequate but rapidly fatiguing. The CCAD was able to provide adequate compressive force, but positioning was problematic. CONCLUSIONS. Delivery of effective CPR in microgravity will be dependent on adequate rescuer and patient restraint, and rescuer size and preference. Free-floating CPR may be employed as a stop-gap method until patient restraint is available. Development of an adequate CCAD would be desirable to compensate for the effects of deconditioning.

ADVANCED CARDIAC LIFE SUPPORT (ACLS) UTILIZING MAN-TENDED CAPABILITY (MTC) HARDWARE ONBOARD SPACE STATION FREEDOM. M. Smith, M. Barratt, C. Lloyd. NASA and KRUG Life Sciences, Inc. Medical Operations Branch, Johnson Space Center, Houston, Texas 77058.

INTRODUCTION. Because the time and distance involved returning a patient from space to a definitive medical care facility, the capability for Advanced Cardiac Life Support (ACLS) onboard Space Station Freedom is essential. In order to evaluate the effectiveness of terrestrial ACLS training on MTC, a medical team conducted simulations during parabolic flight onboard the KC-135 aircraft. The hardware planned for use during the MTC phase of the space station was utilized to increase the fidelity of the scenario and to evaluate the prototype equipment. Based on initial KC-135 testing of CPR and ACLS, changes were made to the ventilator/defibrillator algorithm to increase the probability of a successful defibrillation. Combined with the ventricular fibrillation algorithm in order to accommodate the space environment. Other constraints to delivery of ACLS onboard the space station include crew size, minimal training, crew deconditioning, and limited supplies and equipment. RESULTS. The delivery of ACLS in microgravity is hindered by the environment, but should be adequate. Factors specific to microgravity were identified for inclusion in the protocol including immediate restraint of the patient and early intubation to insure airway. External cardiac compressions of adequate force and frequency were administered using various methods. The most significant limiting factors appear to be crew training, crew size, and limited supplies. CONCLUSIONS. Although the results of the microgravity environment, future evaluations are necessary to further refine the protocols. Proper patient and medical officer restraint is crucial prior to advanced procedures. Also, emphasis should be placed on early intubation for airway management and drug administration. Preliminary results and further testing will be utilized in the design of medical hardware, determination of crew training, and medical operations for space station and beyond.