DELIVERY OF CARDIOPULMONARY RESUSCITATION IN THE MICROGRAVITY ENVIRONMENT. M. R. Barratt* and R. D. Billica*. KRUG Life Sciences and Medical Operations, NASA Johnson Space Center, Houston, TX

INTRODUCTION. The microgravity environment poses several challenges for delivering effective cardiopulmonary resuscitation (CPR). Chest compressions must be driven by muscular force rather than by the weight of the rescuer's upper torso. Airway stabilization is influenced by the neutral body posture. Survivors will consist of crewmembers of varying sizes and degrees of physical deconditioning from space-flight. Several ACLS protocols 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 by recording a 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 free-floating CPR was adequate but rapidly fatiguing. The CCAD was able to provide adequate compressive force, but positional problems were noted. RESULTS. Delivery of effective CPR in microgravity will be dependent on adequate airway, patient restraint, and rescuer size and preference. Free-floating CPR may be employed as a stop-gap measure until patient restraint is available. Development of an adequate CCAD would be desirable to compensate for the effects of deconditioning.


The CMRS is a prototype system designed and developed for use as a universally deployable medical restraint/workstation on Space Station Freedom (SSF). The Shuttle Transportation System (STS), and the Assured Crew Rescue Vehicle (ACRV) for support of an ill or injured crewmember requiring stabilization and transportation to earth. The CMRS will support all medical capabilities of the Health Maintenance Facility (HMF) by providing a restraint/interfacing system for all equipment (Advanced Life Support packs, defibrillator, ventilator, oxygenerator, vascular access, IV pump, transport monitor, transport aspirator, and intravenous fluids delivery systems), and personnel (patient and crew medical officers). It must be functional within the STS, ACRV, and all SSF habitable volumes. The CMRS will allow for medical capabilities within CPR, ACLS, and ATLS standards of care. This must all be accomplished for a worst case transport time scenario of 24 hours from SSF to a definitive medical care facility on earth. A prototype of the design with success will lead to a full scale CMRS for deployment in the STS/ACRV. Ground based simulations testing will be given. Also, parabolic flight and underwater Weightless Environmental Test Facility evaluations will be demonstrated for various medical contingencies. The final design configuration to date will be discussed with future space program impact considerations.