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. Cardiopulmonary resuscitation (CPR) is a fundamental skill of the health care provider. Chest compressions for CPR can be driven by muscular force, either manually or by mechanical means, or by external devices. Several ACLS 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 utilizing a recording CPR manikin to assess adequacy of compressive force and frequency. Under conditions of parabolic flight, methods included conventional positioning of rescuer and victim, free-floating “aircraft.” The hardware planned for use during the MTC phase of the space station was utilized to increase the fidelity of the simulation equipment. Based on initial KC-135 simulations, CPR and ACLS changes were made to the ventilator (Magillian) to accommodate the environment. RESULTS. The delivery of ACLS in microgravity is hindered by the environment, but should be adequate. Factors specific to microgravity identified for inclusion in the protocol included immediate restraint of the patient and early intubation to insure airway. Cardiac compressions of adequate force and frequency were administered using various methods. The identified limiting factors appear to be crew training, crew size, and limited supplies. CONCLUSIONS. Although ACLS protocols in 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.


INTRODUCTION. Surgical techniques in microgravity are being developed for the Health Maintenance Facility (HMF) on Space Station Freedom (SSF). This will be the presentation of the proposed surgical capabilities and associated hardware and procedural investigations. METHODS. Procedures and prototype hardware, which include a medical restraint system, a surgical overhead isolation canopy, a surgical device, and a regional laminar airflow environment. This was accomplished by realistic surgical simulations involving both mannequins and animals during KC-135 parabolic flight and in a high fidelity ground based HMF mockup. RESULTS. Animal surgery in the environment of microgravity allowed the observation of unique arterial and venous bleeding characteristics for the first time. The ability to control bleeding and prevent cabin atmosphere contamination was also demonstrated. CONCLUSIONS. These procedures and prototype hardware tested provided valuable information and should be investigated and developed further. The use of standard surgical techniques are possible in microgravity if the principles of personnel and supply restraint and operative field containment are adhered to.