

HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Advanced Systems, Technologies, and Innovations for Human Spaceflight (7)

Author: Dr. Raffi Kuyumjian
Canadian Space Agency, Canada

Mr. Patrick Sullivan
Canadian Space Agency, Canada

Ms. Annie Martin
Canadian Space Agency, Canada

Dr. Jean-Marc Comtois
Canadian Space Agency, Canada

ADVANCED CREW MEDICAL SYSTEM (ACMS) FOR EXPLORATION MISSIONS BEYOND LEO

Abstract

As future human spaceflight missions extend beyond Low Earth Orbit (LEO), the greater physical distances and mission durations will result in the inability to quickly return a sick or injured crewmember to definitive medical treatment on Earth, and will make real-time telemedicine interactions impossible for much of the mission due to increased communications time delays (up to 20 minutes each way). There will be limited medical specialist expertise on board, and medical care will likely be provided by non-clinicians. As a result, future exploration-class missions will require the development of medical support technologies that provide the crew with enhanced medical autonomy. In 2013, CSA funded the development of a concept for an Advanced Crew Medical System (ACMS). The ACMS would be an integrated medical system capable of providing medical support to astronauts on future long-duration exploration-class missions. The ACMS would include an Electronic Medical Record (EMR) database to store coded health data captured from peripheral medical devices via Sensor Interface, as well as patient-encounter data acquired by the Crew Medical Officer (CMO) via a user interface. Health data would be analyzed by a Clinical Decision Support System (DSS) consisting of a medical knowledge repository and decision engine in order to determine the health status, predict deleterious outcomes based on trending analysis of Health State models, or to assist a CMO in the diagnosis and treatment of a sick or injured crewmember. The medical knowledge repository would be maintained through regular updates to clinical best practices and clinical guidelines as they become available. The ACMS could also allow for maintenance as well as acquisition of CMO medical skills through, amongst others, an integrated virtual reality (VR) trainer component. The required Critical Technology Elements have been identified for further development and maturation which can be achieved through collaboration with partner agencies, industry and academia. This paper will present the concept of CSA's Advanced Crew Medical System for future exploration-class missions as well as the challenges, the terrestrial benefits and future development.