

MEDICAL SYSTEM CONCEPT OF OPERATIONS FOR MARS EXPLORATION MISSIONS

M. Urbina¹, D. Rubin², M. Hailey², D. Reyes³, and E. Antonsen⁴

¹MEI Technologies, ²KBRwyle, ³Univeristy of Texas Medical Branch, and ⁴Baylor College of Medicine.

ABSTRACT

Future exploration missions will be the first time humanity travels beyond Low Earth Orbit (LEO) since the Apollo program, taking us to cis-lunar space, interplanetary space, and Mars. These long-duration missions will cover vast distances, severely constraining opportunities for emergency evacuation to Earth and cargo resupply opportunities. Communication delays and blackouts between the crew and Mission Control will eliminate reliable, real-time telemedicine consultations. As a result, compared to current LEO operations onboard the International Space Station, exploration mission medical care requires an integrated medical system that provides additional in-situ capabilities and a significant increase in crew autonomy.

The Medical System Concept of Operations for Mars Exploration Missions illustrates how a future NASA Mars program could ensure appropriate medical care for the crew of this highly autonomous mission. This Concept of Operations document, when complete, will document all mission phases through a series of mission use case scenarios that illustrate required medical capabilities, enabling the NASA Human Research Program (HRP) Exploration Medical Capability (ExMC) Element to plan, design, and prototype an integrated medical system to support human exploration to Mars.