

DEVELOPING MISSION SEGMENT-SPECIFIC CLINICAL DATA FOR IMPACT

Christopher Zahner, MD

UTMB Pathology, KBR

Abstract

Space exploration missions represent a significant future objective for NASA's human spaceflight operations for the near and long term. By operating missions during longer periods and over further distances, NASA's mission planning models, hardware systems, and medical capabilities will be stretched beyond their original design constraints. The necessity of medical training and medical supply manifesting for such missions is likely to become incredibly intricate as trade-space analysis is performed over varying mission profiles. For this purpose, IMPACT was created to extend and improve the Integrated Medical Model (IMM) which is used for International Space Station (ISS) medical predications and consists of a probabilistic risk assessment tool that simulates missions to calculate risks given the constraints on crew complement, mission duration and activity (such as Extravehicular Activities), power, communication, mass, volume, and evacuation consideration as well as to predict mission outcomes. Currently, the medical evidence used to support IMPACT remains static, addressing risks of a medical condition and the impacts of the condition during spaceflight only, but is only calculated for a small number of mission parameters. Extended missions will consist of new and varied living environments, changing gravitational loads, and dynamic working requirements. Medical risks are not typically constant but will change depending upon the physical and physiological environment of the body during all phases of a mission. Risks are likely to shift during different mission segments, and understanding how components of a mission profile change risks will assist mission planners to increase chances for mission success.