Abstract

Exploration beyond low Earth orbit requires innovative solutions to support the crew, including assessing the risks and benefits that a complicated medical evacuation (MEDEVAC) poses to the injured crewmember, the crew, and the mission. This qualitative study identifies common MEDEVAC risk assessment principles used in spaceflight and other extreme environments to better inform future risk assessment tools and exploration mission concepts. 20 Semi-structured interviews were conducted with spaceflight and analog domain experts. Transcripts were analyzed using the qualitative method of Thematic Analysis. 18 themes divided concepts into two main categories were identified with the method of Thematic Analysis. 18 themes divided concepts into two main categories were identified for MEDEVAC. These findings expand the mission phase. Decision making has impacts both before the mission, and in real-time. This qualitative nature of the work is its primary limitation. The team had significant prior knowledge of the subject with experts recruited steeply with some known to the team, possibly excluding other perspectives.

Introduction

Spaceflight is inherently dangerous. Currently, proximity to Earth and definitive medical care serve as important backstops for manned spaceflight. Future exploration to the Moon and Mars present many challenges, the least of which will be providing medical care to remote crews with limited resources. These more hazardous and less explored environments make medical evacuation both more likely and more challenging. For these reasons, it is important to develop an understanding of the factors that should impact a MEDEVAC decision. This study seeks to fill this knowledge gap by drawing from the experiences of experts in spaceflight and analog domains.

Methods

• Analog domains determined by mission, MEDEVAC complexity, and isolated medical capability
• In-depth semi-structured interviews with experts
• Audio anonymized, transcribed, and analyzed for emerging themes
• Qualitative thematic analysis using a modified method of consensus, co-occurrence, and comparison with 2 additional reviewers serving as reviewers

Discussion

The 8 Primary Risk Considerations themes can be thought of as the factors of primary importance when actively making a MEDEVAC decision. The 8 Contributing Factors themes can be thought of as the “levers” that can be changed or adjusted before a mission to impact the MEDEVAC risks of a given mission phase. Decision making has impacts both before the mission, and in real-time.

Limitations

This work enumerates themes for spaceflight MEDEVAC risk considerations. Future work should develop objective and quantitative criteria for analysis of future mission profiles.