

Analysis of Advanced Respiratory Support Onboard ISS and CCV

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Introduction

NASA is collaborating with private entities for the development of commercial space vehicles. The Space and Clinical Operations Division was tasked to review the oxygen and respiratory support system and recommend what capabilities, if any, the vehicle should have to support the return of an ill or injured crewmember. The Integrated Medical Model (IMM) was utilized as a data source for the development of these recommendations.

Methods

The Integrated Medical Model (IMM) was used to simulate a six month, six crew, International Space Station (ISS) mission. Three medical system scenarios were considered based on the availability of (1) oxygen only, (2) oxygen and a ventilator, or (3) neither oxygen nor ventilator.

Results

The IMM analysis provided probability estimates of medical events that would require either oxygen or ventilator support. It also provided estimates of crew health, the probability of evacuation, and the probability of loss of crew life secondary to medical events for each of the three medical system scenarios. These IMM outputs were used as objective data to enable evidence-based decisions regarding oxygen and respiratory support system requirements for commercial crew vehicles.

Conclusion

The IMM provides data that may be utilized to support informed decisions regarding the development of medical systems for commercial crew vehicles.