IAF HUMAN SPACEFLIGHT SYMPOSIUM (B3)
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SPACE FOR ALL. PRELIMINARY CONSIDERATIONS FOR ACCESSIBLE MISSIONS.

Abstract

Purpose New space missions aiming to colonise the Moon and Mars are currently being prepared. As such, now is the time for accessible designs and approaches to be implemented to make traditionally inaccessible spaceflight open to all. The purpose of our work is to have open discussions with experts in the field of disability and space exploration, to identify unmet needs and propose potential solutions for accessible spaceflight.

Methodology To begin to address this question, we held a workshop on 19th Sept 2023 for 55 people with disability, carers, people involved with charitable organisations supporting individuals with disabilities and those with an interest in aviation and spaceflight. Attendees were asked to consider the established psycho-physiological barriers to human spaceflight, and discuss the additional needs and adjustments for people with different disabilities to overcome these barriers. The focus was on the different phases of space missions: before (recruitment, training, development of new aids), during (launch and countermeasures) and after (re-entry and recovery).

Results Through the discussions, five categories of potential challenges emerged: medical, physiolog-

ical (brain-muscle-bone), subsistence (food and water), perception (psychological/societal), and technical (safety and logistics). Here, one example per category is reported.

Medical: The reaction of polypharmacy during space missions. This spanned medication use during pre-mission training and its impact on performance requirements, drug assimilation during a mission, and at the different stages of post-mission recovery.

Physiological: the effect of the space environment and altered gravity on neuromuscular health. The goal is to prevent long-lasting additional disability after a space mission. To mitigate muscle wasting, in-flight countermeasures, pre- and post-mission physical training and aids specific to an individual's disability are needed.

Subsistence: the effect of altered gravity on digestion, medicine absorption, and bladder and bowel function during a mission needs further investigation.

Perception: the psychological shock of returning to Earth. Psychological preparation and support before, during and after space missions are critical, given the possibility that the level of physical disability experienced by an individual in space may be lowered compared to Earth, making return more psychologically challenging.

Technical: safety for the entire crew is paramount, and disability-adjusted solutions for egress procedures may be beneficial for everyone.

Conclusions This work provides novel insights from a community that traditionally has been at the margin of spaceflight. A team of different experts is working with this community to address each challenge and find/adapt/design solutions for accessible spaceflight.