

Space Outreach & Human Health



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Introduction & Background

The health benefits of space are not generally well communicated to the general public. Human biological optimisation for space flight as well as the individualised and remote delivery of care to astronauts is increasingly applicable in a terrestrial context.

- The current off-Earth medical model of biometric monitoring and checklist based peer evaluation supported by remote expert telemedicine support may be a solution to many challenges of remote care delivery on Earth.
- The methodology of psychological and physical optimisation prior to flight could be adapted for elective surgery patients.
- The use of biometric monitoring outside of a healthcare setting e.g. O2 sats monitor with remote nursing oversight, has exponentially increased since the advent of the COVID pandemic.
- The ageing population of Earth leads to many challenges for physicians. Microgravity causes accelerated effects of ageing including diminished bone density and musculature bulk. The countermeasures devised to tackle these conditions in astronauts have significant utility on Earth and if implemented may reduce overall frailty and debilitation in older people, leading to enormous cost savings for national health services.
- These human and healthcare benefits of space are poorly understood by both the medical community and the wider population. There are several strategies that can be utilised to tackle this understanding deficit through effective science communication and video campaigns.

Frailty

Frailty is characterised by the loss of biological reserve and the increasing exposure to adverse health outcomes. [1] It is a rapidly increasing healthcare burden worldwide and is closely associated with ageing. A 2021 systemic review of 240 studies reporting 265 prevalence proportions from 62 countries and territories, representing 1,755,497 participants found that the pooled prevalence rate of frailty was 12%. This is an enormous and increasing global prevalence. [2] Markers of physical frailty are similar to the adaptations of the human body to spaceflight. Terrestrial frailty researchers and clinicians involved in elderly care medicine are not always aware of the countermeasures being adapted for human spaceflight. More awareness and cross pollination between these two distant specialties can only be beneficial to both.

Proposed strategies to improve space health awareness amongst frailty

- Increasing human health science communication roles within National Space Agencies
- Promoting links between national healthcare system stakeholders and space medicine researchers
- Adaptation of muscle/bone space countermeasures for primary frailty on Earth
- Increased funded research collaboration between terrestrial healthcare researchers and space medicine
- Creation of a human health role within UNOOSA and other international space organisations
- Inclusion of osteoporosis and frailty researchers in briefing/monitoring of the impacts of microgravity
- Targeted education programmes on current microgravity research for geriatricians and frailty researchers

References:

[1] Clegg A, Young J, Iliffe S, Rikkert MO, Rockwood K. Frailty in elderly people. *The Lancet* 2013; 381: 752–62.

[2] O'Caomh et al, Prevalence of frailty in 62 countries across the world: a systematic review and meta-analysis of population-level studies *Age and Ageing*, Volume 50, Issue 1, January 2021, Pages 96–104, <https://doi.org/10.1093/ageing/afaa219>