United States Antarctic Program

Leveraging the Pandemic Through Advancements in Telemedicine & Technology

National Science Foundation
Office of Polar Programs

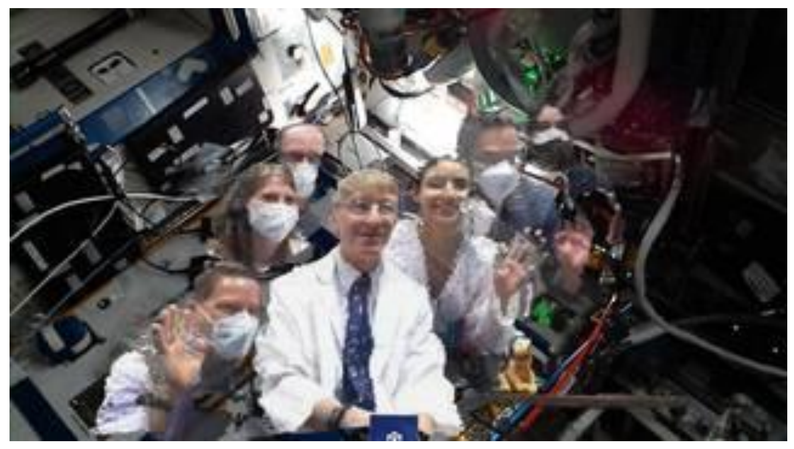
INTRODUCTION

Prior to the pandemic, telemedicine was met with scrutiny and hesitation. Telemedicine was not well studied and not widely adopted. However, the pandemic bore at least one positive outcome: The increased use of telemedicine that resulted in new research and innovation. Promising findings emerged suggesting that telemedicine is non-inferior to in-person care for health outcomes in certain conditions. Simultaneously, digital health technologies (i.e., remote patient monitoring devices and sensors) improved, expanding the possibilities of continuous monitoring and early interventions.

As we emerge from a period that dedicated the Antarctic medical community's efforts primarily to COVID-19 mitigation and control strategies, we are at the doorstep of new healthcare opportunities. There are myriad benefits to telemedicine and digital health technologies to bolster the health of the Antarctic deployer. As internet access improves, so does our opportunity to create a more robust healthcare ecosystem.

This poster highlights new advancements in the fields of telemedicine and digital health technologies. Providing possible approaches that can improve health outcomes, potentially allowing deployers to remain deployed. The presentation describes how leveraging telemedicine and biological monitoring may improve diversity through the inclusion of communities that experience more significant health disparities. Ultimately, the presenter discusses avenues for agility as health needs change in this dynamic Antarctic environment.

Space Technology Applied to Rural Papago Advanced Health Care (STARPAHC)'s Mobile Health Unit (MHU),
Credit: NASA



Holoportation team members are seen projected virtually on the International Space Station, Oct. 8, 2021. From left are Andrew Madrid, Dr. Fernando De La Pena Llaca, Rlhab Sadik, Dr. Joe Schmid, Kevin Bryant, Mackenzie Hoffman, Wes Tarkington.
Credit: ESA (European Space Agency) astronaut Thomas Pesquet

Credits: Canva

APPLICATION

Telemedicine and technology provide an opportunity to remove the barriers of remoteness and personnel limitations. For example, the use of remote electrocardiograms could enable preclinical analysis and consultation by experts. Caltech University is studying the use of non-invasive biosensors for the monitoring of metabolites in sweat, which may allow early detection of health conditions.

National Antarctic Programs could leverage these advanced technologies to improve health outcomes while minimizing the potential for medical evacuations or medical movements off continent. In the 22-23 season, a USAP participant sought medical care when the participant's personal smartwatch alerted them of an arrhythmia. The early identification allowed the participant to receive preemptive medical care without necessitating a medical evacuation or a significant health event.

The offshore oil rig sector provides additional guidance on the potential uses of advanced telemedicine and technology resources. An improved virtual experience via high-quality video and audio connections has improved the available clinical care in these remote settings. The integration of multiple high-quality video cameras affixed to the ceiling above a patient's bed and atop the monitor provides specialists with a whole-body view during consultations. In addition to the improved audio and visual aspects, medical equipment that allows healthcare providers direct access to images and data has improved diagnostic time and quality. On vessels with limited medical support, these improvements

R/V Nathaniel B. Palmer
Credit: NSF

Nathaniel B. Palmer Medical Bay
Credit: NSF

Telehealth Revolutionizing Veterans' Health Care
Credit: U.S. Department of Veterans Affairs

DISCUSSION

In an austere environment with limited resources, telemedicine and advanced technology afford the National Antarctic Programs the opportunity to improve quality of care and health outcomes for deployers. From provider access in the most remote settings to mental health applications, the evolution of telemedicine technology only broadens our ability to provide advanced care. Lastly, improved healthcare may broaden the diversity of deploying populations by loosening physical qualification requirements.

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