

National Space Biomedical Research Institute

Ultrasound Technology in Assisted Living Facilities

This project trains non-medical personnel to use ultrasound to assess health situations for a space mission. These techniques can be applied on earth, e.g. staff at assisted living facilities, ambulance crews, rural medical caregivers and military medics.

Lead Agency:

National Space Biomedical Research Institute (funded through a cooperative agreement with NASA)

Agency Mission:

The National Space Biomedical Research Institute leads a national effort for accomplishing the integrated, critical path, biomedical research necessary to support long-term human presence, development and exploration of space and to enhance life on Earth by applying the resultant advances in human knowledge and technology acquired through living and working in space.

Principal Investigator:

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Partner Agency:

Henry Ford Health System.

General Description:

In spaceflight, a number of crew health situations, such as severe abdominal pain, tooth abscess, sinus infection, muscle and bone loss, broken or fractured bones, and eye, knee or shoulder trauma, could severely impact the success of long-duration missions. These same injuries are common in the elderly. Diagnosing and managing acute health problems in remote locations or non-hospital environments, including space, is challenging due to availability of equipment and trained personnel. Dr. Scott Dulchavsky's project, funded by National Space Biomedical Research Institute, assessed the ability to use ultrasound in health situations which would have a high impact on mission success.

This project uses training regimens and CD-ROM refresher modules to teach non-medical personnel to easily perform ultrasound imaging. Trainees learn to use miniaturized ultrasound to assess health situations that could impact all aspects of a space mission. These same training techniques are transferable to Earth-based medicine, including staff at assisted living facilities, ambulance crews, rural medical caregivers and military medics.

The program gave trainees the tools to assess injuries using real-time remote assistance from medical experts, enabling persons working in a remote environment to assess and manage an emergency medical condition. His team developed training regimens and refresher modules that allowed non-physicians to operate ultrasound as if they were technicians. It normally takes 200 hours plus yearly updates to learn to operate ultrasound, but Dr. Dulchavsky and his team developed training methods that cut the time to two-three hours a year. The training program consists of a computer-based instructional presentation on the basics of ultrasound examination and examples of remote guidance. Trainees then participate in a hands-on session where they perform abdominal and musculoskeletal ultrasound scans.

With remote guidance, a modestly trained operator is coupled with an experienced medical expert, essentially making the non-physician the hands of the expert. The diagnostic, treatment, and training protocols developed in this study will also provide information which can be used in rural care, assisted living care, military conflicts, and third world medicine on Earth. The methods have been used with professional sports teams, in research projects studying athletes at the Olympics in Italy, and during a recent Mount Everest expedition.

Excellence: What makes this project exceptional?

This portable technology facilitates training of lay individuals in a complex medical task that results in improved disease detection and the potential to save lives.

Significance: How is this research relevant to older persons, populations, and/or an aging society?

Because many elderly individuals are immobile or living in confined conditions, this technique allows the technology to come to the patient, without the patient having to come to the clinic or hospital.

Effectiveness: What is the impact and/or application of this research to older persons?

This technology provides improved capabilities for diagnosis of medical problems by a portable means that can be used by non-medical personnel.

Innovation: Why is this research exciting or newsworthy?

This ultrasound training concept is global in nature, in that it has no boundaries.