

Space-age device to deliver more efficient health care on Earth and above

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On an exploration mission, an astronaut has an accident and appears to have serious injuries as the spacecraft speeds to its destination. The ensuing scene is hectic as the other crew members try to get a grasp on the situation and provide appropriate treatment. Efficient use of time and resources may be the difference between life and death.

Engineers funded by the National Space Biomedical Research Institute (NSBRI) are developing a system that will provide an accurate patient history, assist in treatment, and help astronauts be more efficient when providing medical care. Even though the integrated system is being developed for use in space, it can be used in many different locations, such as the emergency room, on the battlefield or at an accident scene.

The project, led by NSBRI Smart Medical Systems and Technology Team member John Crossin, is combining two existing technologies -- the iRevive medical record software and the Lightweight Trauma Module (LTM) monitoring and therapeutic care system. The easy-to-use, integrated LTM/iRevive system will be a tool for providing medical care to astronauts during long-duration spaceflights, especially since a quick return to Earth will not be possible.

"The integrated system creates a medical record for vital sign readings and observational data," said Crossin, president of 10Blade, Inc., in Plymouth, Mass. "It will collect, monitor and fuse patient care information with physiological patient data and optimize remote medical diagnosis, ventilator support, intravenous (IV) fluid therapy and

treatment options."

The LTM, a briefcase-sized device developed by Impact Instrumentation in West Caldwell, N.J., measures vital signs, such as pulse and blood oxygenation, and serves as a ventilator with integrated control systems. The iRevive software, developed by 10Blade, automatically records vital sign data from the LTM and allows the addition of observational data into the patient record. The software, which can run on multiple platforms, will guide caregivers through the observational recording process. The LTM/iRevive system's record-keeping capabilities will improve patient care in both short- and long-term situations.

"The person providing care after an accident is trying to keep the patient alive," Crossin said. "Some of the records can be confusing, lost or not include the time a treatment or an observation occurred. A system that automatically records data will reduce errors and the time needed to look up information. This allows a greater focus on providing care. Also, over time, the system allows you to see trends in the captured data."

The combined system is easy to use. "Generally, the initial emergency care and recording is administered by people who do not have as much training as a doctor," Crossin said. "We are making an intuitive, easy-to-use system that requires little medical training to understand and use."

Another benefit of the system is the ability to transmit LTM/iRevive system data to flight surgeons in Mission Control with one keystroke. The instant access to current and historical data will give flight surgeons the ability to quickly assess the situation and provide guidance to the crew. This feature will also be beneficial to health care providers in rural clinics or emergency personnel at an accident scene.

The combined system will also be a great tool for managing limited resources on a spacecraft and in other settings. For example, the system

could help medical personnel determine how much oxygen is needed for critically wounded patients being air-lifted out of a war zone to a hospital thousands of miles away. The caregiver could then provide the right amount to each patient and conserve oxygen for future use or possibly allow more patients to be transported on the same flight.

One problem caregivers often face, especially in emergency situations, is the lack of a uniform recording system for observational data. The LTM/iRevive system addresses the challenge while keeping the process simple. "The system features the Body Picker, a graphic depiction of the human body that is divided into zones," Crossin said. "The Body Picker's zones get smaller as the user gets closer to the desired location, such as the second joint of a left-hand index finger. Users also have the option to use menus to record the data if they prefer not to use the graphics option."

Crossin said the group plans to begin a clinical trial of the combined system in early 2011 on about 40 patients. He added that the LTM/iRevive system has the capability to receive data from other monitoring systems, and future versions will include a step-by-step treatment tool providing information for specific conditions.

The project is one of nine currently in the NSBRI Smart Medical Systems and Technology Team's portfolio. The team's goal is the development of intelligent, integrated medical systems to assist in delivering quality health care during spaceflight and exploration.

Provided by National Space Biomedical Research Institute

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