The Office of Naval Research (ONR) Expeditionary Medicine is a science and technology focus area that supports Navy and Marine Corps combat forces by developing products to treat injuries. Products must be safe and effective, as well as small, lightweight and rugged, since naval combat forces must travel light and fast.

Under development is a “system of systems” that will provide autonomous control of ventilation, fluid resuscitation, administration of drugs, sedation and analgesia, and maintenance of core body temperature through constant physiologic monitoring. The system will also have telemedicine capability.

The device is called the Autonomous Critical Care System (ACCS), and the objective is to provide appropriate intervention that will yield improved survival and outcomes. The system is based on “closed-loop-control,” an example of which is a household thermostat, which heats or cools a house to maintain a set temperature. The ACCS performs interventions to maintain a patient’s medical condition based on changes in his/her physiology.

The ACCS can be used for patient transport aboard ships or in land-based medical treatment facilities to augment medical personnel.

Research Challenges and Opportunities

- Control of internal bleeding without surgical access
- Artificial resuscitation fluid that increases blood volume, delivers oxygen to ischemic tissues, replenishes coagulations factors depleted by hemorrhage and modulates of immune response.

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