Precision Methods for Wound Management

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The Uniformed Services University (USU) Surgical Critical Care Initiative (SC2i) was established in 2013 to develop Clinical Decision Support Tools (CDSTs) for acute and trauma care. A consortium of seven federal and non-federal entities (Uniformed Services University, Walter Reed National Military Medical Center, Naval Medical Research Center, Henry M. Jackson Foundation, Duke University, Emory University, and DecisionQ Corporation), the SC2i is the Department of Defense's premier precision medicine Center for acute and trauma care.

In its mission to bring highly personalized diagnoses and therapeutic interventions to its wounded service members, the SC2i incorporates best practices in data science to ensure high-quality data is available for all of its translational and clinical research. Thus far the SC2i has enrolled greater than 1500 patients, representing 55,000 bio-banked specimens and 20+ million data elements. Through the implementation of a robust Quality Management System, clinical and bioassay instrumentation data is aggregated across all consortium partners in a Central Data Repository on Amazon Web Services (GovCloud). The data aggregation process involves site and consortium data managers, all focused on data standardization and quality.

SC2i leverages patients' transcriptomic, proteomic, bacteriological, and clinical data, as well as advanced machine learning techniques, to develop CDSTs for conditions associated with a high risk of morbidity or mortality. The SC2i has released three CDSTs to date for the activation of a massive transfusion protocol, the prediction of the onset of sepsis, and the prediction of the development of invasive fungal infections. The SC2i has additional CDSTs in development thus far to include those to predict the development of pneumonia, bacteremia, venous thromboembolisms, and acute kidney injury, among others.

While the main goal is to produce CDSTs, this research has elucidated potential avenues for research into the functional mechanisms underlying various complications seen in the surgical critical care setting. A key player in precision medicine for surgical critical care, the SC2i utilizes high-quality data, standardized across multiple institutions, to develop clinically-relevant CDSTs expected to identify favorable interventions, improve outcomes and resource utilization in both civilian and military health systems.