

# The Development of an Intelligent System Architecture for Autonomous Care (ISAAC)

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## **Abstract**

Unmanned systems and autonomous capabilities provide an avenue for improving enroute care in situations where medical evacuation assets are either not available or unable to reach the patient. To accomplish this, we conducted research to explore how intelligent algorithms can be used to supplement the current capabilities by improving the diagnosis, intervention, and monitoring of combat trauma care. Variability in the sensing technology available, environmental factors influencing the reliability of measurements, and lack of time and skills to synthesize this information can affect how data impacts treatment. The potential lack of knowledge and expertise of the on-the-site caregiver directly impacts whether important symptoms are seen, good medical decisions are made, and interventions are correctly executed. SoarTech has created the Intelligent System Architecture for Autonomous Care (ISAAC), a software system to support medical diagnosis, intervention, and monitoring. Our ISAAC Diagnosis algorithms provide support for physiological, medical imaging, and laboratory test results with an automated pipeline for processing raw data, identifying features, and mapping this information to symptoms. This information is reasoned over by an intelligent cognitive system that uses an expert understanding of symptom-condition mappings along with a logical inference reasoner to formulate hypotheses, recommend additional tests and construct diagnoses. Our ISAAC Intervention support provides knowledge and insight to instruct novice users to complete procedures from basic tunicate application to chest tube insertion. The combination of the diagnostic and intervention capabilities of ISAAC have the potential to provide life-saving support in austere combat environments.