Booz Allen Hamilton worked with the Sisters of Mercy Health System, a St. Louis-based hospital system, to reduce the incidence and mortality rates of severe sepsis and septic shock (S4). This group of healthcare-associated infections (HAIs) kills hundreds of thousands of patients per year, nationwide. Working with Booz Allen, the Sisters of Mercy Health System developed new methods to track compliance with international standards of severe sepsis treatment and more quickly diagnose potential cases.

Finding and Subduing Sepsis

Sepsis is defined as an acute body-wide inflammatory state (also called Systemic Inflammatory Response Syndrome or SIRS) in the presence of a known or suspected infection. Sepsis leading to organ dysfunction is called severe sepsis, and severe sepsis that leads to low blood pressure (hypotension) or insufficient blood flow is called septic shock. Nationwide, sepsis and S4 affect hundreds of thousands of patients annually, particularly those in Intensive Care Units (ICUs), with a mortality rate of 30-60 percent. This costs hospitals an estimated $28 billion to $33 billion a year.

Concerned with sepsis-related morbidity and mortality in their own hospitals, the Sisters of Mercy Health System had three objectives: harness the value of patient information for faster diagnosis; decrease the time between official diagnosis and implementation of the standard of care; and lower mortality rates and overall health care costs. Treating sepsis-related illnesses requires expensive resources and insurance companies don’t reimburse sepsis-related costs because sepsis is a HAI.

To accomplish these goals, the Sisters of Mercy Health System had many challenges and opportunities to consider. It had a large data set of electronic health records (EHRs) containing patient data from several hospitals in the form of structured and unstructured data. System experts knew they needed to understand the efficacy of current treatment guidelines and its relationship to health outcomes, as well as what data they needed for early diagnosis.

Tracking Compliance, Improving Detection

Booz Allen Hamilton, a leading strategy and technology consulting firm, collaborated with the Sisters of Mercy Health System to develop sepsis mitigation techniques. Booz Allen contributed $325,000 to the partnership through participation in the Ideas Festival, an annual conference the company sponsors to cultivate potentially new and innovative services for clients. Starting in October 2010, Booz Allen looked...
at 27,000 de-identified patient health records that included thousands of data fields per record.

The collaboration yielded the Sepsis Intervention Outcomes Research (SIOR) project. Booz Allen’s team led a cross-company effort that tapped analytical, clinical, economic and informatics expertise. SIOR analyzed medical workers’ compliance with international standards of care for severe sepsis and septic shock, and compared that compliance with patient outcomes.

Working together, Booz Allen and the Sisters of Mercy Health System developed an analytically expedient framework to allow for more efficient computation and discovery of underlying relationships. For example, SIOR found that only 17 percent of hospitals followed best practices to treat S4 within six hours of diagnosis and that increased compliance to international guidelines for treatment is correlated with a decrease in patient mortality. Sisters of Mercy uses this information as a critical foundation to increase compliance with international guidelines and ultimately save the lives of its patients.

A second project sought to improve early detection of S4. Booz Allen’s advanced analytics experts helped develop an Event-Centric Ontology (ECO) which incorporated natural language processing (NLP) of medical personnel notes. ECO provided a formalized vocabulary and framework for evaluating electronic health records that expedited real-time discovery and harnessing of structured and unstructured data. These capabilities enabled discovery of “red flags” for S4 in disparate data sources that in turn could alert medical staff of potential situations earlier, buying precious treatment time and decreasing sepsis-related morbidity and mortality. Booz Allen found an initial set of clinical indicators that may classify which patients with sepsis are at risk to develop S4. Though preliminary, these results could help to identify high-risk patients and prioritize their care.

Helping the Sisters of Mercy Health System Be Ready for What’s Next

Both ongoing projects provide insights into how hospitals can lower sepsis-related costs, freeing money for other critical patient care and other priorities. SIOR has already been a use case for advanced analytics to help fight other HAIs. The joint team is making formal presentations about ECO at a number of prestigious healthcare conferences and is presenting ECO as a model for augmented natural language processing.

Booz Allen and the Sisters of Mercy Health System have developed a work stream for ECO implementation and tied its compliance analysis for the 6-hour and 24-hour standard of care guidelines to patient outcomes. The team has also validated the identified clinical indicators for early detection of S4.

Ready to Help You

Our work with the Sisters of Mercy Hospital System is just one example of how Booz Allen’s leading strategy and technology consultants can help organizations use advanced analytics techniques to improve processes and achieve vital mission goals. To learn more about the know-how behind this project’s success and how it can help your team be ready for what’s next, visit www.boozallen.com.

About Booz Allen

Booz Allen Hamilton is a leading provider of management and technology consulting services to the US government in defense, intelligence, and civil markets, and to major corporations, institutions, and not-for-profit organizations. Booz Allen is headquartered in McLean, Virginia, employs more than 25,000 people, and had revenue of $5.59 billion for the 12 months ended March 31, 2011. (NYSE: BAH)