Affecting over 10 million people worldwide, Traumatic Brain Injury (TBI) is a global health problem and a leading cause of death and disability in the United States. While our understanding of mechanisms related to TBI has improved significantly in the past two decades, none of these advances have translated to a successful clinical trial and therefore, management and prognostication of TBI remain a major challenge to clinicians and other caregivers. This talk features applications of biomedical devices and informatics to facilitate and inform treatment of TBI in two different clinical settings – (1) Emergency Room (ER) and (2) Intensive Care Unit (ICU). First, I present results from integrating an advanced robotic technology in the ER to assess the neurologic function of mild TBI patients. In particular, I focus on leveraging data from technology-enhanced assessment of mild TBI patients to predict long-term complications such as post-concussive syndrome. Second, I discuss my research on engineering neuro- and trauma-ICUs, including integration, continuous monitoring, and analysis of multi-parameter data from critically-ill (or severe) TBI patients in ICUs. I present ongoing work in this area, along with future research plans that will ultimately result in disease-specific knowledge discovery and intelligent electronic health record systems for clinical practice and research.