**Highly interdisciplinary and collaborative, CRISS conducts basic and applied research in healthcare informatics, patient safety and clinical quality; and designs, prototypes and evaluates health information technology, care processes and medical devices.**

**Design & Usability**
CRISS investigators design and evaluate medical devices and health information technology. We have collaborated with the VA, other Vanderbilt centers and outside vendors to develop and improve the user experience.

**Teaching & Training**
Faculty and staff provide guidance in theories, methods and tools related to human factors through simulation-based training and assessment.

**Communication & Decision Making**
We investigate team communication, coordination, adaptive problem solving, culture and effectiveness, and individual and group performance-shaping factors.

**Work Analysis & Improvement**
Using human factors engineering, cognitive psychology, biomedical engineering and implementation science, CRISS studies performance during patient care to understand how and why care deviates from optimal.

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**What We Know...**
Developing and improving the other Vanderbilt centers psychology, biomedical communication, we investigate team coordination, adaptive performance and simulation-based training. The IMPACTS specific study of crisis event decision-making in anesthesiology (Weinger et al., Anesthesiology 127(3): 475-89, 2017). IMPACTS is a sequel to our prior AHRQ-funded study on simulation-based performance of board-certified anesthesiologists (Weinger et al., Anesthesiology 127(3): 475-89, 2017). IMPACTS specific aims are to: 1) Develop and test an updated and unified cognitive model and taxonomy for clinician decision-making strategies used in critical event management; 2) Determine the critical event performance ratings of physicians and relate them to: a) participants’ clinical practice and simulation experience attributes; and b) decision-making strategies; and 3) Explore differences between simulation-based performance and existing validated metrics of physicians’ competence (i.e., anesthesiology board exam scores).

**Some of What We Are Doing...**
In partnership with surgeons, oncologists, nurses, staff, and adult patients with lung and head or neck cancer recovering from and/or undergoing treatment as outpatients, and their lay caregivers, CRISS aims to reliably detect and effectively respond to unexpected clinical deterioration. Specific aims are to: 1) Create and refine software tools and a predictive model for a surveillance-and-response system to prevent harm from unexpected clinical deterioration in outpatients receiving cancer treatment; 2) Develop processes and training that engage patients and their caregivers as active and reliable participants in detecting and reporting potential clinical deterioration using high reliability organizational (HRO) principles; and 3) Implement in the operational environment and formally evaluate the integrated detection and response tools and processes. We hypothesize that this system will decrease the likelihood and severity of unexpected treatment events. Further, with a patient/family focused HRO framework, we hypothesize that the system will increase non-routine event reporting and decrease clinician response time.

**Improving Medical Performance During Acute Crises Through Simulation (IMPARTS)**
We are the coordinating center and primary investigators for a federally funded five-site study of crisis event decision-making in anesthesiologists. IMPARTS is a sequel to our prior AHRQ-funded study on simulation-based performance of board-certified anesthesiologists (Weinger et al., Anesthesiology 127(3): 475-89, 2017). IMPARTS specific aims are to: 1) Develop and test an updated and unified cognitive model and taxonomy for clinician decision-making strategies used in critical event management; 2) Determine the critical event performance ratings of physicians and relate them to: a) participants’ clinical practice and simulation experience attributes; and b) decision-making strategies; and 3) Explore differences between simulation-based performance and existing validated metrics of physicians’ competence (i.e., anesthesiology board exam scores).

**Studying Collective Mindfulness in Perioperative Neonatal Care**
Using a novel event discovery method, based on the construct of Non-Routine Events (NREs), to efficiently capture dysfunctional clinical microsystem attributes and potentially dangerous conditions, we are assessing how Collective Mindfulness (CM) behaviors in neonatal intensive care unit (NICU) and operating room (OR) teams impact patient safety by evaluating the incidence and severity of NREs during NICU-to-OR handovers and subsequent care. Our aims are to: 1) Conduct a prospective observational pilot study of NICU and OR teams to estimate the prevalence of perceived CM (i.e., self-reported using the SOS) during neonatal perioperative care; 2) Assess the concordance between expert-rated behavioral markers from video recordings collected during the observational study (exhibited CM) and those teams’ self-reported SOS scores (perceived CM); and 3) Determine the relationship between perceived and exhibited CM and the incidence and severity of NREs occurring during such care.

**Preventing Clinical Deterioration in Outpatients: Cancer Patient Safety Learning Laboratory (CaPSSL)**
In partnership with surgeons, oncologists, nurses, staff, and adult patients with lung and head or neck cancer recovering from and/or undergoing treatment as outpatients, and their lay caregivers, CRISS aims to reliably detect and effectively respond to unexpected clinical deterioration. Specific aims are to: 1) Create and refine software tools and a predictive model for a surveillance-and-response system to prevent harm from unexpected clinical deterioration in outpatients receiving cancer treatment; 2) Develop processes and training that engage patients and their caregivers as active and reliable participants in detecting and reporting potential clinical deterioration using high reliability organizational (HRO) principles; and 3) Implement in the operational environment and formally evaluate the integrated detection and response tools and processes. We hypothesize that this system will decrease the likelihood and severity of unexpected treatment events. Further, with a patient/family focused HRO framework, we hypothesize that the system will increase non-routine event reporting and decrease clinician response time.

**Utilizing Risk Stratification and Decision Support to Improve Care and Outcomes in Children with Pneumonia**
We are collaborating with pediatric emergency medicine clinicians, hospitalists and informaticists at two academic medical center sites to investigate how technological solutions may reduce variation in both antibiotic use and hospitalization decisions among clinicians caring for children with community acquired pneumonia. Specific aims are to assess whether: 1) Electronic antibiotic decision support increases guideline-concordant antibiotic use compared with usual care in the pediatric emergency department; and 2) The delivery of severity information generated by our prognostic tool leads to more appropriate site-of-care disposition compared to usual care. A pneumonia radiology algorithm will use natural language processing to identify potentially eligible children and trigger clinical decision support tools within the electronic health record that provide a targeted decision support strategy that emphasizes management in accordance with national guideline recommendations.

**Research Support**
Agency for Healthcare Research & Quality (AHRQ)
Anesthesia Patient Safety Foundation (APSF)
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National Institutes of Standards & Technology (NIST)
Patient-Centered Outcomes Research Institute (PCORI)
Veterans Affairs Health Services Research & Development