Johns Hopkins Collaborates with Lockheed Martin to Build Next-Generation Intensive Care Unit

Systems Integration, Virtual Simulation to Guide Study of Complex Health Care Setting

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The Armstrong Institute for Patient Safety and Quality of Johns Hopkins Medicine is collaborating with the Lockheed Martin Corporation, a global security and technology company, to create a safer and more efficient hospital intensive care unit (ICU) model. The two organizations will work to streamline complex and fragmented clinical systems and processes to reduce medical errors and improve the quality of care for critically ill patients.

"A hospital ICU contains 50 to 100 pieces of electronic equipment that may not communicate to one another nor work together effectively," says Peter Pronovost, M.D., Ph.D., Armstrong Institute director and senior vice president for patient safety and quality for Johns Hopkins Medicine. Pronovost, who often contrasts the health care and aerospace industries, says, "When an airline needs a new plane, they don't individually select the controls systems, seats and other components, and then try to build it themselves." The piecemeal approach by which hospitals currently assemble ICUs is inefficient and prone to error, adding risk to an already intricate environment. "Lockheed Martin has the expertise to integrate complex systems to help us build a safer and more efficient ICU model not just for Johns Hopkins but for patients around the world," Pronovost says.

A single system that could prioritize patient alarms based on individual risk of cardiac or respiratory arrest, for example, could prevent alarm fatigue, when clinicians sometimes are inundated with a chorus of competing alarms. This could help us understand risks on a personal level based on each patient's age, diagnosis and family history.

"Flight simulators and systems integration revolutionized the aerospace industry, and similar concepts can be applied to increase effectiveness and efficiency of the health care industry," says Dr. Ray O Johnson, Lockheed Martin senior vice president and chief technology officer. "Lockheed Martin's advanced computer-generated modeling and simulation will allow scientists to input ICU data to mimic possible outcomes of life-like scenarios. The software can also be used to train health care providers on newly engineered devices or processes, similar to the way pilots learn to respond to high-pressure scenarios."

Hopkins researchers will test alternative approaches to ICU care in a learning laboratory with a virtual simulation theatre, an engineering workshop and testing area with mannequins that imitate patient conditions and responses.

Further strengthening the relationship between these world-class organizations, Johns Hopkins has invited Robert J. Szczerba, Ph.D., Lockheed Martin's corporate director of healthcare innovation, to serve on the advisory board of the Armstrong Institute. Szczerba will provide guidance on how advanced technologies from the aerospace and defense industries can be used to improve patient safety and overall quality of care.

The Armstrong Institute oversees all patient safety and quality efforts throughout Johns Hopkins Medicine. It is designed to rigorously apply scientific principles to the study of safety for the benefit of all patients, not just those at Johns Hopkins. The Institute is committed to eliminating

preventable harm for patients, reducing health disparities, ensuring clinical excellence and creating a culture that values patient-centered care, collaboration, accountability and organizational learning.

Headquartered in Bethesda, Md., Lockheed Martin is a global security company that employs about 126,000 people worldwide and is principally engaged in the research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services. The Corporation's 2010 sales from continuing operations were $45.7 billion.