

Training for Readiness: Learning Together

“A paradigm shift is now underway that promotes new patterns of collaboration among industry consortia, university linkages and government agencies, with an emphasis on the integration of commercialization, empirical knowledge and the public good.”¹

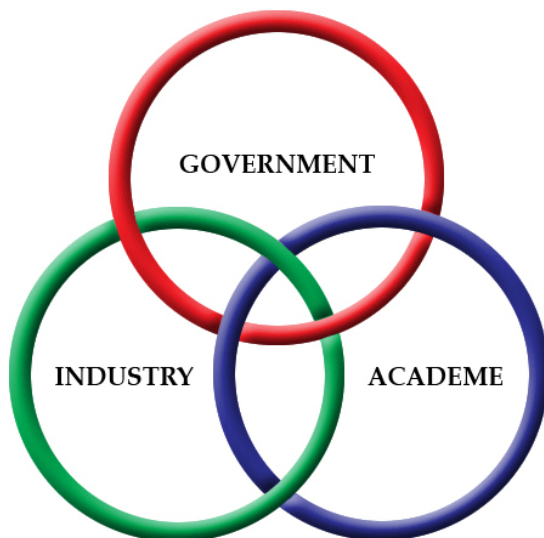
Improving the Outcomes of Critical Care Medicine and Combat Casualty Care: A Collaborative Model

A consortium that engages the best minds from academia, industry and the military creates unprecedented opportunities to improve outcomes of critical and combat casualty care. Synergy occurs at the intersections where these powerful entities join forces stimulating innovation in research, training and technology transfer. This model of university, industry and government collaboration has been referred to as “The Triple Helix.”²



Photo courtesy Davis-Monthan Air Force Base

THE TRIPLE-HELIX MODEL



Source: Henry Etzkowitz and Loet Leydesdorff, 2000
Diagram: www.techpinoytrend.blogspot.com (03 March 2011)

Application of The Triple Helix Concept: Lessons Learned

Through conducting Live Virtual Constructive Exercises (LVCEs) in close collaboration with the Warfighter Readiness Research Division, 711th Human Performance Wing at Wright Patterson Air Force Base (WPAFB), and with select industry collaborators*, the University of Nebraska Medical Center (UNMC) team learned essential lessons to apply to a new training paradigm for health care. This model is purposefully designed to improve human performance in critical and combat casualty care medicine – where care must be administered under great pressure.

1. An Interdisciplinary Approach

Creating the optimal training model to improve efficiencies involves working across disciplines. This means breaking down barriers (“silos” or “stove pipes”). This phenomenon is more easily identified than achieved and includes: arriving at common goals; understanding the language specific to a discipline; attitudinal adjustments; sharing knowledge, technologies and equipment; and, practicalities such as calendar realignment and transport. Developing appropriate and accurate metrics across the stove pipes is key to measuring success for large scale LVCEs – especially related to assessing return on investment.

2. Identify and Assess Medical Mission Essential Competencies (MECs)^{TM3}

Justifying costs and maximizing benefits of LVCEs related to improving performance presents significant challenges. The primary being the creation of a training model that accurately and reliably collects and analyzes multiple sources of data. Data can be recorded, measured and assessed from tracking devices, human patient simulators and biosensors that record vital signs of participants. This auditory and visual data combined offers ways to further develop Medical MECs – a critical element for demonstrating improved training that leads to improved safety and quality outcomes for the critically ill or wounded.

Responding effectively and efficiently to critical, life-threatening conditions requires a rare set of competencies, including procedural proficiencies, leadership skills, critical thinking and teamwork. These human factor elements are essential ingredients that when combined, profoundly affect the outcomes of care.

Assessment of human performance and effectiveness in critical and casualty care medicine involves working with training experts, data analysts and requires special skills and understanding of complex medical devices; tracking and assessment tools; remote connectivity; human patient simulators and simulation capture systems.

3. Addressing the Return on Investment (ROI)

High risk industries, such as oil and gas, nuclear power, military and health care, recognize that the adoption of modeling and simulation for training and research is an essential tool to improve outcomes as well as reduce costs.

However, initial investments in technology and organizational preparation are without doubt costly. It is difficult for agencies to invest substantial funds for what appears to be only possible gains. Therefore, investment in simulation ROI (especially large scale LVCEs) should be considered long term – knowing that the principle ROI is the mission of saving lives.

Civilian and military medicine can benefit greatly from partnering in research and development for technology transfer and commercialization. Developing new and better training methods, simulation technology and remote capabilities for supporting LVCEs can help sustain the costs of simulation. Achieving this requires the development of a framework and culture that engages industry in innovative and entrepreneurial strategies.



Photo courtesy Davis-Monthan Air Force Base

Observations/Opportunities for LVCEs:

- ✓ Safe training environments and framework for developing life-saving procedural skills, triage skills, team training, leadership development, critical thinking and decision making.
- ✓ Opportunities for repetitive practice (muscle memory) and attainment of procedural competencies.
- ✓ Hands-on simulation to improve human performance and positively impact care outcomes.
- ✓ For high performing, healthy and fit professionals, simulation scenarios must be relevant and challenging.
- ✓ Detailed and performance-based After Action Review (AAR) is a critical element.
- ✓ Unprecedented research and development opportunities for human performance, including data collection from biosensors, tracking devices, remote connectivity, imagery and physiological data from human patient simulators.
- ✓ “Hand-offs” and en route care require different skill sets than stabilization and triaging of casualties – including communication and managing shock and sepsis under difficult situations – such as the noise and turbulence of air transport.
- ✓ LVCEs can include critical care transportation skills (stabilization to hospitalization).
- ✓ Further development of reliable, valid competency-based assessment tools; including the Medical Mission Essential Competencies (MECs).
- ✓ Competencies are prone to skill decay over time and individuals learn and retain at different rates.
- ✓ Readiness is affected by variables such as: ongoing exposure to procedures; personal learning styles; previous training and experience; and repetitive training opportunities.
- ✓ Developing innovative and collaborative platforms greatly helps advance the technologies used to create LVCEs, such as the ability to test new equipment, drive human patient simulators remotely and capture multiple data streams.

Funding for Live Virtual Constructive Exercises

"Catch 22"⁴ - Costs of Simulation and ROI

ROI for simulation can be quantified in many ways, including mission values; improved outcomes of training which, in turn, impact outcomes of care; warrior feedback related to perceived effectiveness; and data that assesses performance improvement. During a time in history when resources are reduced with less available funding for training and research, the expansion of LVCEs requires initial investments in technology and simulation expertise – including human factors professionals. Articulating a business model for LVCEs will prove of value for the next steps in the evolution and funding for this training model.

As with all innovative strategies, fiscal risk is involved. Yet, as medical technology becomes more complex, and the acute care and warfighter settings become more volatile and lethal, can medicine and the military afford not to make this investment?

University of Nebraska Medical Center: Address the Quality, Safety and Costs of Care in Civilian Medicine

To improve human effectiveness in health care, UNMC is creating the Interprofessional Experiential Center for Enduring Learning (iEXCELSM). This combined legislative and philanthropic investment in simulation technology and expertise by the State of Nebraska represents support for a transformational training model for health care professionals and involves the creation of a statewide network of interconnected clinical simulation centers. To achieve optimal outcomes, UNMC is collaborating with key industry partners to provide the widest range of simulation models in simulated health care settings possible, including 3D, Virtual Immersive Reality technology and Biocontainment Units.



Photo courtesy of the University of Nebraska Medical Center

A combination of task trainers, high fidelity simulators and surgical capabilities replicate a wide spectrum of critical care scenarios that prepare individuals and teams to respond to a variety of unexpected critically important events. These intense exercises increase readiness and foster the honing of skills, the assimilation of new knowledge, the development of a sense of consequence management, team communication, the transfer of care and, ultimately, the improvement of health care outcomes.

iEXCEL will, therefore, involve the development of “high stakes” training exercises designed to enhance human performance in order to achieve a constant state of readiness. This includes partnering with the health professionals at UNMC who took care of several patients with Ebola during the recent outbreak of this highly infectious disease.

The concept of learning by doing without compromising patient care underlies the future of iEXCEL

Readiness Takes More Than Words

UNMC understands the importance of readiness. In 2014 the U.S. Department of State asked UNMC and its clinical partner, Nebraska Medicine, to receive a patient who had contracted Ebola. Due to ten years of preparation, including repetitive drilling for such an eventuality, UNMC proved ready for the challenge.

UNMC has a proud history of working with the U.S. military. The U.S. Department of Defense also consulted with UNMC as world leaders in Ebola care and prevention. Additionally, UNMC researchers have active projects in the University of Nebraska's National Strategic Research Institute (NSRI), a collaboration between Nebraska University and the U.S. Strategic Command (USSTRATCOM) to support research for combating weapons of mass destruction.

References

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- ³ “A psychometric examination of Mission Essential Competency (MEC) measures used in Air Force distributed mission operations training needs analysis” Alliger, George M.; Beard, Rebecca; Bennett Jr., Winston; Symons, Steven; Colegrove, Charles Military Psychology, Vol 25(3) (May 2013) 218-233. <http://dx.doi.org/10.1037/h0094964>.
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For more information please visit:
<http://www.unmc.edu/iexcel>