

# Medical Training magazine

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MAGAZINE

INTERDISCIPLINARY TRAINING

## **Building a Future Model for Health Professions Education**

SIMULATION

## **Value-based Simulation Driving Healthcare Improvement**

SIMULATION TRAINING

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Simulation is now routinely used in training but as an exciting prospect for redesigning healthcare service delivery.

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# Building a Future Model for Health Professions Education

## Interdisciplinary - Experiential - Competency-base

Pamela J. Boyers, Ph.D. and Jeffrey P. Gold, M.D. offer ideas and strategies to improve health profession education and improve patient safety.

**T**he State of Nebraska and a small group of committed citizens have made significant investments in a major project called iEXCEL<sup>SM</sup> (Interprofessional Experiential Center for Enduring Learning). This support is to ensure success of the design, construction and future operations of a 192,000 square foot interprofessional simulation facility (the Davis Global Center), currently under construction on the UNMC Omaha campus. To ensure the iEXCEL vision of Global Leadership in Improving Human Performance and Effectiveness in Health Care is successfully realized, as well as expensive missteps avoided, it was important to learn from those with prior experience in building and operating medical simulation centers. In addition, valuable insights were gained from high-reliability organizations (HROs) – including the military – which engage in modeling, simulation and visualization to reduce errors, enhance quality, improve safety and lower costs.

### Lessons Learned

#### 1. Articulate a Societally Impactful Vision

Clearly articulating desired outcomes and benefits is a critical first step for

any sizeable investment in construction involving complex and costly simulation technologies and staff expertise. The iEXCEL message conveys a powerful commitment to positively impact the outcomes of health care by transforming health professions education. The overall goal is to reduce medical errors and improve efficiencies through the establishment of a truly interdisciplinary simulation center in which procedural and professional skills, as well as teamwork are honed and assessed. Due for completion in December 2018, the Davis Global Center will be a highly technical, experiential (hands-on) training facility, where knowledge transfer, communication skills, critical thinking, leadership and team training will be taught, practiced and assessed. The Center will also serve as a “clinical test bed” in which human factors and other research and development can occur. Significant societal benefits include technological workforce development and the creation of 3D/Augmented Reality/Virtual Reality (3D/AR/VR) and holographic content for health care. Opportunities also abound for disciplines including engineering, computer technology and the arts - as well as for community engagement and collaboration with the military.

Above  
Clinical simulation emphasizes realism and team communication to improve quality and safety for patients.

Image credit: iEXCEL at UNMC.

#### 2. Be Bold! Be Relevant! Be First!

Creating momentum by being bold and “first to market” is highly attractive to industry and military collaborators who express interest in opportunities for joint research, trialing and testing equipment, and training methods. The size (and audacity) of the project, in combination with significant institutional and philanthropic investment, creates energy - acting as a magnet for national leaders, innovators and entrepreneurs. Working with the clinical entities to create a new and relevant model for health care training involves supporting faculty, students and practitioners in the shift from the well-established tradition of “see one, do one, teach one” towards a comprehensive competency-based model of training.

#### 3. Break Down “Silos”

Central to iEXCEL is the creation of a genuinely interdisciplinary venue. Created as a hub that fosters innovation in training, the Center is purposefully discipline-agnostic, serving all health care disciplines - at all levels of training. This

involves providing simulation expertise to help faculty and students accelerate the adoption of experiential learning. With the goal of ensuring highly functional and effective individuals and health care teams, critical success factors include teaching team skills early and throughout training and managing the transition of very sick patients throughout the echelons of care. This interprofessional initiative necessitates total support from the leadership of the institution including the “buy-in” of health care leadership (Deans of Medicine, Nursing, Pharmacy, Dentistry, Allied Health, Public Health and Graduate Studies, and our clinical partner, Nebraska Medicine).

In addition to providing support for innovative curriculum development, partnering with faculty and the clinical enterprise(s) to support quality, safety and continuous process improvement necessitates active engagement with hospital quality and safety initiatives. Ensuring ease of access to the facility, providing highly relevant training exercises, and offering “in situ” simulations are also key to accelerating the adoption of simulation by busy clinicians, faculty and learners.

#### 4. Enhance Reputation


Creating a new paradigm for health professions education assists not just the health sciences but also the “University-at-Large” in building stature locally, nationally and globally. Backed by the state of Nebraska and in partnership with the private community, this new cutting-edge facility dedicated to fostering innovation in education, research and development, demonstrates a strong and collective commitment to achieving excellence. Recruitment of learners, faculty and staff who are “the brightest and best” is achieved, in part, due to the excitement of being educated in a forward-thinking institution that invests in the future. Offering unprecedented learning, teaching and research environments – especially for the new generation of digital learners – is compelling. Accreditation of departments, colleges, residency programs, the hospitals and ambulatory centers is also positively impacted by the availability and capabilities of an interdisciplinary simulation center that measures and assesses the outcomes of learning.

Understanding the powerful impact of simulation on aviation safety outcomes and applying these concepts to patient care is a concept that is well understood by the community, thus helping enhance the reputation of the clinical entities.

#### 5. Deploy Disruptive Technologies

Incorporating cutting-edge simulation technologies, especially 3D, Holographic and Virtual and Augmented Reality (not yet widely embraced in the health professions educational “tool kit”) is found to be extremely important in achieving a transformational learning environ-

ment. Health care learners, industry and military collaborators are inspired and encouraged by the availability of the wide range of very advanced simulation modalities. Simulation modalities include: surgical simulation (fresh tissue), advanced simulation (human patient simulators, computerized simulation, and task trainers), 3D, Augmented and Virtual Immersive Reality technologies. This combination offers the ability to create realistic health care scenarios, stimulate new research opportunities, including and especially human factors research, and identify the most effective methods



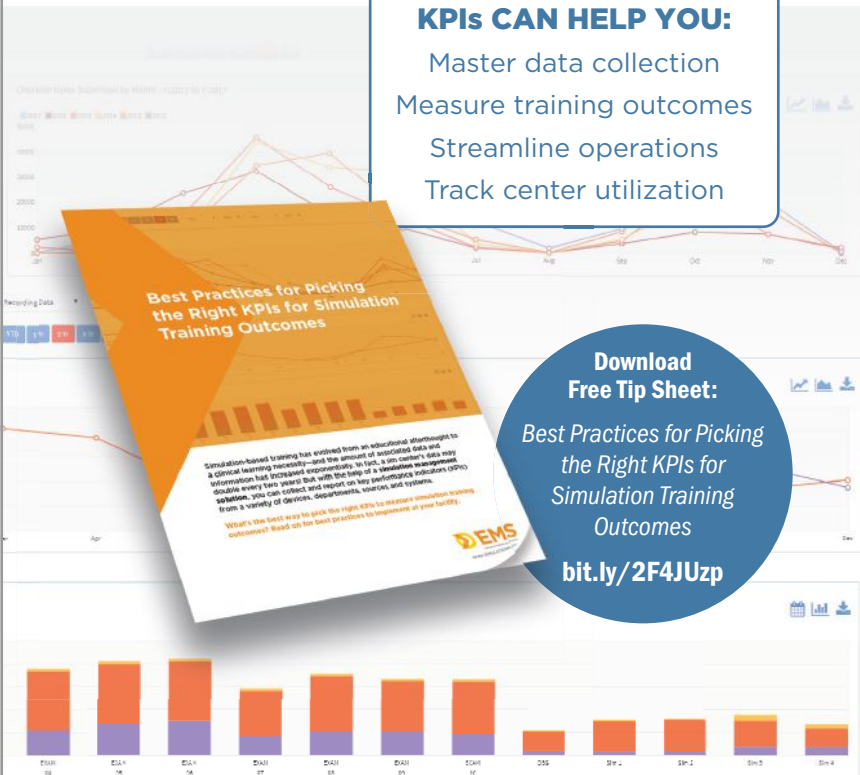
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for improving learning styles and the resulting impact on patient outcomes.

## 6. Emphasize Technology Selection & Integration

Taking technological compatibility into consideration when selecting and installing advanced technologies leads to less breakdowns, thus minimizing unanticipated costs. As advanced educational technologies (especially visualization and simulation technologies) are adopted by health care, it is critically important that these are viewed in total and not as individual “systems within a system.” Whenever possible, technologies must be compatible and interconnected so that “the whole is greater than the sum of its parts.” Sufficient bandwidth to allow remote connectivity and broadcasting to and from other sites requires specialized expertise, especially if the data to be transmitted is 3D and/or highly dense. Reliable connectivity across the organizational sites and with partner clinical institutions is key.

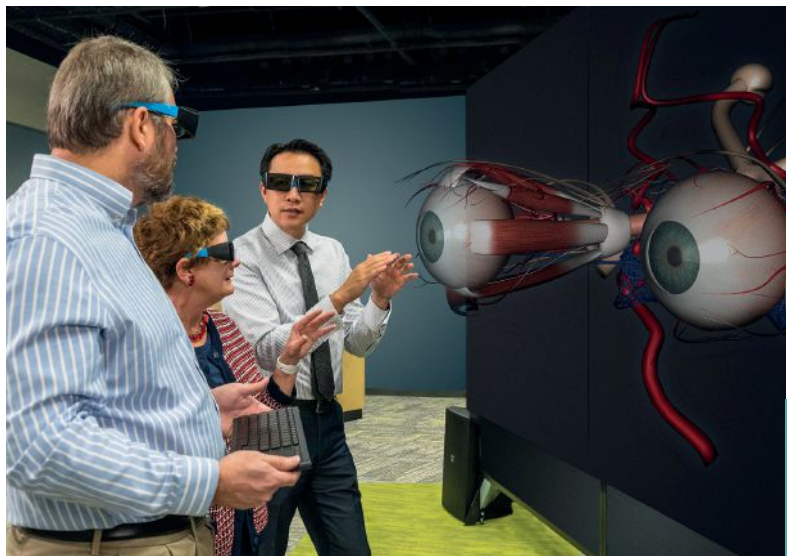
Connectivity of this complexity requires specialized teams – usually from the world of advanced visualization/high performance computing and even entertainment. These technical teams preferably possess a skill mix to provide network, communication and collaboration solutions, and the ability to offer end-to-end support. Since simulation technologies are rapidly emerging in the market place, they are frequently promoted while still in the early development stages. It is not only essential that each technology investment be carefully selected for reliability, quality, cost and sustainability, but that selection and integration are managed in such a way that ensures total connectivity. Once integrated, they must work together reliably and consistently. Costly lessons learned from others are leading to the recommendation of a new model for selecting professional AV/IT integrators at the start of the project in a contract that is of equal importance and yet separate from the architects and construction contractors.

## 7. Implement Robust Academic & Business Strategies

A framework for interrelated academic and business missions must be purposefully designed to achieve substantive (qualitative and quantitative) academic and business development strategies. Business development opportunities for innovators in the medical professions and beyond can be created with industry and military collaborators, resulting in the commercialization of new products, training methods and improved human performance processes. It is important to address long-term sustainability through revenue generation; and 3D/VIR content development is among the options, however, overemphasis on the business element too early in the development of a simulation center can detract from achieving the transformational academic mission. Keeping a balance of academic and business missions while focusing on long-term goals will ultimately yield mission-driven strategic and fiscal results.

## 8. Engage Digital Learners

Raised with interactive devices and web-based access, the new generation of learners seek and absorbs knowledge very differently than their instructors. As the “NextGen” learners enter higher education, they are quite facile with accessing informa-



Above

**Disruptive technologies will transform the learning process.**

Image credit: iEXCEL at UNMC.

tion from the web and using highly realistic apps and games to access and transfer knowledge. “Passive” learning models clearly do not meet the learning needs of millennials. With learners expecting advanced education to offer the same level of advanced educational technologies, institutes of higher learning are rapidly responding by adopting e-learning. For skills-based professions, ideally e-learning should be combined with interactive, experiential activities. Originating in entertainment, the worlds of gaming, modeling and simulation, and more recently, artificial intelligence, are converging to offer extraordinary learning opportunities. These modalities can also be deployed remotely, bringing learning to life by engaging students and creating virtual worlds. While health care education is adopting clinical simulation to enhance the training of individuals and health care teams, there are still few simulation centers incorporating interactive 3D/AR/VR technologies and immersive learning experiences. As a “spin-off”, developing unprecedented methods for knowledge transfer applicable to every segment of a university’s mission, including teaching, research, service and business development, is definitely achievable.

## 9. Deploy an Outcomes-based Approach: Assessing and Measuring Performance

Powerful economic and social forces and a changing health care delivery system necessitate transformation of the health professions educational model. There is a much-discussed need for a robust and reliable competency assessment model that allows for flexible student progression through the curriculum. Curriculum development would then focus upon improved outcomes of care as related to creating safer, more effective and more efficient health care environments for patients - as well as for health care providers. This approach focuses on continuously improving clinical quality of care through performance analysis and collaboration with the clinical environments.

It is well known that people learn differently - with some bet-



ter at knowledge assimilation and testing. However, the latter does not necessarily transfer to proficiencies and expertise in conducting procedures, problem solving or team functioning. A competency-based training model could potentially shorten training time providing an alternative to the current “lockstep”, time-based approach to progression through a training program. Once developed, this model would offer learners the ability to progress through the curriculum at their

c. Continuously develops an innovative nimble and rigorous culture.

d. Remains nimble and flexible, avoiding becoming overly “corporatized” or concerned with exclusivity, competition, and intellectual property, which seriously limits collaboration with other simulation centers, the military, and joint grant opportunities - potentially stifling collaborative innovation.

e. Offers a wide breadth and depth of modeling and simulation expertise, in-

forward in the education of health care professionals is truly daunting. To do so in partnership with nontraditional industry and military partners is even more challenging. Yet, each day, there is more and more convincing evidence of the accuracy of the trajectory and the need for innovation. While bold steps can be daunting, and change is hard, not addressing necessary changes is irresponsible and inconsistent with core principles of our profession. *Primum non nocere!* **MTM**

## About the Authors

*Pamela J. Boyers, Ph.D.*, is the Associate Vice Chancellor for Clinical Simulation for the Interprofessional and Experiential Center for Enduring Learning (iEXCEL) at the University of Nebraska Medical Center (UNMC). With significant experience in designing and operating medical simulation centers, Dr. Boyers is well-published and speaks nationally and internationally about the need to address the quality and safety of care through transforming the education of health care professionals. To help improve the outcomes of care, Dr. Boyers believes in working closely with industry collaborators as well the U.S. military in order to learn from their experiences, thus ensuring best practices related to the application of simulation technologies to improve the outcomes of training and patient care.

*Jeffrey P. Gold, M.D.*, is a nationally recognized leader and tireless advocate for transforming academic medicine and health care delivery. Based upon his medical and engineering background, he had a major dedication to advanced simulation and high technology blended education, now spanning several decades. A board-certified thoracic surgeon, Dr. Gold is the eighth chancellor of the University of Nebraska Medical Center and chairs the board of UNMC’s principal clinical care system partner, Nebraska Medicine. Dr. Gold is responsible for all aspects of UNMC campus administration, academic and clinical leadership. UNMC is known for prolific medical science research, cutting-edge education and a decade-plus building boom of state-of-the-art infrastructure, including the Fred & Pamela Buffett Cancer Center.

*“If you do not change direction, you may end up where you are heading.” – Lao Tzu*

own pace as they develop the discipline-specific competencies for their level of training, before, and long after, they enter practice. For example, when a well-defined level of competency in a given procedure has been identified and reached, e.g., inserting a central line or performing in an emergency care clinical scenario, learners could advance to the next level of the curriculum.

More rapid progression through the curriculum would mean joining the health care workforce earlier and result in less debt for the individual and less costs to society. By facilitating shorter training periods, a competency-based model would add the benefit of addressing current and projected shortages of health care professionals. This would ensure the training model for health care professionals is highly relevant and carefully designed to impact patient care, and incorporates knowledge, skills, professional development, and team work.

## 10. Create a “Purposeful” Culture

A critical yet often overlooked success factor that can “make or break” all well-intended investments and efforts is the selection and nurturance of a highly collaborative, talented and interdisciplinary staffing model that:

a. Exhibits and practices genuine interprofessional and interdisciplinary collaboration between health care and related disciplines.

b. Creates and maintains a harmonious balance of academic and entrepreneurship values.

cluding visualization with the goal of creating new models for education, teaching and research.

f. Incorporates a non-traditional approach to design, construction and implementation of the vision, so that the Center is perceived, operated and utilized as an innovation hub and clinical test bed for research and development - as well as an extraordinary teaching center.

g. Develops a system that rewards and recognizes faculty, staff and students’ time and simulation accomplishments that include transformation of the curriculum, learning methodologies, process improvement, product design and development – including new teaching methods – and outcomes research.

h. Sustains an innovative and entrepreneurial (yet accountable) culture that engages and challenges the total culture, including departments and entities such as legal, purchasing, IT and facilities. Engaged departments will require the overall institution to convey an understanding of the cultural expectations.

i. Creates opportunities for new kinds of research and technology transfer — including expanding opportunities for collaborative grant funding, as well as helping drive much needed quality and safety efforts in the health care enterprise.

j. Understands the important strategy of learning from other high-reliability organizations. Significant tangible societal benefits can be gained from collaboration with industry, government and the military (including military contractors).

The opportunity to take a bold step