Overview of Advanced Simulation Technology, Collaboration and Education

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Disclosure Statement

What Does Simulation Mean to You?

Simulation – An Experiential Learning Tool
A Historical Perspective

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  - Th…
  - 70…

Simulation – An Experiential Learning Tool
A Historical Perspective

- 2004-Jt. Comm.-Sentinel Event Alert
  - Root causes found are:
    - Communication (72%)
    - Safety culture (55%)

Simulation – An Experiential Learning Tool
A Historical Perspective

- 2009-Enhancing SIMULATION Act of 2009 (HR 855)
  - Focus is safety in medicine utilizing leading advanced simulation
  - Three Major Requirements:
    - Establish medical simulation centers of excellence
    - Promote innovation by conducting and supporting research on complex or challenging medical simulation and interdisciplinary simulation technologies
    - Award grants for purchasing, incorporating and deploying such technologies for training of physicians, nurses, allied health professionals and qualified students

Simulation isn't NEW

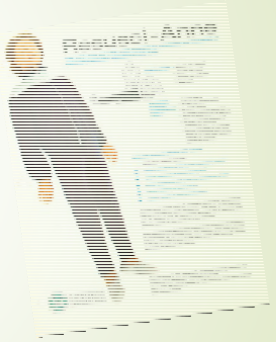
- 1911 mannequin used at Hartford Hospital Training School, Hartford, Conn.
  - Realistic features such as hips, elbows and knees
- 1932 Indiana University Training School for Nurses lab
  - Used to train student nurses in giving hypodermic injections

Mrs. Chase and beyond

- What was the name of this first mannequin used in 1911 by Hartford Hospital Training School?
- Mrs. Chase
- Mrs. Chase was first introduced in 1911
  - Was updated a number of times with better skin, more natural features

Mrs. Chase and beyond

- 1960's –modern day use of simulation with introduction of Laerdal's Resusci-Anne
- Stanford starting doing research in 2001 to validate simulation use
- Benner provided literature on becoming expert nurses by acquiring knowledge through Clinical experience.



Simulation Efficacy Research

The strength of simulation training is its suitability for Multidisciplinary team training. There is good evidence that simulation training improves provider and team self-efficacy and competence on manikins. There is also good evidence that procedural simulation improves actual operational performance in clinical settings. However, no evidence yet shows that crew resource management training through simulation, despite its promise, improves team operational performance at the bedside.

Nishisaki, A., Keren, R., & Nadkarni, V. (2007). Does simulation improve patient safety?: self-efficacy, competence, operational performance, and patient safety. *Anesthesiology clinics*, *25*(2), 225-236.

Simulation Efficacy Research

There is no doubt that SBME is superior to traditional clinical education for acquisition of a wide range of medical skills represented in this study: advanced cardiac life support, laparoscopic surgery, cardiac auscultation, hemodialysis catheter insertion, thoracentesis, and central venous catheter insertion.

McGaghie, W. C., Issenberg, S. B., Cohen, M. E. R., Barsuk, J. H., & Wayne, D. B. (2011). Does simulation-based medical education with deliberate practice yield better results than traditional clinical education? A meta-analytic comparative review of the evidence. *Academic medicine: journal of the Association of American Medical Colleges*, *86*(6), 706.

Simulation Efficacy Research

National Council of State Boards of Nursing National Simulation Survey

Hayden, J. K., Smiley, R. A., Alexander, M., Kardong-Edgren, S., & Jeffries, P. R. (2014). The NCSBN National Simulation Study: A longitudinal, randomized, controlled study replacing clinical hours with simulation in prelicensure nursing education. *Journal of Nursing Regulation 5*(2). S1 –S64

Do you need all the bells and whistles





Do you need all the bells and whistles

- Fidelity-What is Fidelity
  - Extent is to which appearance & behavior match the appearance and behavior of the real world
- Low-fidelity are static and offer little realism (generally single skill)
- Medium-fidelity are more realistic in nature and can be used for introduction of new skills, maintain competencies or practice multiple skills
- High-fidelity are used to teach critical thinking, teamwork, and critical incident management
  - Can maximize physical and psychological feedback as students are assessing and treating

High-fidelity vs. Barbie

- How real does it have to be
  - Based on Learning Objectives
  - Based on needs for interaction
  - Real enough to allow participants to suspend the reality

"I can do simulation with a Barbie doll, if necessary!"

Hybrid Simulation

- Use of two or more types of simulation modalities in one training scenario
- Use of hybrid simulation offers students a range of realistic educational experiences.
  - From normal birth to complications including shoulder dystocia and post-partum hemorrhage
    - Incorporating in the use of actors as standardized patients (a birthing mother and her partner)
    - Incorporated into existing curricular simulations such as normal births, breastfeeding and newborn care etc.
  - Use of suture pad on SP for OSCE testing
  - Use of SP and virtual NG trainer

iPads, 3-D modeling, Avatars, oh my

- Use of iPads, Google Glass
- Samsung VR/Occulus Riff/Hololens
- Augmented Reality
- 3-D Reality
  - Google Cardboard
  - 3-D Modeling
  - Cad Walls/iMirror/iWalls
  - Sim "caves"

iPads, 3-D modeling, Avatars, oh my

- Multitaction walls
- Training tool
  - Cutsuits
- Avatars
  - iHuman, Shadow Health
  - USC, Ohio State, Stanford, University of North Texas

Serious Gaming/E-Learning/Computerized Simulations

- **Basic characteristics:**
  - Technical quality
  - Ergonomic quality
  - Esthetic quality
  - Game Design/Play

Serious Gaming/E-Learning/Computerized Simulations

- **Apps-Examples**
  - Mass Casualty Triage Free
  - iMumur
  - Prognosis
  - Plague
  - Pandemic
  - Flumania
  - Learning medical terminology
  - Resuscitation!
  - Top 200 drug match game

Simulation Technologies-the Crystal Ball says.....

- Used as integrated into the educational framework as the use of Powerpoint (Nickerson, 2010)
- An educational method for experiential learning and assessment
- Will provide hands-on training for comprehensive, organization-wide patient safety programs including team training and corrective measures for sentinel events.

Simulation Technologies-the Crystal Ball says.....

- Extremely useful for education and professional training
  - Used “in-situ” , just in time, to practice a procedure just prior to doing on the patient
  - Provides “practice” on procedures and patient assessments and care that are high risk-low volume
  - Provides opportunities to check systems/ processes and procedures
  - Provides opportunities to “test” teams in safe environment for high-risk and/or low incident treatments
    - Fire in the OR
    - Pandemic
    - Rare conditions needing to be treated

Simulation Collaboration – Simulation in Motion – Nebraska (SIM-NE)

- The Leona M. and Harry B. Helmsley Charitable Trust
- Statewide, mobile education system which brings state-of-the-art, hands-on-training, using high fidelity human patient simulators to pre-hospital and hospital professionals throughout the state
- A partnership of educational institutions
- Dedicated to improving the health and well-being of Nebraskans

Simulation Education - Who's in the Field

Society for Simulation in Healthcare

International Nursing Association for Clinical Simulation and Learning

Clinical Simulation Educator Certificate Program – Bryan Health

The National League for Nursing – Simulation Innovation Resource Center

Drexel University Certificate in Simulation

Center for Medical Simulation - Harvard

Certified Healthcare Simulation Educator (CHSE)

Clinical Simulation Program – University of Southern Indiana

Simulation Collaboration – NLN Leadership Development Program for Simulation Educators

- This program is designed to:
  - Foster individual growth,
  - Facilitate and Encourage interpersonal interactions within the group
  - Foster networking with previous program participants to build upon and develop new simulation initiatives

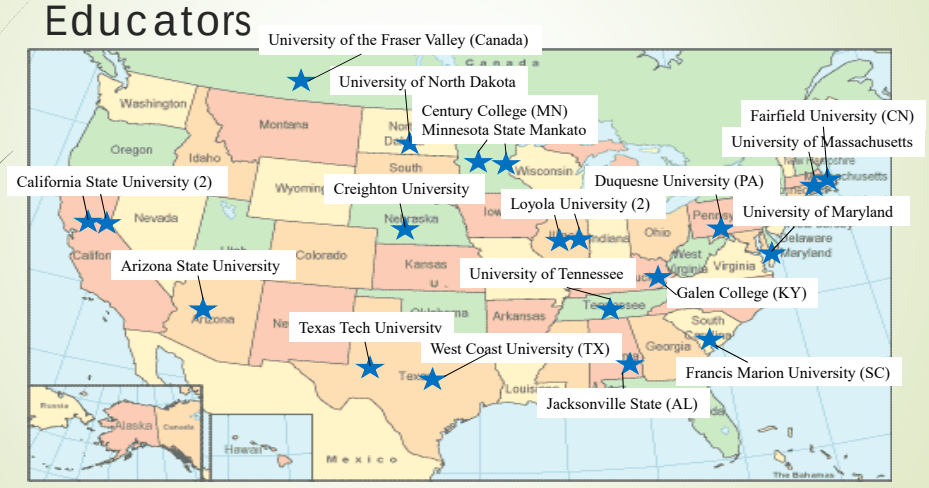
Simulation Collaboration – NLN Leadership Development Program for Simulation Educators

- This program includes:
  - 15 Stimulation Innovation Resource Center (SIRC) Courses
  - Access to the NN Leadership Webinar Series
  - Executive Coaching Sessions
  - Invitation to Laerdal SUN Meeting
  - Invitation to the NLN Leadership Retreat
  - Registration Pass to the NLN Educator Summit

Simulation Collaboration – NLN Leadership Development Program for Simulation Educators

- This program includes:
  - Monthly Meeting with a team of 20 experts across the country
  - Mentorship from one of the leaders of the Leadership Development Program for Simulation Educators
  - Multiple opportunities to identify personal strengths and opportunities for growth
  - Participation in a team-based research project with other experts across the country

Simulation Collaboration – NLN Leadership Development Program for Simulation Educators



References

- Aebersold, Michelle. (2016). The History of Simulation and Its Impact on the Future. AACN Advanced Critical Care. 27(1), 56-61
- Aggarwal, Rajesh Der, Mytton, Oliver T., Derbrew, Milliard, Hananel, David, Heydenburg, Mark, Issenberg, Barry, MacAulay, Catherine, Mancini, Mary Elizabeth, Morimoto, Takeshi, Soper, Nathaniel, Ziv, Amitai, and Rznick, Richard. (2010). Training and Simulation for Patient Safety. *Qual. Saf. Heath Care.* 19 (supp2),i34-i43
- Botezatu, Micdhaela, Hult, Hakan, Fors, Uno G. (2010). Virtual Patient Simulation: What Do Students Make of IT? BMC Medical Education. 10:91 Retrieved 9/27/16 at: http://www.biomedcentral.com/1472-6920/10/91.
- Burdall, Oliver. (2016). 3D printing to Simulate Laparoscopic Choledochal Surgery. Journal of Pediatric Surgery. 51(5). 828-831.
- Cates, LeighAnn. (2011) Simulation Training, A Multidisciplinary Approach. *Advances in Neonatal Care.* 11(2), 95-100.
- Fonseca, Luciana Mara Monti; Dias, Danielle Monteiro Vilela; Goes, Fernanda Dos Santos Nogueira; Seixas, Carlos Alberto; Scochi, Carmen Gracinda Silvan; Martins, Jose Carlos Amado; Rodrigues, Manuel Alves. (2014). Development of the e-Baby Serious Game with Regard to the Evaluation of Oxygenation in Preterm Babies. Computers, Informatics, Nursing. 32 (9), 428-436.
- Kennedy, Joshua. (2013). High-Fidelity hybrid Simulation of Allergic Emergencies Demonstrates Improved Preparedness for Office Emergencies in Pediatric Allergy Clinics. 1 (6). 608-17,e1-14.
- Kohn, Linda T., Janet M. Corrigan, and Molla S. Donaldson, eds. *To err is human: building a safer health system*. Vol. 6. National Academies Press, 2000.
- Nickerson, Michael, Pollard, Melissa (2010). Mrs. Chase an*Journal of Allergy and Clinical Immunology in Practice.* d Her Descendants: A Historical View of Simulation. *Creative Nursing,* 16 (3), 101-105
- Ricciardi, Francesco, and DePaolis, Lucio Tommaso. (2014). A comprehensive Review of Serious Games in Health Professions. *International Journal of Computer Games Technology*. 2014, pgs 11. Retrieved 9/27/16 at http://dx.doi.org/10.1155/2014/787968,.
- Wang, R., Demaria S Jr., Goldberg, A., Katz, D. (2016). A Systematic Review of Serious Games in Training Health Care Professionals. *Simul Healthcare.* 11(1) 41-1.

References - Videos

- Resusi –Annie: https://video.search.yahoo.com/yhs/search;_ylt=A2KLqIMJK_1Xwn4AGMEsnIlQ;_ylu=X3oDMTBncGdyMzQ0BHNlYwNzZWFyY2gEdnRpZAM;_ylc=X1MDMTM1MTE5NTY5MgRfcgMyBGJjawMlMjIxbjcwaG5sYWo2MzFxJTI2YiUzRDMlMjZzJTNEOWolMjIEZnlDeWhzLW1vemlsbGEtMDA0BGdwcmlkA3p3dGFnSEpYUWlHbXJBYjlFVHlPcUEEbXRlc3RpZANudWxsBG5fcnNsdAM2MARuX3N1Z2cDMQRvcmlnaW4DdmlkZW8uc2VhcmNoLnlhaG9vLmNvbQRwb3MDMARwcXN0cgMEcHFzdHJsAwRxc3RybAMxMgRxdWVyeQNyZXN1c2NpIGFubmUEdF9zdG1wAzE0NzYyMDk1OTgEdnRlc3RpZANudWxs?gprid=zwtagHJXQiGmrAb9ETyOqA&pvid=xKBQCjk4LjEbnBG9VTMMOgK5NjguMQAAAADJ.J5G&p=resusci+anne&ei=UTF-8&fr2=p%3As%2Cv%3Av%2Cm%3Asa&fr=yhs-mozilla-004&hsimp=yhs-004&hspart=mozilla#id=9&vid=374744e2aebc7802cd1278dff1992b5e&action=view
- Monsters Inc: https://www.youtube.com/watch?v=Z9C0yVgTcbs
- CPR Scenario: https://video.search.yahoo.com/yhs/search;_ylt=A2KLqID0Kv1XGCIAv1QsnIlQ;_ylu=X3oDMTBncGdyMzQ0BHNlYwNzZWFyY2gEdnRpZAM;_ylc=X1MDMTM1MTE5NTY5MgRfcgMyBGJjawMlMjIxbjcwaG5sYWo2MzFxJTI2YiUzRDMlMjZzJTNEOWolMjIEZnlDeWhzLW1vemlsbGEtMDA0BGdwcmlkAzladDlRekY2UldTcXNGY3BSa2lyX0EEbXRlc3RpZANudWxsBG5fcnNsdAM2MARuX3N1Z2cDMARvcmlnaW4DdmlkZW8uc2VhcmNoLnlhaG9vLmNvbQRwb3MDMARwcXN0cgMEcHFzdHJsAwRxc3RybAMyNgRxdWVyeQNleGFtcGxlcyBvZiBDUFlgc2ltdWxhdGlvbgR0X3N0bXADMTQ3NjIwOTQxNwR2dGVzdGlkA251bGw-?gprid=9Zt9QzF6RWSqsFcpRkir_A&pvid=kQTKyzk4LjEbnBG9VTMMOgScNjguMQAAAADltmGx&p=examples+of+CPR+simulation&ei=UTF-8&fr2=p%3As%2Cv%3Av%2Cm%3Asa&fr=yhs-mozilla-004&hsimp=yhs-004&hspart=mozilla#id=1&vid=a46e96d852433e0291e916b9120f7dd9&action=view

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