Michigan Hospital Association – Keystone Spring Workshop

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HOW REAL IS REAL ENOUGH?

LEVERAGING LOW-FIDELITY/LOW COST HEALTHCARE SIMULATION

1. THE VALUE OF SIMULATION

Outline examples and features of simulation-based interventions that have demonstrated positive impact on clinical performance measures.

A. The definition of simulation has expanded over the last 10 years
   i. Audience response – free text what is simulation?

B. Simulation is an educational strategy, not a means unto itself
   i. There are 6 steps of curricular development – the choice of simulation as an educational strategy is number 4

C. There are key features associated with successful learning transfer in simulation (Cook et al., 2013)
   i. Deliberate Practice
   ii. Mastery Learning

D. The choice of simulation as a modality should be targeted based on learning objectives
   i. Just because we can use simulation, doesn't mean we should
   ii. Requires increased resources – so how can we justify the use of simulation?

E. The Phillips' ROI model provides a framework for describing value
   i. Based on Kirkpatrick – 4 levels of outcomes + ROI when there is tangible ($) benefit
      1. *Reaction*
      2. *Learning*
      3. *Application/Implementation*
      4. *Impact*

F. There is evidence that simulation can impact clinical performance…. Studies presented are limited to practicing clinicians (see reference list)

G. And evidence it can impact patient and institutional outcomes

i. Banner – Mock Code training associated with improved survival

ii. Advance Care Planning – cost savings

H. Value is impact as a function of cost… how can we decrease costs of simulation?

i. Efficiencies (learners per session)

ii. Facilitator costs

iii. Equipment costs – how real is real enough? This is the issue of fidelity

2. TYPES OF FIDELITY

Define three types of fidelity and their relationship to structuring simulation based encounters

A. Cost and Fidelity are two separate constructs although they can be linked

i. An SP is physically as real as a patient model can be – yet "cheaper" than a technologically advanced human patient simulator

B. There are 3 types of fidelity

i. (Dieckmann, 2007) described fidelity as a combination of 3 modes of thinking – physical, semantical, phenomenological – can think more simply as physical, conceptual, experiential

ii. The framework can be linked to learning domains of technical skill, knowledge, attitude/behavioral skills

iii. 3 examples showing variation in fidelity sub-types based on goals of simulation. Semantic fidelity may be enhanced by a 'fiction contract'. (Rudolph, 2007).

C. When structuring a simulation-based learning encounter, there are 3 primary components to consider, each with their own degree of realism

i. Patient – Clinical Facilities (Environment) – Clinical Encounter (Tun, 2015)

1. SP, mannequin, moulage, in-situ vs sim lab, equipment available

ii. Level of stress/cognitive load is the result of the combined complexity of these 3 areas, and stress can be beneficial or harmful depending on the learner level (Rudolph, 2007)

iii. The learners' interpretation of the realism will be based on their individual frames (Dieckmann, 2007). Example of resident feedback on Lyme-induced 3rd degree heart block case scenario

iv. Investing time in semantic (cognitive) fidelity can make up for lack of physical (Dieckmann, 2007)

D. Simulation fidelity should be targeted to maximize learning

i. Educator plays a critical role in creating realism through 'affordances' (Schoenherr, 2017)
ii. The construction is based on what is known about the learners' current knowledge, what is possible to see during in the encounter (what is reasonable to expect them to look for), will successful performance of the desired scenario actions meet the established learning objectives?
iii. Key component of Vygotsky ZPD – remove unnecessary problems ("noise"), while retaining learner's ability to problem-solve and learn (vs giving all the answers) [Wass, 2014]
iv. Challenge Performance Framework (Guadagnoli, 2012) - graphic

E. Take home message: fidelity is highly dynamic

i. Fidelity of the simulaTION not the simulaTOR is what's important.
ii. How the 3 components are developed in relation to the 3 domains of realism is related to context: learner, environment, learning objectives (known as modulators)

3. WHAT IS KNOWN ABOUT FIDELITY?

Summarize the contexts in which low fidelity simulation has resulted in positive outcomes

A. There are limitations to any current research on fidelity because of inconsistent terminology

i. There has been a call to action to eliminate the term 'fidelity' and replace with 2 domains: physical resemblance and functional task alignment (Hamstra, 2014),
ii. Functional alignment can be reframed to align with both conceptual and experiential fidelity within the Dieckmann framework
iii. The point is to be consistent in the terminology used.

B. For this audience, limited this discussion to clinical learners (vs students/residents)

i. Fidelity is contextual, phenomenological – not generalizable between different learner levels

C. What is the takeaway?

i. The use of HFS is no guarantee of learning transfer
ii. Multiple studies in novice learners show equivalent learning with lower fidelity
iii. Limited studies in practicing clinicians
iv. Environmental (in-situ) fidelity was valuable for identifying system issues, but no difference in knowledge acquisition (Sorensen, 2015)

4. EXAMPLES OF LOW-COST "LOW-FIDELITY" SIMULATION TOOLS

Describe at least 3 examples of low cost or low fidelity simulation tools

A. Knowledge

i. "serious games" – https://www.jumpsimulation.org/education/applications

ii. Septris - http://med.stanford.edu/septris/

B. Technical Skills

i. 3-D printing – cath trainer available at jumpsimulation.org

ii. Thoracotomy - https://simhacks.atavist.com/simhacks-throacotomy

C. SimHacks examples (see references at the bottom)

i. IV insertion trainers

ii. Pericardiocentesis

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