High-Fidelity Simulation-Based Athletic Training Education

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Today’s Presentation

• History of simulation-based education
• Components of high-fidelity simulation-based teaching and learning activities
• Evidence-based learning outcomes
• The next steps; further incorporating high-fidelity simulation into the AT curriculum

Thank you Jenna Doherty-Restrepo for sharing presentation content and multi-centered collaborative study (HARVEY)
✓ History of simulation-based education

• Components of high-fidelity simulation-based teaching and learning activities
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• The next steps; further incorporating high-fidelity simulation into the AT curriculum
What is Simulation?

• Immersion of a student in a realistic scenario created within a person, device, or set of conditions which attempts to present education and evaluation problems authentically.

• The reality of the simulation is directly affected by the fidelity of the elements.
  • Low-Fidelity verses High-Fidelity

Realism necessary to suspend disbelief and become fully-immersed in a scenario.
High-Fidelity Simulation Hardware and Software
Advantages to high-fidelity simulation

• Provides students with deliberate practice opportunities

• Opportunity to practice clinical skills in a safe environment without causing harm to the patient.

• Use of critical thinking and active learning to build practice in integrating basic clinical teaching and advanced clinical decision making skills.

• Provides the student with a real clinical problem under the pressure of a realistic simulation.
• History of simulation-based education

✓ Components of high-fidelity simulation-based teaching and learning activities

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Planning for High-Fidelity Simulation

• Educator’s planning (+ my role in CPR simulation)
  • Focus on skills just taught or learning over time model
  • Include skills and critical thinking appropriate for the scenario
  • Develop appropriate scenario objectives
  • Scenarios can be pre-programmed or “on the fly”
Simulation

• Length of time dependent on skill, goals, and fidelity level.

• Students may respond individually or as group
  • Advantage of group = communication, teamwork.
  • 2-5 participants per group is generally best

• Educators’ role = observation

• Students’ role = either participant or observer

Debrief

• The main learning experience!
• Allows the student to reflect on their performance, actions they took, and any actions they would change when presented with a similar scenario.
• Can use video review, scenario output report and observer reports
• Educators’ goal in debriefing = “coach on the side”.
• Develop reflection skills - The ability to learn to have these kinds of constructive and collegial self reviews is a key component to on-going quality improvement in the practice world.
Post-Debrief

- Opportunity to repeat simulation
- Further reflection
• History of simulation-based education
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Best evidence practice for effective simulation based teaching/learning suggests that high-fidelity medical simulations facilitate learning under the right conditions, which include:

- Provide **feedback** during the learning experience.
- Learners should repetitively **practice** skills.
- Integrate simulators into the overall **curriculum**.
- Learners should practice increasing levels of **difficulty**.
- Adapt the simulations for multiple **learning** strategies.
- Ensure the simulator provides for clinical **variation**.
- Learning should occur in a **controlled** environment.
- Provide **individualized** (in addition to **team**) learning.
- Clearly define **outcomes** & benchmarks for the learners.
- Ensure the simulator is a **valid** learning tool. (level of fidelity)
Meta-analysis – 609 studies assessing 35,226 students

In comparison with no intervention, simulation training in health professions education is consistently associated with large effects for outcomes of knowledge, skills, and behaviors.


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Deliberate Practice

• Deliberate practice focuses on constant skill improvement, not just skill maintenance.

• “Randomness” of clinical experiences – Could be a problem if you rely on traditional clinical education or field experience alone to assure that students gain the needed skills that they have to master.

• Considerations:
  • Some students may never have some experiences
  • Some may not have enough
  • Rarely are we evaluating performance after the experience to assure that students have mastered the skill.
Simulation-based Medical Education with Deliberate Practice Yields Better Results than Traditional Clinical Education

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<tr>
<th>Study</th>
<th>N</th>
<th>Competency Assessed</th>
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<tbody>
<tr>
<td><strong>Randomized Trials</strong></td>
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<tr>
<td>1. Wayne et al, 2005</td>
<td>38</td>
<td>Advanced cardiac life support</td>
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<tr>
<td>2. Ahlberg et al, 2007</td>
<td>13</td>
<td>Laproscopic choleystectomy</td>
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<tr>
<td>3. Andreatta et al, 2006</td>
<td>19</td>
<td>Laproscopic skills</td>
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<tr>
<td>4. Korndorffer et al, 2005</td>
<td>17</td>
<td>Laproscopic suturing</td>
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<tr>
<td>5. Korndorffer et al, 2004</td>
<td>20</td>
<td>Laproscopic camera navigation</td>
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<tr>
<td>6. Van Sickle et al, 2008</td>
<td>22</td>
<td>Intracorpeal suturing</td>
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<td><strong>Cohort Studies</strong></td>
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<td>7. Issenberg et al, 2002</td>
<td>98</td>
<td>Cardiology skills</td>
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<tr>
<td>8. Barsuk et al, 2009</td>
<td>18</td>
<td>Dialysis catheter insertion</td>
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<tr>
<td>9. Butter et al, 2010</td>
<td>108</td>
<td>Cardiac auscultation</td>
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<tr>
<td><strong>Case Control Studies</strong></td>
<td></td>
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<tr>
<td>10. Wayne et al, 2008</td>
<td>78</td>
<td>Advanced cardiac life support</td>
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<tr>
<td><strong>Pre-Post Baseline Studies</strong></td>
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<tr>
<td>11. Wayne et al, 2008</td>
<td>40</td>
<td>Thoracentesis skills</td>
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<tr>
<td>12. Barsuk et al, 2009</td>
<td>41</td>
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✓ The next steps; further incorporating high-fidelity simulation into the AT curriculum
• Historically AT education (as well as with other medical training) went from books/classroom to field training/real world

• Long learning curve
  • Students “wait” for something to happen to apply skills at clinical site
  • May never happen
  • May not be able to apply skills
Simulation (versus clinical experience alone) provides opportunity for deliberate practice/reinforcement

- Impacts learning, confidence, and competence
• New paradigm in AT Education should be Classroom – Simulation – Field.

• In this model each student is assured exposure to all clinical experiences, there are opportunities for practice and mastery learning, and opportunities for confidence and competency development and skill validation.
High-Fidelity Simulation Integration

• Many skills are practiced using low-fidelity simulation
  • Considerations:
    • Realism factor?
    • Critical thinking?
    • Ability to integrate skill into larger picture/treatment?
    • Opportunity for feedback/debriefing?
    • Opportunity for practice or re-testing?
4 Steps to close the loop
High-Fidelity Simulation Integration into AT curriculum

1. Identify weaknesses in student knowledge and/or skills
2. Identify low incident events at clinical sites
3. Revise courses/curriculum
4. Increase collaboration among department (and interprofessional/interdepartment)
Break out Application

Auscultation training in athletic training education using varying levels of simulation.
Wrap up - Today’s Presentation

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Thank you for your time. Kristin Tivener, MET, ATC/L, Tona Hetzler, Ed.D., ATC/L