Using Simulation to Reinforce Basic Science Content

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HPSN World
2017
Learning Objectives

• Learn an approach to elicit Basic Science content with Simulation
• Understand how to engage the student with Simulation for Basic Science Content
• Gain an understanding of the facts on the use of Simulation in Basic Sciences
• Learn of ways to improve Basic Science Simulation
Simulate Basic Sciences
Can it be done?

My First Impression

• Personal Medical School Reflection
• High Fidelity Simulation
• Addressing Learning Styles
• Basic Sciences Come to Life
Simulate Basic Sciences
How was it done?

Initial Basic Science Simulation:
• Medical School Sim Center
• Voluntary participation
• Two Osteopathic Medical Students
  – One First Year
  – One Second Year
Simulate Basic Sciences
How was it done?

Initial Plan:

• Assessment

• Tailored to students needs

• Clinical Case to elicit basic science info
Simulate Basic Sciences
How was it done?

Working Plan: (Day One-See the Patient First)

• Reinforce Anatomy/Physiology
  – Abnormal to Normal
  – Sim Case of System
  – Verbal Communication of focused Physical Exam Results
  – Supplement: Sketch/Textbook/Video
Simulate Basic Sciences
How was it done?

Working Plan: (Day Two- Medications)

• Quick Review of Day One
• Case specific meds effect the focused system based off tissue type and receptor
• Show effects of meds with simulation
Simulate Basic Sciences
How was it done?

Working Plan: (Day Three- Assess learning)

Simulated Case of System

– Pre-brief
– Simulation: Verbal Basic Science Questions and Answer during Simulation
– De-brief
Simulate Basic Sciences
Outcome

**Student 1:** No longer failing, found study style, and now understands the clinical relevance of the basic sciences. Currently studying for COMLEX 1.

**Student 2:** I wish this could be the main way to learn the information. It was more understandable with a case and ability to hear and see what I have read. Passed COMLEX 1 currently in 3rd year.
Simulate Basic Sciences
The FACTS!

AAMC Survey

• The AAMC (Association of American Medical Colleges), working jointly with the Society for Simulation in Healthcare (SSH), the Association for Standardized Patient Educators (ASPE), and the American Association of Colleges of Nursing (AACN) developed a survey to better understand how medical schools and teaching hospitals are using simulation for education and assessment and determine the operational impact of simulation at AAMC-member institutions.

• The survey was distributed to 133 AAMC-member medical schools and 263 teaching hospitals January through March of 2010.

• The combined cohort used for analysis included 90 (68% response rate) medical schools and 64 (24% response rate) teaching hospitals.
Simulation in the Curriculum

The FACTS!

<table>
<thead>
<tr>
<th></th>
<th>1st year</th>
<th>2nd year</th>
<th>3rd year</th>
<th>4th year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medical School</strong></td>
<td>84%</td>
<td>91%</td>
<td>94%</td>
<td>89%</td>
</tr>
<tr>
<td><strong>Teaching Hospital</strong></td>
<td>22%</td>
<td>28%</td>
<td>55%</td>
<td>69%</td>
</tr>
</tbody>
</table>

**Most Common Content**
- Clinical Skills
- Intro Clinical Medicine
- Physical Diagnosis

**Most Common Content**
- Internal Medicine
- Pediatrics
- Emergency Medicine

**Most Common Content**
- Emergency Medicine
- Obstetrics-Gynecology
- Internal Medicine

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Practice with a Purpose
Simulation in the Curriculum
The FACTS!

AAMC Survey-Pre-Clinical Years:
• Systems Based
• Basic Science- Path, Pharm, Physio (3P’s)
• Clinical Skills- History and Physical Diagnosis
Simulation in the Curriculum
The FACTS!
Simulation in the Curriculum
The FACTS!

- Core Competencies: 6-Allopath 7-Osteopath
  (Uniformity of Medical Education but allows for unique and creative design)
  - Patient Care
  - Medical Knowledge
  - Practice-Based Learning and Improvement
  - Interpersonal and Communication Skills
  - Professionalism
  - Systems-Based Practice
  - Osteopathic Philosophy and OMM
# Simulation in the Curriculum

The FACTS!

<table>
<thead>
<tr>
<th></th>
<th>Education</th>
<th>Assessment</th>
<th>QI or Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical knowledge</td>
<td>(86) 96%</td>
<td>(80) 89%</td>
<td>(46) 51%</td>
</tr>
<tr>
<td>Patient care</td>
<td>(88) 98%</td>
<td>(78) 87%</td>
<td>(50) 56%</td>
</tr>
<tr>
<td>Interpersonal</td>
<td>(88) 98%</td>
<td>(81) 90%</td>
<td>(47) 52%</td>
</tr>
<tr>
<td>communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professionalism</td>
<td>(83) 92%</td>
<td>(75) 83%</td>
<td>(34) 38%</td>
</tr>
<tr>
<td>Practice-based</td>
<td>(65) 72%</td>
<td>(53) 59%</td>
<td>(22) 24%</td>
</tr>
<tr>
<td>learning/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>improvement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System-based</td>
<td>(63) 70%</td>
<td>(42) 47%</td>
<td>(22) 24%</td>
</tr>
<tr>
<td>practice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychomotor tasks</td>
<td>(81) 90%</td>
<td>(68) 76%</td>
<td>(37) 41%</td>
</tr>
<tr>
<td>Leadership</td>
<td>(62) 69%</td>
<td>(41) 46%</td>
<td>(25) 28%</td>
</tr>
<tr>
<td>Team training</td>
<td>(78) 87%</td>
<td>(52) 58%</td>
<td>(40) 44%</td>
</tr>
<tr>
<td>Critical thinking/</td>
<td>(82) 91%</td>
<td>(72) 80%</td>
<td>(38) 42%</td>
</tr>
<tr>
<td>Decision making</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Usage</td>
<td>86%</td>
<td>71%</td>
<td>40%</td>
</tr>
</tbody>
</table>
Simulate Basic Sciences
How can we Improve?

• Curriculum
  – Implement Simulation into Curriculum to Assess Basic Sciences (ARCOM)
  – Core Competency-Medical Knowledge
  – Basic Science Course Learning Objectives (Simulation Integrated)
  – Sim Case Written to Assess Basic and Clinical Concepts
Simulate Basic Sciences
How can we Improve?

• Facilitators Prospective
  – Teaching with Simulation
  – Semi Autonomous Simulation
  – Fully Autonomous Simulation
Simulate Basic Sciences
How can we Improve?

• Facilitators Tools for Assessment
  – Dreyfus Model (adjust for basic science knowledge acquisition)
  – Develop Basic Science Knowledge Checklist
Facilitators Tool for Assessment

Dreyfus Model Of Skill Acquisition

**Expert**
1. Transcends reliance on rules, guidelines, and maxims
2. Intuitive grasp of situations based on deep understanding
3. Has a vision of what is possible
4. Uses an analytical approach in new situations

**Proficient**
1. Holistic view of situation
2. Prioritizes importance of aspects
3. Perceives deviations from the normal pattern
4. Employs maxims for guidance, with meanings that adapt to the situation at hand

**Competent**
1. Coping with crowdedness (multiple activities, accumulation of information)
2. Some perception of actions in relation to goals
3. Deliberate planning
4. Formulates routines

**Advanced Beginner**
1. Limited situational perception
2. All aspects of work treated separately with equal importance

**Novice**
1. Rigid adherence to taught rules or plans
2. No exercise of discretionary judgment
Simulate Basic Sciences
How can we Improve?

- Facilitators Tools for Assessment
  - Dreyfus Model (adjust for basic science knowledge acquisition)
  - Develop Basic Science Knowledge Checklist
## Facilitators Tool for Assessment

<table>
<thead>
<tr>
<th>Suture Task Checklist</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Recognizes that the wound should be sutured</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Enquires re: tetanus status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Mentions anesthetic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Sterile technique (gloves)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Adequate irrigation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Selection of appropriate instruments and suture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Correct placement of needle in needle driver</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Perpendicular penetration and exit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Bite no closer than 0.5cm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Equal bites on either side of wound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Curvature of needle followed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Smooth passage of needle, no hesitancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Instrument tie technique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Initial double wrap throw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Square knot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. At least 3 knots</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Leaves 0.5cm after cutting suture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Minimum 3 sutures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Stitch perpendicular to wound edge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Adequate eversion of wound edge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Discuss correct time for removal (prompted by instructor) (face, hands=5-7 days. Rest=7-10 days)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Wound care</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Simulation Case Template

Simulated Clinical Experience
Patient Scenario –

Synopsis of Scenario-

Setting-

History/Information *(only provide history information if asked)*
HPI:

Allergies:
Current Medication:
Immunizations:
PMH:
Surgical History:
Family History:
Social History:
ROS:

Learning Objectives

1-Demonstrates proficiency in conducting a primary and secondary assessment.
2-Demonstrate ability to apply basic sciences to justify clinical reasoning

Monitors required and/or Provider’s orders:
# Simulation Case Template

## Specific Equipment and Supplies Required

<table>
<thead>
<tr>
<th>IV Supplies</th>
<th>Intubation Supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV Infusion Set</td>
<td>Endotracheal Tube-(4.5 or 5.0 mm)</td>
</tr>
<tr>
<td>IV Fluid</td>
<td>Laryngoscope with Miller and Mac Blades (#2)</td>
</tr>
<tr>
<td>IV Arms to Start IV infusion (1 arm)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Genitourinary Supplies</th>
<th>Oxygen, Airway</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Nonrebreather face mask</td>
</tr>
<tr>
<td></td>
<td>Nasal cannula</td>
</tr>
<tr>
<td></td>
<td>Bag valve mask</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Medication Supplies</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottles of Saline with the labels created to simulate parenteral medications</td>
<td>Tape, Gauze, Alcohol Wipes, Rubber tourniquet</td>
</tr>
<tr>
<td>Syringes and needles</td>
<td>Lots</td>
</tr>
<tr>
<td>Epinephrine Pen</td>
<td>Lots</td>
</tr>
<tr>
<td></td>
<td>Lots</td>
</tr>
<tr>
<td></td>
<td>Lots</td>
</tr>
<tr>
<td>Lab Supplies</td>
<td>Lots</td>
</tr>
<tr>
<td>Vacutainer tubes</td>
<td>Lots</td>
</tr>
</tbody>
</table>

## Notes
1. 
2. 
3. 

## References
# Simulation Case Template

<table>
<thead>
<tr>
<th>Scenario States</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>State</strong></td>
</tr>
<tr>
<td><strong>State #1:</strong> Initial Evaluation at Instructor Note:</td>
</tr>
<tr>
<td><strong>Transition:</strong></td>
</tr>
</tbody>
</table>
Simulation Case Template

Prompts, Questions and Teaching Points:

Reference Materials:
Summary

• Basic Science Simulation
  – Interactive Learning
  – Learning Styles
• Curriculum
  – Core Competencies
  – Anatomy and 3P’s
• Develop Assessment tools
• Cases written to assess basic sciences
Reference

“Medical Simulation in Medical Education: Results of an AAMC Survey”
https://www.aamc.org/download/259760/data
Thank You!