AACP Simulation Webinar

Amy L. Seybert, PharmD, FASHP, FCCP
Department Chair, Pharmacy and Therapeutics
University of Pittsburgh School of Pharmacy

Erica Ottis, PharmD, BCPS
Clinical Assistant Professor
University of Missouri-Kansas City at MU
Overview

• High Fidelity Human Patient Simulators
• Integration throughout pharmacy curriculum
• Assessment
• CE programs
• Patient and Medication Safety
University of Pittsburgh School of Pharmacy
and Peter M. Winter Institute for Simulation Education and Research (WISER)
PK/PD Programming
• Vital signs
• Hemodynamic monitoring
• Intubation
• Line placement
• Defibrillation
• Medication administration
• Voice commands
• Over 10,000 heart rhythms and sounds
1994 - Human Patient Simulation Begins at the University of Pittsburgh

1999
- Intro Critical Care
- Pharmacotherapy of CV Disease

2000
- EL Cardiology Specialty Residency

2003
- Critical Care Specialty Residency

2006
- Continuing Education - School of Pharmacy

2007
- Teach Me to Teach You

2008
- PGY1 Residency
- FM Residency
- PGY2 Residency

2010
- ACIE Innovation in Teaching Award: Pitt Profession of Pharmacy

- Validation of Grading Rubric
- Pharmacokinetic/pharmacodynamic programming for crisis team training course

Skills Assessment
- Problem Solving Skills
- Medication Administration Errors
- Satisfaction/Confidence

Biochemistry

Teaching/Course
- Clinical Exams

Research
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Example of Integration into Curriculum

P1-Physical Assessment

P-1 Biochemistry

- Acid-Base Disorders
  - Henderson-Hasselbalch equation
  - pKa and pH
  - Calculation of base deficit
- Practical application
  - Lactic Acidosis due to Metformin overdose
- Debriefing Viewer
  - Video of case scenario
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Example of Integration into Curriculum

P2-Pharmacotherapy of Cardiovascular Disease
SBL: Critical Thinking Skills

• Final session:
  • MI, ACS, NSTEMI, etc
  • Hypertensive Crisis
  • HF requiring inotrope
  • HF volume overload
  • Vtach +/- pulse
  • Vfib
  • Atrial Flutter
  • Atrial Fibrillation
  • Torsades de Pointe
  • Stroke, PE, DVT

• Includes:
  • Physical Assessment
  • Chart interpretation
  • Pharmacotherapy decision making skills
  • Patient counseling
Acute Care Simulation

- Immersive, dual technology course
- P3 elective
- iPad/smartphone app
Residency Training

- Teaching technology
- Assessment development
- Practical teaching opportunities
- Course development
- Patient case scenarios
- ACLS/Crisis Training
- Research
Continuing Education Programs

- Chronic Care of Patients with Cardiovascular Disease
  - Physical Assessment
  - Hypertensive Case Scenarios
  - Acute Myocardial Infarction
  - Patient Counseling
  - Blood Glucose Monitoring
Debriefing Sessions

• Allows for immediate feedback
• Programmable for point totals, additional references, etc.
• Able to print to give to each group as soon as simulation is complete
• Puts real time value with each decision
Debriefing

Date: 29.09.2008  Time: 15:27:31

Cardiogenic Shock 2 20 08 assessment

00:00:00  Scenario started: Cardiogenic Shock 2 20 08 assessment
00:00:00  Name: Adam Freeman  Age: 75 years  Weight: 85 kg  Height: 73 inch  Gender: Male
00:00:00  HR: 106  BP: 90/60  SpO₂: 96  PAP: 25/10  etCO₂: 35 mmHg  T blood: 37.9 °C  etO₂: 16

00:00:10  01. Appropriate introduction
00:00:10  ✓ Correct, you must inform the patient of your role as the pharmacotherapy expert caring for them. Points = 5
00:00:10  01. Asked patient for chief complaint
00:00:13  ✓ Correct step, the patient's chief complaint is extremely important. Points = 1
00:00:15  04. Did not ask for history of present illness
00:00:15  x The history of present illness is extremely important. This is a key element in the critical thinking process for patient assessment and guides treatment decisions. Points = 0
00:00:16  06. Did not ask for family history of CV disease
00:00:19  01. Determined patient's PMH
00:00:19  ✓ Go to position videos. Double-click to play from this point. Right-click to insert/edit comment.
00:00:22  01. Obtained appropriate medication history
00:00:22  ✓ This is a key role for pharmacists, good job. Points = 8
00:00:25  02. Did not obtain patient's allergies
00:00:25  x This is a key element of developing the plan, this could be a fatal error if you do not obtain this information. Points = 0
00:00:33  02. Does not interpret laboratory data
00:00:33  x Incorrect, please remember to treat the patient first, the numbers/labs will help to guide therapy. Points = 0
00:00:36  04. Does not ask for further lab testing if needed
00:00:36  06. Does not interpret data from procedures or tests
00:00:36  x You will need to collaborate with other members of the interprofessional team to interpret data from tests and procedures. Points = 0
00:00:37  08. Does not ask for further procedure and test data
00:00:37  x Incorrect, more data is needed. Points = 0

Level of Detail

Play

Sound

View

Exit  Save

Time: 0:00
Comparison of Simulation-Based Training vs. Traditional Didactic Lecturing on Medication Administration Errors in the ICU

Types of Errors: Baseline Data

- Drug Prepared Incorrectly: 12%
- Expired Product: 4%
- Improper Dose or Quantity: 15%
- Mislabeling: 4%
- Omission: 32%
- Wrong Administration Technique: 24%
- Unauthorized or Wrong Drug: 1%
- Prescribing: 7%
- Wrong Route: 1%
Results: Comparison of Error Rates

<table>
<thead>
<tr>
<th>Observation Period</th>
<th>Medical ICU (Traditional Lecture)</th>
<th>Cardiac Care Unit (Simulation Based Training)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># doses observed</td>
<td>Error rate (%)</td>
</tr>
<tr>
<td>Baseline</td>
<td>159</td>
<td>20.8</td>
</tr>
<tr>
<td>Post-Intervention 1</td>
<td>172</td>
<td>22.7</td>
</tr>
<tr>
<td>Post-Intervention 2</td>
<td>147</td>
<td>36.7*</td>
</tr>
</tbody>
</table>

*Comparison between post-intervention and baseline; p<0.05
Results: Subjective Assessment

- I would like more in-services like this
- I learned something from this in-service
- I prefer this teaching method
- I enjoyed participating in this in-service
- This in-service was beneficial

CCU MICU

<table>
<thead>
<tr>
<th>Category</th>
<th>CCU</th>
<th>MICU</th>
</tr>
</thead>
<tbody>
<tr>
<td>More in-services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learned something</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefer teaching method</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enjoyed participating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-service was beneficial</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Simulation at UMKC
Objectives

• Understand different techniques to maximize the use of high-fidelity mannequins
• Describe a hybrid simulation model and ways to incorporate standardized patients into simulation learning
• Discuss various approaches to assessing student performance and giving feedback for simulated activities
Educational Environment

- The UMKC School of Pharmacy at University of Missouri
  - Location in Columbia, MO
- Enrolls 28 students in each academic year
- Students complete all didactic coursework and IPPEs at Columbia location
- All simulations developed to date have been for P3 IPPE students
- Russell D. & Mary B. Shelden Clinical Simulation Center
  - [som.missouri.edu/SimCenter/](som.missouri.edu/SimCenter/)
  - 4 simulation rooms
  - 2 observation and control rooms
  - 8 examination rooms
Observation Room

Exam Room

American Association of Colleges of Pharmacy (AACP)
Discover • Learn • Care: Improve Health
Use of Simulation Center Technology

• Video/Audio (live & recorded)
• Mannequin Microphone
• Bells & Whistles
• iPads
  – Lexi-Comp
  – Incorporation of EMR
High Fidelity Mannequins

- The HAL® Mobile Team Trainer (Gaumard)
- Pharmacy faculty provided mannequin responses
- Simulation center staff remotely operated the mannequin

- The mannequin simulated:
  - Wheezing
  - Crackles and Rales
  - Cyanosis
  - Angioedema
  - Palpable pulse
  - Systolic murmur
Maximizing the use of high fidelity mannequins

• Through the use of moulage the mannequin also simulated:
  – Splinter Hemorrhages
  – Osler’s Nodes
  – Peripheral Edema
  – Jugular Venous Distention

• Use of walk in/out of room
  – Allow for prop and mannequin resetting
  – Progression of days
Moulage Kits
Maximizing the use of high fidelity mannequins

• Props
  – Demonstration inhaler
  – Can of soup- diet education
  – “Code Box”
  – IV bags/medications with Rx labels
Simulations Developed

• Acute asthma exacerbation
• Heart failure exacerbation
• Infective endocarditis with anaphylaxis
• Septic shock
• Series of Anticoagulation clinic visits
• Pharmacotherapy clinic visit
  – Physical Assessment
Simulation Objectives

• Expose students to acute clinical situations that might not otherwise present during IPPE
• Allow students to become more comfortable with a multi-disciplinary team approach
• Allow students to develop confidence prior to starting APPEs in an environment that does not compromise patient care
Simulation Components

• Case Work-up
  – Students worked in groups with notes to develop an assessment of the patient

• Clinical Simulation
  – Lexi-Comp provided as a drug information source

• Debrief Session
  – Pre-developed PowerPoint outline
  – Case discussion led by pharmacy faculty/residents
Hybrid Simulation Model

• High Fidelity Mannequin + Standardized Patient = Greatest Success at UMKC
  – Less of the “deer in headlights” reaction
  – More natural communication
  – More professional
  – Allowed for external feedback
Standardized Patients (SPs)

- Prior to the simulation day, SPs were trained and provided with specific cues to follow during the simulation.
- SPs displayed specific emotional responses including concerns regarding the patient’s well-being, home medications, and dietary needs.
The Roles

– Physician: Pharmacy Faculty
– Nurse: Hospital RN and/or Clinical Nursing Faculty
– Family Member: Standardized Patient
– Simulation Observers and Debriefers: Pharmacy Faculty and Pharmacy Practice Residents
Developing the Simulation Cases

- Ensuring consistency of experience case-to-case
  - Drug-drug interaction
  - Drug-disease interaction
  - Calculations (dose and rate)
  - Physiologic response to medication
  - Education
    - Patient, Caregiver, or Healthcare Team Member
  - Acutely stressful
Have a Practice Session…or Two!

• Ensure all individuals from the script have direction
  – No gaps
  – Ensure assumptions/inferences are true
  – Input from physicians, nurses, and technicians

• How long does everything actually take?
  – Changing mannequin effects
  – “Administering” medication/Writing orders

• Is there enough manpower?
Assessment

• Reflection of learning objectives
  – Knowledge
    • Pre and Post quiz specific to each simulation scenario
    • Observer checklist
  – Skills/Communication
    • Pre and Post Likert based confidence survey
    • Observer checklist
  – Attitude
    • Pre and Post Likert based satisfaction survey
    • Satisfaction survey also allowed freeform comments
    • Verbal feedback during debriefing session
Knowledge retention was significantly higher among simulation participants versus student controls (50.8% vs. 48.7%, p=0.004)

Results: Confidence Survey

Table 3. Change in Pharmacy Students Confidence Level After Completing a High-Fidelity Patient Simulation Series

<table>
<thead>
<tr>
<th>Question</th>
<th>Percentage of Students With a Net Increase in Confidence</th>
<th>P&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using drug information resources to find appropriate answers</td>
<td>48</td>
<td>0.01</td>
</tr>
<tr>
<td>Identifying medication errors</td>
<td>70</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Communicating with physicians, nurses and other healthcare providers</td>
<td>78</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Making clinical recommendations to a healthcare provider regarding</td>
<td>78</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>medication regimen adjustments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working up clinical cases in a limited time frame</td>
<td>67</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Writing drug orders in a patient chart</td>
<td>62</td>
<td>0.03</td>
</tr>
<tr>
<td>Looking up patient information in an electronic medical record</td>
<td>52</td>
<td>0.023</td>
</tr>
<tr>
<td>Calculating drip rates for intravenous medications</td>
<td>56</td>
<td>0.003</td>
</tr>
<tr>
<td>Identifying drug-drug interactions</td>
<td>78</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Identifying physiologic effects of drugs on the human body</td>
<td>70</td>
<td>0.011</td>
</tr>
</tbody>
</table>

<sup>a</sup> P values demonstrate a change in the positive direction with matched student identifiers.
Challenges at UMKC

• 2 soon to be 3 locations
• Creating the same experience for all students
• More “high-stakes” simulations to assess achievement of curricular outcomes
• Cost
Interprofessional Simulation Curriculum at MU

• 300 students
• Medicine, Nursing, Pharmacy, Respiratory Therapy, HMI
• Focus on patient safety
• 4 week curriculum
  – Didactic lecture
  – Small groups
  – ER simulation
Questions?
SURVEY LINK:
HTTP://BIT.LY/TIPEL_SIG_EVAL

Gaming in Pharmacy Education – March 2012