Sim Lab Success

A Novel Curriculum Bridging the Gap Between Didactics and Bedside

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Genesis

- Resident: “I don’t feel comfortable running codes on the floor. I was at [X] institution, and they have a sim lab where they do [Y].”

ECU BSOM Clinical Simulation Center Staff

Dr. Walter ”Skip” Robey – Assistant Dean for Clinical Simulation

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ECU Pulmonary Critical Care Fellows
















Equipment

HIGH-FIDELITY MANIKINS

Laerdal

SimMan 3G
SimMom
SimJunior
SimBaby
SimNewB

Gaumard

Hal S3201
Hal 5 y.o.
Hal 1 y.o.
Newborn Hal

B-line Video Debrief System

Defining the Scope of Simulation

- What's been done in the past with high-fidelity manikins in internal medicine?
  - Hypothetical case scenarios
    - What is the degree of clinical knowledge retention?
  - ACLS algorithm retention
  - Procedural skill retention

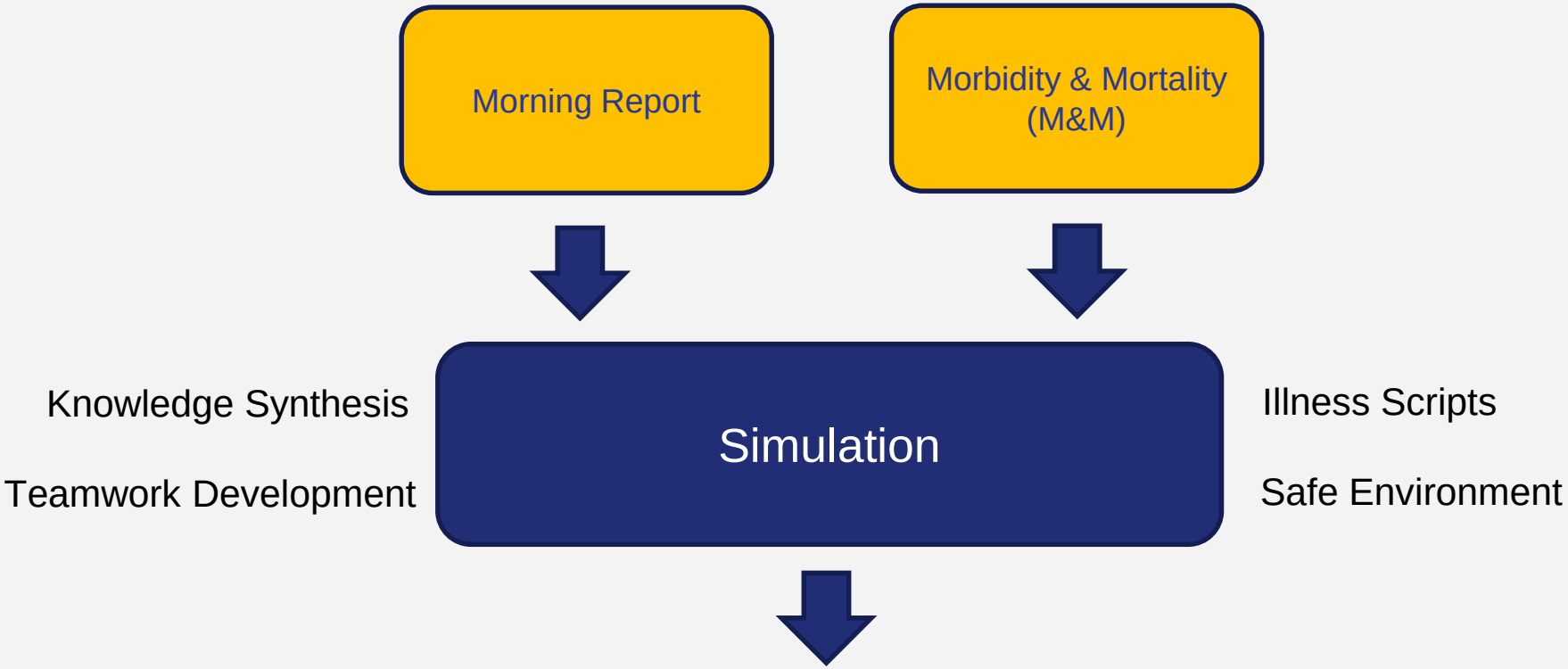
What can simulation do as an educational platform?

- Clinical knowledge retention?
- Quality and safety-based training
- Improve teamwork and communication
- Procedural skill retention

What can simulation do as an educational platform?

- Teamwork
  - Team leadership
  - Interdisciplinary & interprofessional
- Communication
  - Peers
  - Ancillary Staff
  - Improve patient hand off

Traditional Didactics



Improving clinical knowledge retention

- Goal directed approach to case design
  - Help learners develop “illness script”
  - Stress objective cues through working with manikins
    - “If you can succeed in sim lab, you can succeed on the floors”
- Bridging the gap between didactics and bedside in a safe learning environment

Improving clinical knowledge retention

- Focus on areas of weakness
  - Solicit feedback from collaboration partners
    - Pulmonology & Critical Care fellows
    - EM residents
    - Emergency Response Team

Five Core Cases

- Recognition & management of sepsis & septic shock
- Detect easily reversible causes of altered mental status
- Appropriate use of noninvasive ventilation for respiratory failure
- Approach to tachyarrhythmias
- Approach to refractory hypoxia

Goal Directed Case Design

- Learning objectives clearly predefined
- Case progression based on decision points tied to learning objectives
- Post simulation didactics to solidify learning objectives
- Pre & Post tests to evaluate knowledge retention

Case Walk Through

Sepsis in ESRD Patient

Objectives:

1. Define Sepsis and septic shock (use of qSOFA and SOFA)
    - Q-SOFA score:

      1) New/Worsened Altered Mentation? 2) RR ≥ 22? 3) Systolic BP ≤ 100?

    - SOFA score (see attached document for details)
2. Recognize septic shock and have a systematic approach for management
3. Plan for appropriate resuscitation with fluids despite being on HD.
    - Use 30cc/kg initial IVF then reassess for more IVF if needed
    - emphasize that being a HD patient should not cause us to under-resuscitate septic patients
4. Review components of cardiac output and the changes during septic shock to maintain end organ perfusion
5. Appropriate choice of vasopressors: when to start, which to use and at what dose.
6. Antibiotics to be started soon after recognition of septic shock

Scenario:

Most of history is provided by his friend who also adds that Mr. Brown has not been his energetic self since yesterday.

Stuart Brown is a 58 yo who works as a carpenter is brought in by his coworkers today after almost passing out at work. He has not been feeling well for the past 2 days and feels lightheaded today. His last dialysis was on 2 days ago. He has a history of medical noncompliance but in the past year he has been consistently taking his meds and not missed HD.

More information if trainees investigate patient's left hand dressing: He had a minor injury to his left hand a few days ago while hammering large nails, he used a T-shirt as dressing and resumed his work. The friend thinks he has not been eating as much as his usual self in last 2 days as he has skipped some meals to rest during breaks and was feeling unwell and did not take his pills since yesterday.

Meds: insulin, Norvasc, Hydralazine, Imdur, Coreg,
PMHx: DM2, HTN, ESRD on HD (MWF), CAD, neuropathy

Time (min)	Scenario Flow	Actions	VS for programming
0-3	Initial assessment	• assess ABC • Obtain IV access • place on monitor • obtain vitals	T : 102 BP 107 /65, HR 115, RR 28 SaO2 99% RA
3-4	Recognize septic shock give one bolus at a time citing access limitation for rate	• Obtain focused history • Focused physical exam • Check FS • Recognize this BP is low for this patient who is on multiple antihypertensive agents • IVF: trainee to verbalize what fluid, how much and how fast and through what route.	T : 102 BP 107 /65, HR 115, RR 28 SaO2 99% RA
4-5	Labs: LA 7	• IVF: 30cc/kg bolus • Reassess VS for fluid responsiveness and give more IVF • Once recognize septic shock, have to check cultures and start ABx.	T : 102 BP 99 /55, HR 130, RR 28 SaO2 99% RA

5-8	Patient remains in shock state state a few minutes have passed and all of your bolus fluid is in by now. emphasize that patient is a dialysis patient. <u>IF NO IVF in previous steps</u>, then have BP drop to 77 / 45 HR 140 <u>If not enough fluids given,</u> then have BP 95/55 HR 120	• review need for vasopressors for septic shock: when to start, which pressor, what dose and which route? • Consider more IVF	If appropriate IVF BP 99 /55, HR 99, If less IVF given BP 85 /45, HR 138, If no IVF given: BP: 72/35 HR 140

1. What are the Sepsis-3 Definitions of sepsis and septic shock?
    a. Sepsis:
    b. Septic Shock:
2. According to the Surviving Sepsis Campaign 2016 Guidelines, what are three immediate interventions in the management of patients with sepsis or septic shock?

3. In terms of initial resuscitation:
    a. How much is considered adequate fluid resuscitation in the first 3 hours?
    b. What is the blood pressure target?
    c. What vasoactive agent is recommended if this goal is not met?
4. After initial resuscitation, what must you frequently reassess, e.g. at least every 4 to 6 hours?

5. The Sepsis-3 task force recommends using the Sequential [Sepsis-related] Organ Failure Assessment (SOFA) score to measure organ dysfunction, with an increase of 2 indicating higher associated mortality. Name the 6 organ systems involved in calculating the SOFA score.

6. The Sepsis-3 task force created a bedside quickSOFA (qSOFA) score to identify septic patients more likely to have poor outcomes, if they have at least 2 of 3 clinical criteria.
    a. Name these criteria as precisely as possible
    b. Compared to SIRS criteria, is qSOFA more sensitive or more specific in predicting in hospital mortality?

Trainee Teams

- Small groups: 3 to 4 residents
- Equivalent trainee level: interns vs. seniors
- Interprofessional teamwork
  - Students from pharmacy, RT, RN, medicine
  - ERT nurse

Logistics

- Time: during Morning Report
- Who: consult residents
- Case load: 2 “pre-code” cases & 4 ACLS sessions per rotation
- Frequency: twice a week
- Staffing: 1 facilitator, 1 simulation specialist

How to Effectively Debrief

- Failure to debrief has been shown to have negative effects on communication
- Debriefing content is based on the learning objectives stated to participants in the prebrief by the faculty debriefer
- As the facilitator, pose a question and let the group discuss themselves the topic

How to Effectively Debrief

- Use what went well and what the team can improve on (Plus/Delta Method)
- Have participants come up with strategies to use during the next scenario
- Ask open ended questions

Structured Debrief on Team Dynamics

- Team leadership
- Time to defibrillation
- CPR technique
- Communication techniques
  - Teamwork Handout

Putting it all together

8:00 – 8:05	Meet & greet. Equipment tutorial.
8:05 – 8:15	Pre-test
8:15 – 8:35	Run case
8:35 – 8:50	Debrief (½ didactics, ½ teamwork)
8:50 – 9:00	Post-test

No pre & post test for ACLS cases

Results

- Near term retention:
  - Significant post-test improvement across the board
- Six month retention:
  - Post-test improvement in interns but not seniors
- Positive ERT feedback on resident performance
- Universal positive feedback from participants

Results

- 73 medicine residents participated in at least one case
- Overall post test average increased 26.8% (p=.0001)
- Overall average from pre-test to final increased 15.3% (p=.008)
- Of interns who did (n=5) and did not (n=13) participate in Case4, the mean score on the final related to Case4 questions were 60% (SD, 17), and 47% (SD, 16.5)

Next steps in application of knowledge

- Run cases based on real world RCA's
- Opportunity to apply knowledge to a real world case
- Opportunity to teach quality and safety in a hands-on setting
- Stroke simulation to reduce time to CT

RCA Case Walkthrough

- Collaboration with Hospital Quality & Safety Team
  - Provide time course of events
  - Pre-identified errors in Swiss Cheese Model
- Multi-stage simulation
  - Septic Shock Case
  - Objectives are to stress communication and management

Conclusions

- Two year longitudinal experience with high-fidelity simulations
- Versatile, active learning platform
- Trend towards clinical knowledge retention
- Supplements traditional didactic formats

Questions?

References

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