

Development and Quality Assessment of a High-Alert Medication Simulation for Education or Research

Laura Sessions PhD, MScN, RN, CNE¹; Lynne S. Nemeth PhD, RN, FAAN²; Kenneth Catchpole PhD²; Teresa J. Kelechi, PhD, CWCN, FAAN²

¹Towson University, ²Medical University of South Carolina



Problem - Theory to Practice Gap in Nursing

Two gaps require immediate attention: making clinical nursing judgments and implementing quality and safety education standards for nurses (QSEN). Nurse educators, and our colleagues in nursing service, must collaborate to close these gaps, as safe and patient-centered care depend on it.¹

Diane M. Billings, Ed.D, RN, ANEF, FAAN

Educational Methodology - Simulation-Based Learning

- Why Simulation-Based Learning (SBL)?
 - Links theory to practice
 - Develops clinical decision making
 - Provides a safe space for students to learn from their mistakes
 - Allows the application of nursing knowledge, skills and attitudes (KSA) without putting the patient at risk
 - Develops communication and collaboration skills
 - Improves student confidence

Aim

- Teach nursing students *High-Alert Medication* (HAM) administration safety
 - Why HAM safety?
 - Safe administration:
 - Relies on clinical judgment
 - Requires collaboration
 - Is technologically complex

Goals

- To develop two HAM SBL scenarios
 - Highly realistic
 - Based on evidence-based nursing practice
 - Incorporate evidence-based practice guidelines
 - INASCL Standards
 - Grounded in theory
 - High quality
 - For use in education or research
 - Measure learning outcomes
 - Utilization of quality metrics to evaluate simulation scenarios

EBP - Nothing is as easy as it sounds!

- Limited evidence base for HAM safety
- Huge variability in current practices

Factors Contributing to HAM Errors:

- Frequent unit transfers²
- Interruptions and workflow issues³
- Nurse knowledge^{3,4,5}
- Failure to implement bar-code scanning appropriately⁶

And down the rabbit hole we go...

- What are the supports and barriers to HAM safety?

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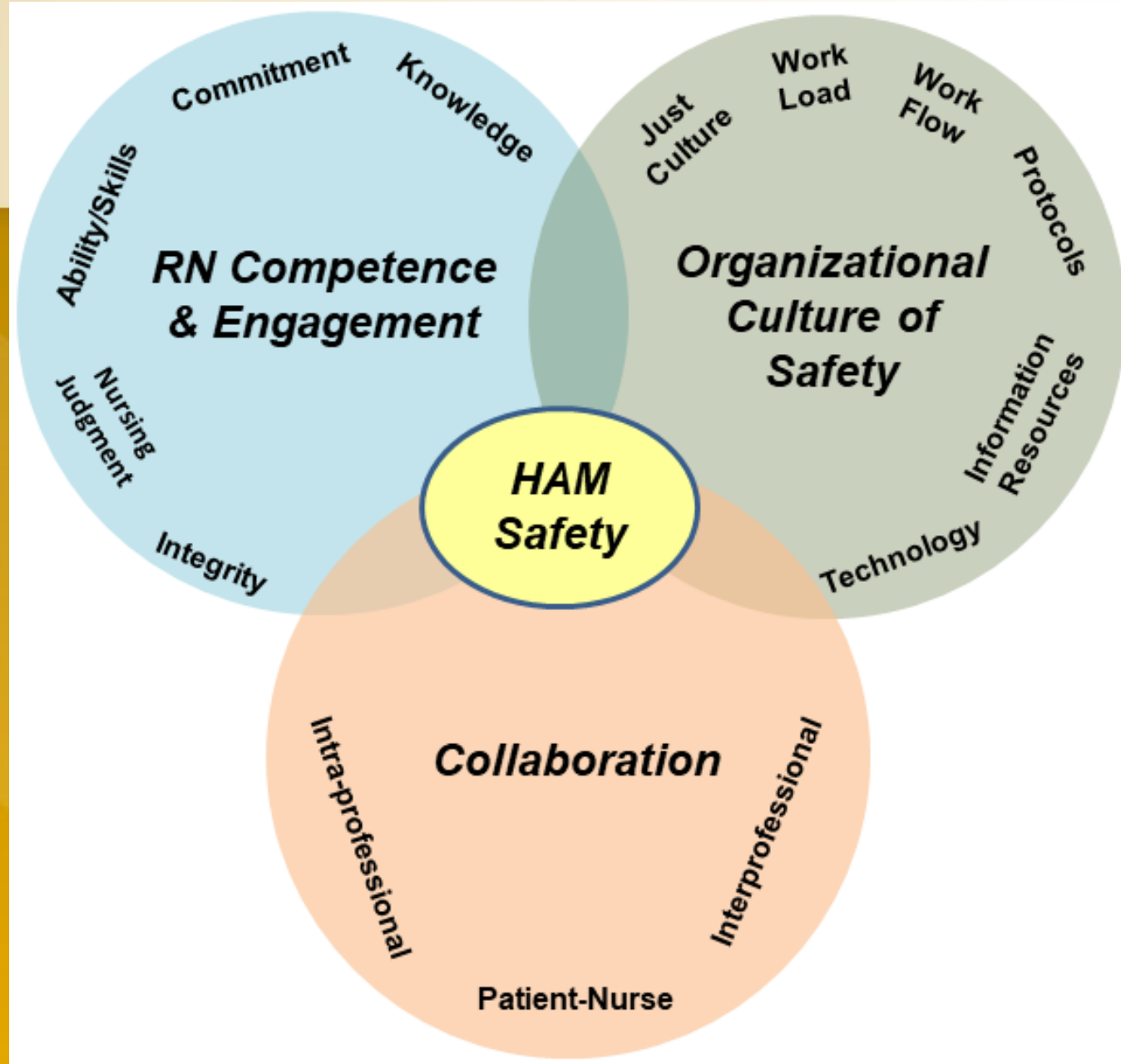
ORIGINAL RESEARCH: EMPIRICAL RESEARCH – QUALITATIVE

Nurses' perceptions of high-alert medication administration safety: A qualitative descriptive study

Laura C. Sessions PhD, RN, CNE ✉, Lynne S. Nemeth PhD, RN, FAAN, Kenneth Catchpole PhD, Teresa J. Kelechi PhD, RN, FAAN

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Findings



Medication errors result from gaps in the safety processes of complex systems, when humans fail to identify the problem and intervene before the patient receives the medication.^{7,8}

Nurses confirmed that HAM errors are complex

Reason's Swiss Cheese Model would support inclusion of HAM complexity in the SBL design

The use of the NLN Jeffries Simulation Theory would support overall SBL design

NLN Jeffries Simulation Theory⁹

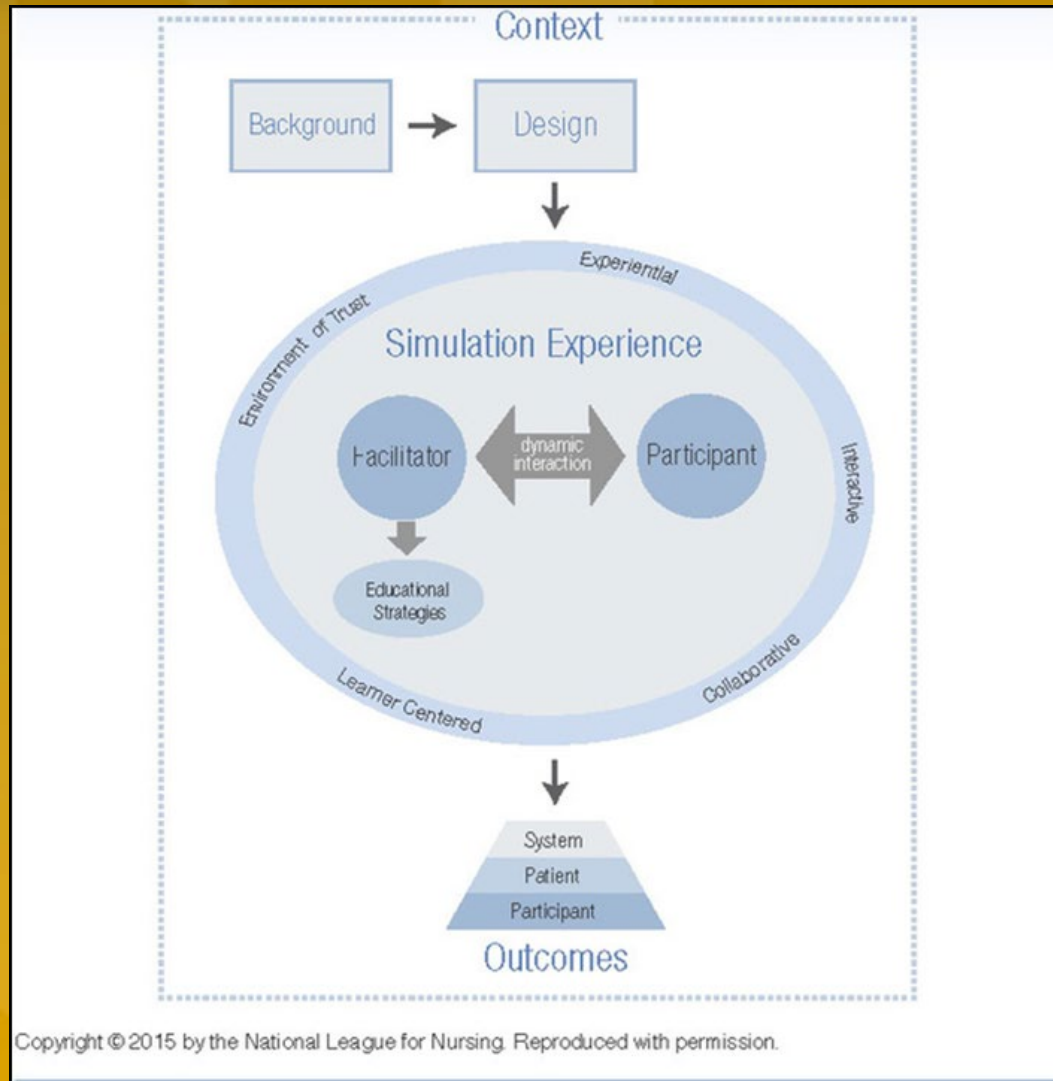


Image source:
Jeffries, P.; Rodgers, B.; Adamson, K. (2015).
NLN Jeffries Simulation Theory: Brief Narrative
Description. *Nursing Education Perspectives*.
36(5):292-293.

FOR Clinical Simulation and Learning (NACSL)¹⁰



Clinical Simulation in Nursing (2016) 12, S5-S12



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Standards of Best Practice: Simulation

INACSL Standards of Best Practice: SimulationSM
Simulation Design

INACSL Standards Committee

INASCL Standards – NLN/JST

NLN/Jeffries Simulation Theory (NLN/JST)	INACSL
Context: Circumstances, setting and purpose of the simulation (education or evaluation)	Criterion 1: Performs a needs assessment
Background: Goals and expectations	Criterion 2: Measurable Objectives
Background: Theoretical perspective	Criterion 3: Format based on purpose & theory
<ul style="list-style-type: none"> • Design: Utilize specific learning objectives to guide development/selection of simulation activities • Design: Participant and observer roles, progression of activities • Participant attributes considered in scenario design 	Criterion 4: Design scenario to provide context for the simulation-based experience. Include a case or backstory, participant roles, clinical progression and time frames
Design: Physical fidelity - equipment, moulage	Criterion 5: Use of various types of fidelity

INASCL Standards - NLN/JST



NLN/JST	INACSL
<p>Design: Conceptual fidelity - predetermined facilitator responses</p> <p>Simulation experience: Experiential, interactive, collaborative, and learner centered</p> <ul style="list-style-type: none"> • Facilitator & educational strategies: Skill, educational techniques, preparation • Responds to learner needs 	<p>Criterion 6: Participant centered facilitative approach driven by objectives</p>
<p>Design: Pre-briefing activities</p> <ul style="list-style-type: none"> • Facilitator and educational strategies: Provides appropriate feedback <p>Background: Access to and allocation of resources</p>	<p>Criterion 7: Pre-briefing</p> <p>Criterion 10: Preparation material & resources</p>
<p>Design: Debriefing activities</p> <p>Facilitator and educational strategies: Provides appropriate feedback</p>	<p>Criterion 8: Debriefing</p>

INASCL – Criterion 1

• Needs assessment

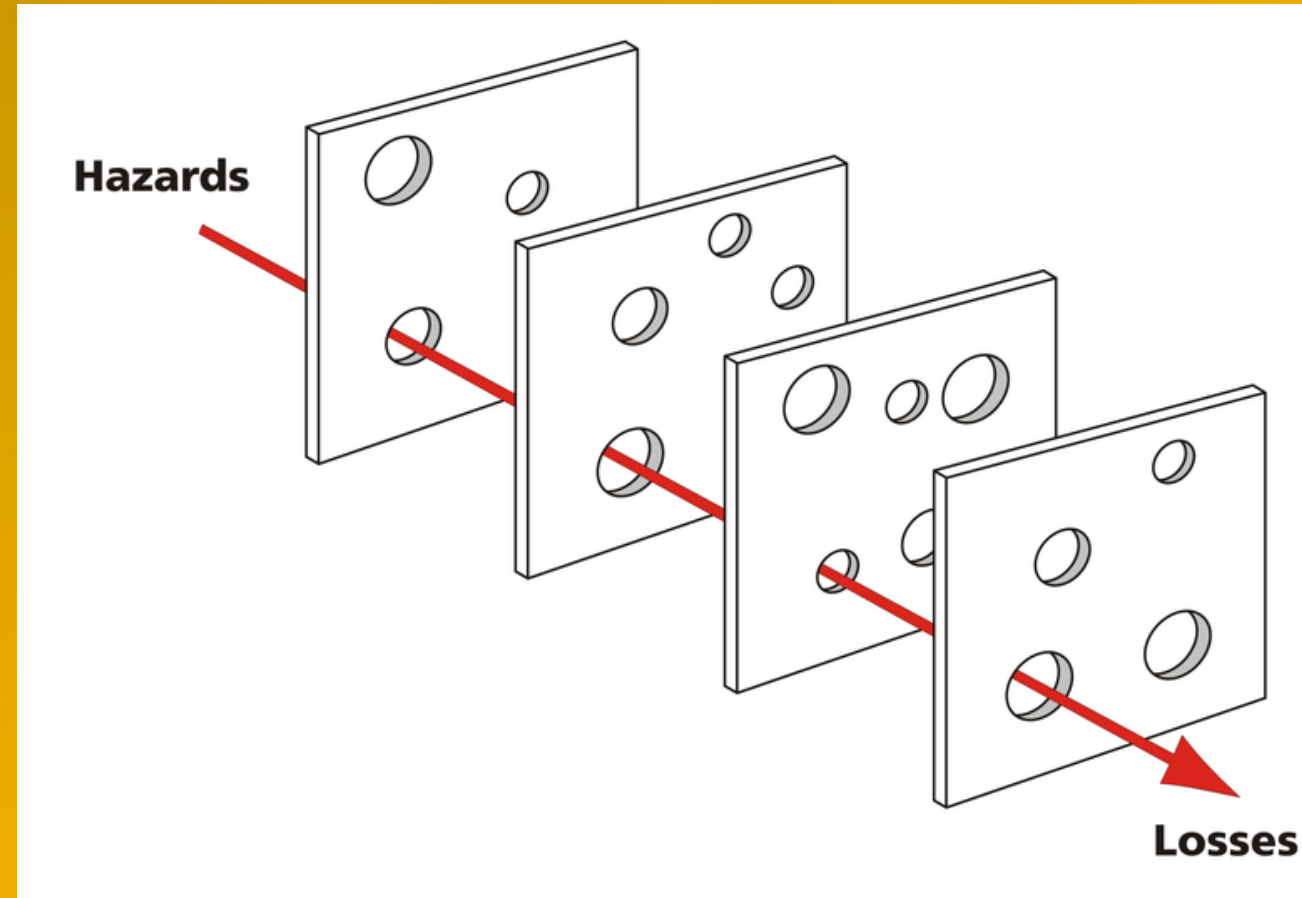
- Review of literature on HAM safety
 - Medication errors
 - 7000 inpatient deaths occur in US hospitals annually from medication errors⁹
 - Increased risk of harm from high alert medications (HAM)
 - HAMs increase risk of causing serious patient harm even when administered correctly
 - Risk increases when associated with a medication error¹⁰
 - HAM errors: 14% and 50% of medication incidents; 11-29% occur with administration^{11,12,13}
 - Nurses receive little training on HAM best practices⁴
- Qualitative Research on HAM Safety

INASCL – Criterion 2

- Construct **measurable objectives**
 - Based on *Quality and Safety Education for Nurses Pre-licensure Competencies*
 - Performs a focused assessment of the client prior to procedure.
 - Interprets data to determine the appropriate nursing actions.
 - Follows policy and procedure regarding administration of high-alert medications.
 - Communicates effectively with the health care team.
 - Prioritizes and implements nursing actions effectively based on client needs.

INASCL – Criterion 3

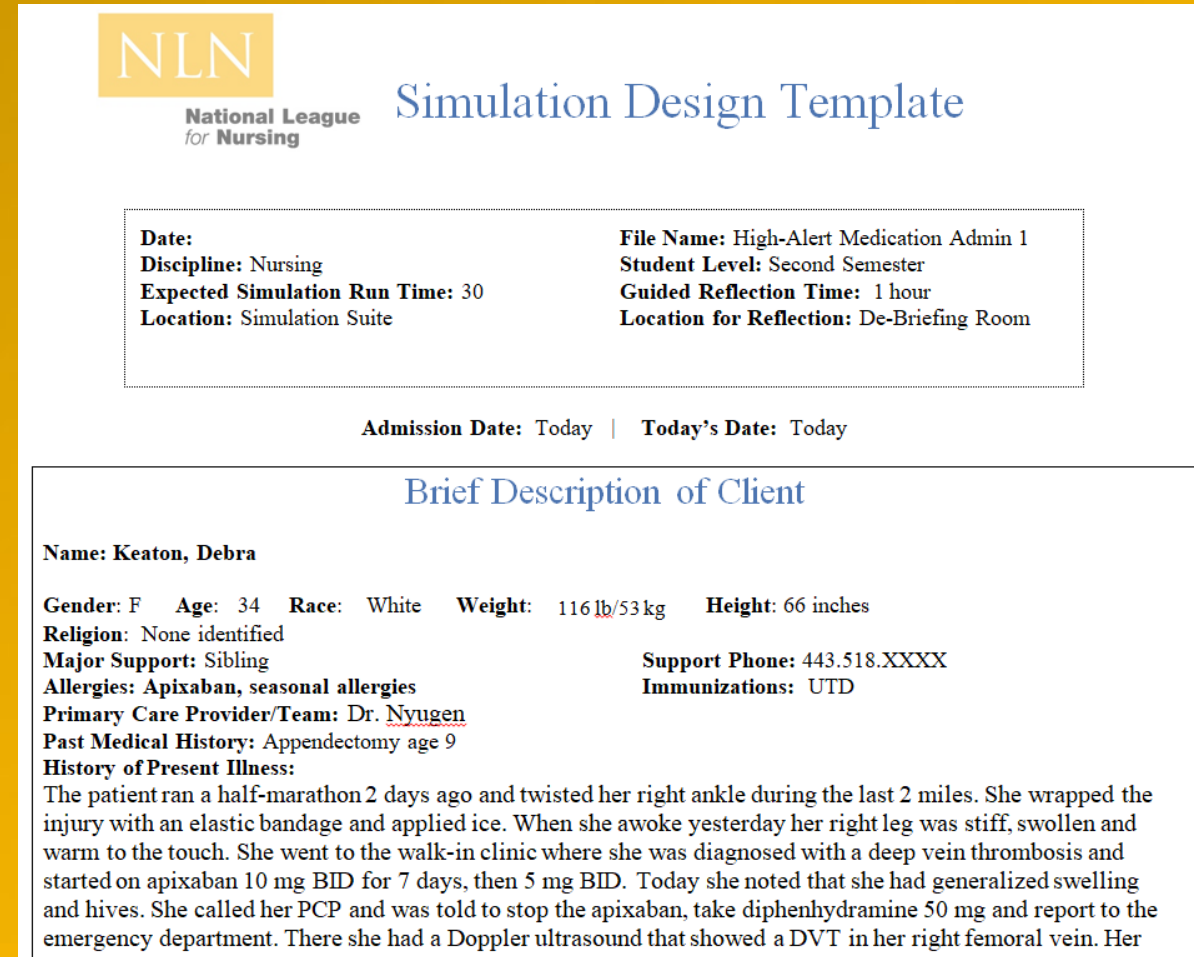
- Structure the format of a SBL scenario on the **purpose, theory, and modality** for the simulation-based experience
 - Purpose: Improve safety during HAM administration
 - Theory: Reason's Swiss Cheese Model¹⁶
 - Modality: Mannequin-based Patient Simulation



Swiss Cheese Model

INASCL – Criterion 4

- Design a SBL scenario to **provide the context**
 - NLN simulation design template¹⁷
 - Structured written situation and backstory created
 - Role cards directing student performance (e.g. nurses, family, unit secretary)
 - Clinical progression & cues
 - Simulation timeframe allowed for achievement of outcomes
 - Evidence based performance measures identified



NLN
National League
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Simulation Design Template

Date:	File Name: High-Alert Medication Admin 1
Discipline: Nursing	Student Level: Second Semester
Expected Simulation Run Time: 30	Guided Reflection Time: 1 hour
Location: Simulation Suite	Location for Reflection: De-Briefing Room

Admission Date: Today | **Today's Date:** Today

Brief Description of Client

Name: Keaton, Debra

Gender: F **Age:** 34 **Race:** White **Weight:** 116lb/53kg **Height:** 66 inches

Religion: None identified

Major Support: Sibling **Support Phone:** 443.518.XXXX

Allergies: Apixaban, seasonal allergies **Immunizations:** UTD

Primary Care Provider/Team: Dr. Nyugen

Past Medical History: Appendectomy age 9

History of Present Illness:
The patient ran a half-marathon 2 days ago and twisted her right ankle during the last 2 miles. She wrapped the injury with an elastic bandage and applied ice. When she awoke yesterday her right leg was stiff, swollen and warm to the touch. She went to the walk-in clinic where she was diagnosed with a deep vein thrombosis and started on apixaban 10 mg BID for 7 days, then 5 mg BID. Today she noted that she had generalized swelling and hives. She called her PCP and was told to stop the apixaban, take diphenhydramine 50 mg and report to the emergency department. There she had a Doppler ultrasound that showed a DVT in her right femoral vein. Her

INASCL – Criterion 5

- Use **fidelity** to create the required perception of realism
 - High fidelity mannequin
 - Moulage
 - Used makeup to simulate reddened area for DVT
 - Sewed bubble wrap between two ace bandages to wrap the injured ankle
 - Wig and makeup to simulate a female



INASCL – Criterion 5

- Cognitive Pretesting
 - Two master's prepared ICU nurses pretested the SBL scenarios
 - Needed to develop:
 - **Electronic medical record**
 - **Electronic medication administration system with bar-code scanning**

INASCL – Criterion 5

- What was of value to you in this scenario?
- What do you wish you knew prior to the simulation experience?
- What do you wish you knew about the Simulation Lab and equipment prior to the simulation experience?
- Were the expectations of what you would be doing in the simulation made clear before you started the scenario?
 - Were the objectives clear? Why or why not?
- How did the preparation activities help you prepare for the simulation?
 - How would you enhance these activities?
- What challenges did you experience when completing the simulation?
 - What can we do to fix these for future students?
 - Describe the challenges you experienced working with the SimMan™.
 - What equipment do you wish you had that was not available to you during the scenario?
- How could the room be made to simulate a more realistic environment?
- Was there enough information in the patient's medical record for you to provide safe patient care?
 - What information needs to be added to the patient record so that you feel you could provide safe patient care?
 - What information could be removed from the patient record?
- What about the scenario was realistic? What was not realistic?
- In what ways did the scenario match the objectives? Where could the objectives be enhanced?
- What was the scenario asking you to do?
- In what ways did the scenario require you to use your nursing judgment to care for the patient?
- In what ways did you feel supported during the scenario? How could support be enhanced?
- In what ways was the scenario realistic? How could realism be enhanced?
- Please describe the impact of the debriefing experience. How was it effective? What could have been improved?
- Describe your level of comfort during debriefing. What would have increased your level of comfort?
- In what ways did the debriefing discussion add to your understanding of caring for a patient receiving a high-alert medication?
- What were the most important things you learned about safely administering a high-alert medication during the scenario and debriefing?
- In what ways did this experience affect your ability to safely administer high-alert medications?
- Overall, how could this learning experience be improved?

- Students' iterative evaluation of SBL scenarios
 - Groups of six
 - Focus groups
 - Revisions made based on each simulation groups feedback
 - Multiple revisions to Heparin Protocol and Flow Sheet

INASCL – Criterion 6

- **Facilitative approach**

- Facilitator SEL II trained
- Scripted report
- Built in learner cues
- Communication cues designed based on

Report Students Will Receive Before Simulation

Time: 1000

PMH: Ms. Keaton is a 34-year-old female who works for the Department of Energy as a Human Resources Specialist. Her past medical history is unremarkable except for an appendectomy at age 9. She took up running 4 years ago and tries to run a marathon at least every other month. She does not take any medications except for acetaminophen and NSAIDs PRN for muscle pain, and norethindrone and mestranol (Necon 1/50) daily for birth control.

Report:

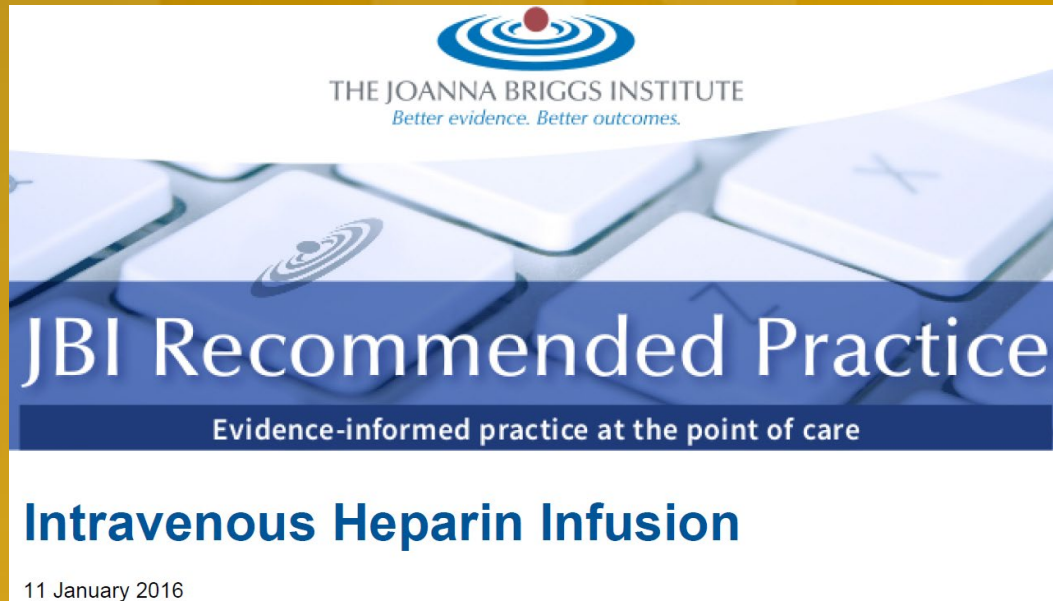
Situation: Ms. Keaton has a right femoral DVT and is being admitted to your medical/surgical unit for heparin therapy.

Background: The patient ran a half-marathon 2 days ago and twisted her right ankle during the last 2 miles. She wrapped the injury with an elastic bandage and applied ice. When she awoke yesterday her right leg was stiff, swollen and warm to the touch. She went to the walk-in clinic where she was diagnosed with a deep vein thrombosis and started on apixaban 10 mg BID for 7 days, then 5 mg BID. Today she noted that she had generalized swelling and hives. She called her PCP and was told to stop the apixaban, take diphenhydramine 50 mg and report to the emergency department. There she had a Doppler ultrasound that showed a DVT in her right femoral vein. Her D-dimer was elevated. She received a heparin bolus in the ED and is being admitted for heparin therapy since it appears she is allergic to apixaban. She also took ibuprofen this morning for her ankle pain.

Assessment: Lungs are clear, heart rate is regular, and vital signs are within normal limits. She rates her pain as 2/10. She has a #18 IV SL in her right AC that was placed around 0900 and remains patent. She is drinking well. She received a heparin bolus of 4,240 units at 0915 this morning. Her PT, aPTT and INH are within normal ranges.

Recommendation: Pharmacy received the order for the heparin drip and will be sending the IV heparin to your floor. Once the drip is started she will need an aPTT in six hours.

INASCL – Criterion 7 & 10



10 Provide **preparation materials** and resources

- Textbook resources
- Intravenous Heparin Infusion (2016). JBI Recommended Practice: IV Heparin Infusion¹⁸

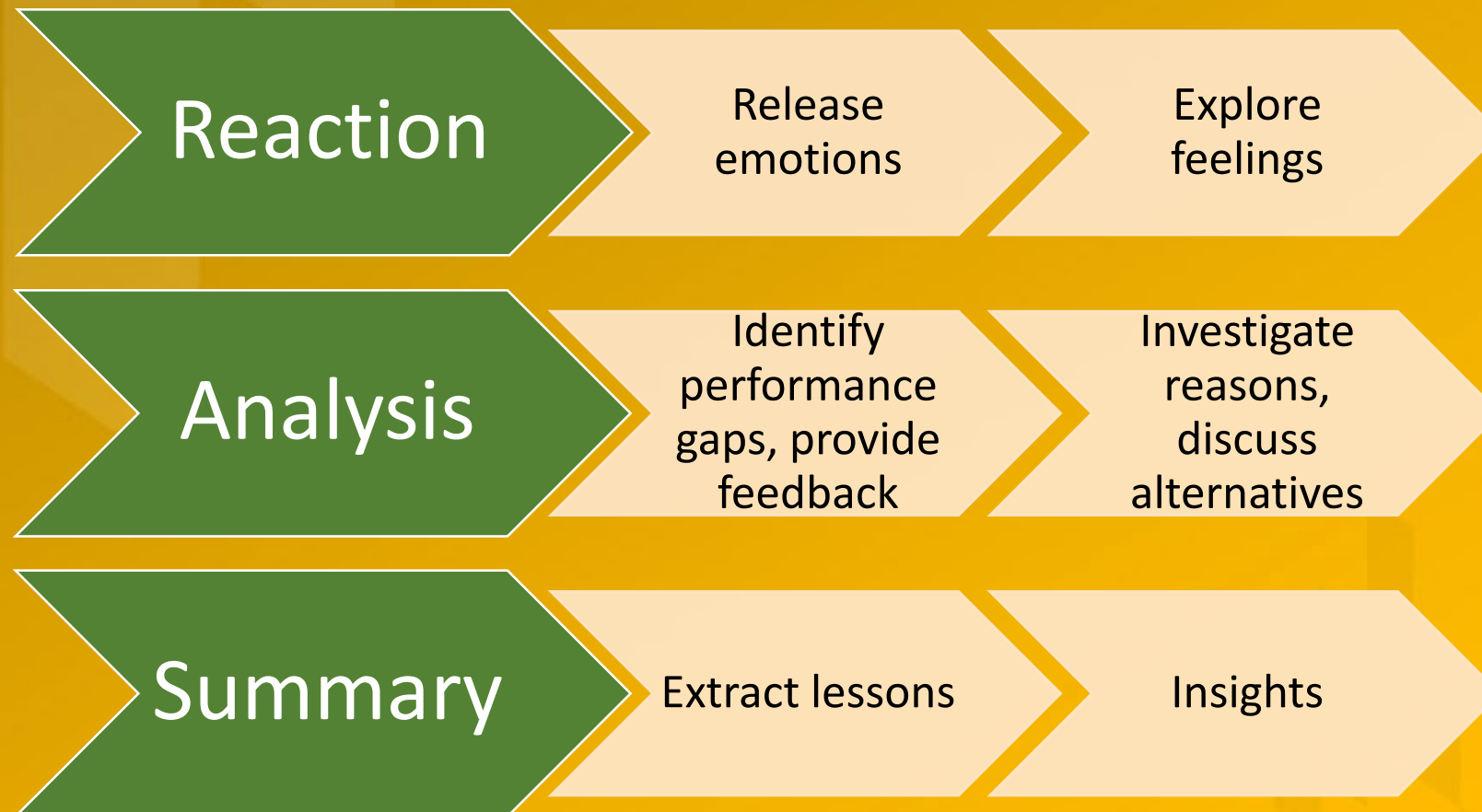
7 **Prebriefing**

- Simulation orientation
- Scripted pre-brief topics based on objectives

INASCL – Criterion 8

- **Debriefing**

- The Reaction, Analysis, and Summary¹⁹ method used for debriefing



INASCL – Criterion 9 & 11

9 **Evaluation**

- SBL Quality outcomes measured with:
 - Simulation Design Scale (SDS)²⁰
 - Debriefing Assessment for Simulation in Healthcare (DASH)²¹
 - Focus group feedback
- Participant outcomes – Focus groups “what did you learn?”

11 **Pilot test** simulation-based experiences

Outcome Findings - Quantitative

- Participants rated the simulations highly!
- Simulation Design Scale (0-5)
 - Sim 1: $M = 4.86$, $SD = .4$
 - Sim 2: $M = 4.86$, $SD = .422$
- Debriefing Assessment for Simulation in Healthcare (0-7)
 - Sim1: $M = 6.84$, $SD = .476$
 - Sim 2: $M = 6.86$, $SD = .410$

Outcome Findings – Qualitative

Participant Learning

- *"I liked the affirmation that it's okay to say, 'Hold on. Let's take a moment. This is time that I need for my patient.'... Like the unit secretary comes over and says, 'Hey, we need you', and it's okay to be like, 'This is my priority right now', be able to prioritize your patient, make sure that you don't make mistakes..."*
- *"I feel like also as a new nurse, I would think, 'Oh, if I have to ask them repeatedly to check it, they might think I'm incompetent.' I feel like it'd be easy to feel like that when you're new."*
- *"We're so busy in nursing school. So, if I'm going to spend time doing something, I want to make sure it's going to be worth my time. And this, I felt like it was, because a lot of the things were realistic, like adding in the distractions and making things real like the nurse being too busy."*

Questions?



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