Preamble

Simulation continues to evolve as an important technique that facilitates student learning. The use of simulation in EMS education is appropriate in both the learning process (formative phase) and when evaluating competency. Simulations can be used to evaluate: individual skills, management of various patient conditions and ages, and comprehensive summative assessments. The structure, length, and complexity of simulations vary. Simulations ideally begin early in the curriculum and are incorporated throughout the program as one means to help learner move toward competency. The determination of competency for graduates is not made at a single point in time, at a single event, but rather is an accumulation of a body of evidence when a student consistently performs at an acceptable level. Entry level competency is determined using simulation, clinical, and field assessments.

Programs are responsible to evaluate student progression from novice to competency and have discretion in the development of the curriculum, the sequencing of content, and the use of simulation to augment live patient encounters. This learning plan ideally includes incremental steps from simulation to clinical and field experiences.

Simulation has proven to be an effective education strategy that can replace or enhance other traditional delivery methods, such as lecture, to achieve student learning outcomes. The strength of simulation isn't that it's real. The strength of simulation is that it *isn't* real, and the facilitator controls the variables. Simulation is a technique, not a specific technology. It often involves a scenario followed by a structured debriefing process. Many of the learning objectives are reinforced during debriefing phase.

This document does not define requirements for simulation but is intended to provide guidelines that programs must consider when assessing the appropriate incorporation of simulation as a learning and evaluation tool. The decision on when and how to incorporate simulation in the curriculum should be a deliberate part of the instructional design.

These Guidelines and Recommendations are not intended to be exhaustive or address the entirety of simulation. Programs are encouraged to explore various avenues to acquire increased depth and breadth of information on the subject. Literature relevant to simulation is referenced later in this document. A short glossary of terms is included later, and a complete list of definitions can be found in the Healthcare Simulation Dictionary, Second Edition (2.1)

Simulation Definition

A technique that creates a situation or environment to allow persons to experience a representation of a real event for the purpose of practice, learning, evaluation, testing, or to gain understanding of systems or human actions.

An educational technique that replaces or amplifies real experiences with guided experiences that evoke or replicate substantial aspects of the real world in a fully interactive manner (Gaba, 2004).

Purpose of simulation in EMS education

1. Provides a learning tool in the development of competency in the following domains:
   a. Cognitive: clinical judgement, decision making, leadership
   b. Psychomotor: procedural skills
   c. Affective: communication, teamwork, empathy, professional behavior

2. Simulation supplements/augments clinical experiences and provides opportunity for the following:
   a. Infrequently encountered clinical experiences or skills
   b. Practice for high acuity and/or low frequency events
   c. Challenging situations
   d. Opportunity for repetition and safe practice
   e. Simulation **does not** replace all clinical experiences

3. Simulation is a tool for summative verification of competency in a safe environment.
   a. Allows verification prior to patient encounters
   b. Provides assessment of student abilities at major points of the education program

Benefits of Simulation when used appropriately include:

1. Enhances retention of knowledge

2. Transfers theory into application and problem solving

3. Transfers theory into application and problem solving

4. Fosters deeper learning

5. Synthesizes learning and enables linking to various aspects of the curriculum

6. Fosters teamwork

7. Builds confidence

8. Reduces errors and promotes a culture of safety

9. Addresses gaps in clinical presentation

10. Improves accessibility to a wide variety of patient conditions

11. Provides the education program more control over the pace, content, depth and breadth, and variables in the student experiences
    a. Provides opportunity to include diverse cultural experiences and incorporate cultural humility

12. Mimics or creates emotional states present in real situations

13. Rehearse communication and leadership skills

14. Reduces the variation in the assessment of the students

15. Provides reproducible curriculum for all training

Cautions when using simulation

1. Even well-constructed simulations cannot replicate a totally realistic experience
2. Poorly conducted simulations and debriefings can waste time and provide negative reinforcement of learning
3. Simulations can be resource intensive (personnel, equipment)
4. Simulation requires expertise
5. A simulation can lose focus and not fulfill the objectives
6. The simulation can adversely impact well-being and cause psychological trauma for the participants

Simulations enhance skill acquisition and progression

1. Simulation is a tool to promote skills' progression: task trainer to full out-of-hospital scenario
2. Simulation is based on well-defined objectives
3. High fidelity simulation can begin early in the education program
   a. High-fidelity refers to simulation experiences that are extremely realistic and provide a high level of interactivity and realism for the learner and can apply to any mode or method of simulation; for example: human, manikin, task trainer, or virtual reality.
   b. Objectives can evolve as the learner progresses
4. The complexity of the simulation should progress in depth and breadth over time to match the program objectives and assessment of student outcomes
5. The expectation of student performance should increase over time
6. Incorporate multi-disciplinary or inter-disciplinary simulation: IE include other emergency responders, public safety personnel, or other healthcare professionals

Incorporate simulations into the schedule and sequencing

1. Simulations should correlate with course content
2. Simulations should be part of the curriculum with intentional integration at appropriate points

Simulation is an option to live patient encounters when permitted

1. Simulation use is defined in the Student Minimum Competency Recommendations (SMC)
2. Simulation is not a replacement for all live patient experiences
3. Simulation can enhance the student's ability to manage subsequent live patient encounters
4. Assessments of performance during simulation are more reliable than assessments in the clinical and field environment but may not have the same validity

Ratio of a live patient encounter to a simulated experience

1. There is no recommendation for the number of simulations that can replace a live patient encounter
2. The program determines if a ratio is appropriate (IE 1:1, 2:1, or other)
3. The use of simulations is related to resources, available course hours, and other factors.
4. When simulation is used in lieu of a live patient encounter, the simulation should be high fidelity

Simulation plan

1. Defines the framework to conduct a simulation
2. Scenario
   a. The scripts or stories created for instructing the participants, including the simulators, on how to interact with the students
   b. Provides a framework and flow for the simulation
   c. A template is an existing or developed document that includes standard elements: goals, objectives, debriefing points, narrative description of clinical simulation, staff requirements, simulation room set-up, simulators, props, simulator operation, time frames, and instructions for standardized patients.
      i. Commercial scenarios are available and should be used in conjunction with program specific educational objectives
         - Commercial scenarios or templates should be evaluated for clinical accuracy and appropriateness for the student level
         - Templates should be validated by the program
      ii. Students may develop scenarios as a learning activity

3. Technology/Strategies
   a. Technology is employed as indicated for the scenario
   b. Technology and strategies are based on the scenario objectives
   c. A collection of definitions can be found in the Healthcare Simulation Dictionary: https://www.ssih.org/dictionary

4. Potential participants are based on learning objectives and include:
   a. Faculty (evaluator, observer, simulation operator)
   b. Students: roles include team leader, team members, peer evaluator
   c. Confederates (family, friends, bystanders)
   d. Other emergency responders or personnel
   e. Simulated patient
   f. Standardized patient

5. Objectives
   a. Define expected measurable learner outcomes
   b. May include cognitive, psychomotor, and affective domains
   c. Objectives are based on where the simulation occurs in the sequencing of course material

6. Equipment appropriate to the scenario and includes the following:
    a. Medical and other EMS equipment such as walkie talkies
    b. Props that relate to the scenario (visual, tactile, olfactory, auditory)
    c. Task trainers or manikins
    d. Recording, storage, and review capability
7. Environmental fidelity
    a. Replicates reality and appearance of an actual environment
    b. Incorporates suspension of disbelief
    c. Patients should reflect the diversity and inclusiveness of various cultures and communities
    d. Dedicated space that recreates an environment is ideal (bedroom, bathroom, living room, etcetera)
    e. Other elements can include: ambulance (simulated or actual), hazards, other distractors
8. Pre-briefing
    a. Establishes a safe environment (physical and psychological)
    b. Consider a fiction contract
    c. Includes all participants
    d. Outlines expectations of learners: interaction with environment and the patient
    e. Provides time for learners to establish a plan
    f. Assign roles for competency evaluation: terminal assessment of skills and patient management
    g. Allow for familiarization with equipment
9. The Session
    a. Establish a time frame (length of session)
    b. Simulation does not have to run to completion if primary learning objectives have been met
    c. Student to instructor ratios are based on the scenario
    d. Provide cueing/prompting as appropriate
    e. Interject or interrupt as appropriate
    f. Establish the role of evaluators (if more than one)
    g. Record session if applicable
    h. Monitor safety
    i. Conclude the session based on the objectives
10. Debriefing
    a. Provide guided self-reflection: cognitive, affective elements, reactions
    b. Feedback is based on the objectives and desired outcomes
    c. Explore positive components and constructive feedback
    d. Move toward assimilation and accommodation of learning for future situations
    e. Foster clinical judgement and critical thinking
    f. Use accepted framework for the debriefing session (various models of debriefing are available and published)
    g. Conduct the debriefing as soon as possible after the session
    h. Length of the debriefing session depends on the complexity of the situation
    i. Review documentation of patient care

j. Significant learning should occur during the debriefing session making it an essential component of the simulation

k. Additional learning activities may be integrated before and/or after the simulation to address knowledge or skill gaps

Assessment tools and rubrics

1. Design of the simulation assessment tool includes the following:
   a. Limited number of assessed components
      i. Component should be observable and not require a secondary judgement of the action
   b. Assessment scoring per component should be yes/no and not a multiple rating scale
   c. Identify critical criteria (trap door scoring or mandatory actions)

2. Assessment tool should be linked to the scenario and the objectives

3. Analysis includes:
   a. Interrater reliability
   b. Degree to which the scenario assessment tool measures the same way each time it is used under the same conditions

4. Validation is required for high-stakes assessments
   a. Requires faculty and other subject matter expert review
   b. Successful performance is aligned with the expected learner outcome
   c. Medical Director review is required
   d. The scenario design should be a reasonable facsimile of a patient encounter

5. Standard setting includes how to set pass/fail criteria if indicated
   a. Establish if a time frame is required

Documentation

1. Formative scenarios: program determines:
   a. Number of performances required
   b. Instructor versus peer monitored
   c. Instructor versus peer evaluation

2. Tracking must include unsuccessful attempts

3. Competency
   a. Ensure sufficient assessments (formative and summative) to demonstrate consistent performance at an acceptable level culminating in the decision of entry level terminal competency
   b. Documentation of appropriate competencies is required prior to patient contact in the clinical or field environment

4. Approvals/endorsement for integration of simulation into the curriculum and required tracking and reporting are to be obtained from the following:
   a. Faculty
   b. Medical Director
   c. Advisory Committee

5. Other considerations
   a. When exceptions occur, such as substituting simulation for a live patient encounter, document the what/why/discussions/approvals

b. Interdisciplinary simulations are valuable tools and may depend on resources available to the program
   c. Recognize when a student has been psychologically impacted by the scenario and provide support
   d. Simulation must comply with institutional policy and state or other regional regulations

6. Accommodations
   a. Reasonable student accommodations may be appropriate in certain circumstances
   b. Establish a policy for student accommodations when requested

7. Key points: simulation and the CoAEMSP Student Minimum Competency Recommendations (SMC)
   a. Simulation is allowed as indicated in the CoAEMSP Student Minimum Competency Recommendations
   b. A simulation that is used in lieu of a live patient experience must include a minimum of scene management, patient assessment, and treatment as appropriate based on differential diagnosis
   c. The simulation must be high-fidelity (realistic conditions)
   d. Motor skills that are initially best learned and assessed on task trainers should then be assessed in the context of high-fidelity simulation, especially when used in lieu of live encounters
   e. Programs are encouraged to provide education for faculty on effective use of simulation

Literature support for simulation recommendations: References

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Glossary

The following is a partial list definition of key terms used int the context of this document.

Competent
Demonstrated characteristics of proven ability to perform consistently at an acceptable level.

Competency
The state of being competent.

Competency assessment
Measurements of progress related to knowledge, skills, and attitudes.

Competency evaluation process
Process to review a series of assessments that provide a body of evidence by the faculty, preceptors, Program Director, and Medical Director, to determine if the individual has demonstrated consistent performance at an acceptable level.

Fiction contract
Concept that encourages participants to put aside their disbelief and accept the simulated exercise as being real.

Fidelity
The degree to which the simulation replicates the real event and/or workplace; this includes physical, psychological, and environmental elements.

Formative assessment
A type of assessment "wherein the facilitator's focus is on the participant's progress toward goal attainment through preset criteria; a process for an individual or group engaged in a simulation activity for the purpose of providing constructive feedback for that individual or group to improve".

High-stakes assessment
A type of assessment (sometimes called an evaluation) "associated with a simulation activity that has a major academic, educational, or employment consequence (such as a grading decision, including pass or fail implications."

Patient
An individual encountered in a clinical or field environment presenting with a potential medical condition.

Simulated patient
An individual who is trained to portray a real patient in order to simulate a set of symptoms or problems used for health care education, evaluation, and research.

Standardized patient
An individual trained to portray a patient with a specific condition in a realistic, standardized, and repeatable way and where portrayal/presentation varies based only on

learner performance; this strict standardization of performance in a simulated session is what can distinguish standardized patients from simulated patients.

Summative assessment
A type of assessment (sometimes called an evaluation) "at the end of a learning period or at a discrete point in time in which participants are provided with feedback about their achievement of outcome through preset criteria; a process for determining the competence of a participant engaged in healthcare activity. The assessment of achievement of outcome criteria may be associated with an assigned grade".

Terminal competency
The candidate has successfully demonstrated consistent performance at an acceptable level as a minimally competent, entry-level, Paramedic as determined by the Program Director and Medical Director and is eligible for State and National Certification.

The complete *Healthcare Simulation Dictionary, Second Edition (2.1)* can be found at: https://www.ssih.org/Portals/48/sim-dictionary-2_1.pdf developed by the Agency for Research and Quality.

Selected excerpts from the *Healthcare Simulation Dictionary, Second Edition (2.1)* are attached to these *Simulation Guidelines and Recommendations* and are used with permission.