Need A Distraction? Enhancing Overall Fidelity By Adding Simulation Distractors

Texas Children's Hospital Simulation Team:

Lisa Caplan MD, Priscilla Garcia MD, William Waldrop MD, Kale Wayman MD, & David Young MD

Workshop Binder Table of Contents

Agenda

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Benefits, challenges, and types of distractors used to increase simulation fidelity	11-21	Priscilla Garcia MD
Video demonstration of standard scenario without distractors	22-27	Lisa Caplan MD Priscilla Garcia MD William Waldrop MD Kale Wayman MD David Young MD
"Small group break out session" **Introduction to the Distractor Development Worksheet** **Incorporation of socioemotional distractor into a standard perioperative scenario using distractor development worksheet**	28-38	Lisa Caplan MD
Video demonstration of standard scenario with socioemotional distractor	39-44	Lisa Caplan MD
"Small group break out session" **Incorporation of environmental distractors into a standard perioperative scenario using distractor development worksheet**	45-55	Lisa Caplan MD
Video demonstration of standard scenario with environmental distractors	56-61	Lisa Caplan MD
Discussion regarding impact from added distractor[s]	62-72	David Young MD
Developing higher complexity distractors	73-83	Kale Wayman MD
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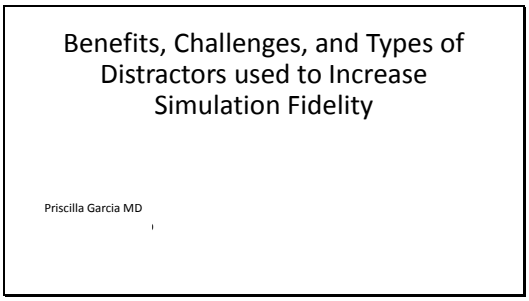
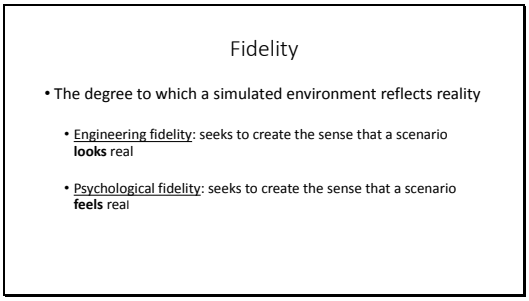
Benefits, challenges, and types of distractors used to increase simulation fidelity





Fidelity manikins

Low Fidelity
- Segmented clinical task trainer capable of a small number of specific tasks or procedures
  - Ex: an IV-arm or a CPR manikin

High Fidelity
- Computer controlled manikin, live or dead tissue
  - More realistic (authentic)
  - More expensive

Norman, G, et al. "The minimal relationship between simulation fidelity and transfer of learning" *Medical Education* 46 (2012): 636-647.

Which fidelity should you choose?

Cognitive load

- Total amount of mental effort being used in the working memory
- Working memory:
  - is **limited** with respect to the **amount** of information it can hold and the **number** of operations it can perform on that information
- When a learner is engaged in learning a *novel task*, working memory is occupied with *processing task-relevant information*

Adams A, et al. "A Comparison of teaching modalities and fidelity of simulation levels in teaching resuscitation scenario." *J Surg Educ* 72 (2015): 778-785.

Cognitive Load Theory

- *Low fidelity* may be better suited for *novice* learners to cut down on excess "irrelevant" stimuli whereas *high fidelity* may be better for *advanced learners*

Distractors

- Distractor processing impairs memory because distractors are encoded into working memory, thereby interfering with memoranda
- Free time following distractors is used to remove them from working memory by unbinding their representations from list context

Oberauer K, Lewandowsky S. "Control of information in working memory: encoding and removal of distractors in the complex-span paradigm." *Cognition* 156 (2016): 106-128.

Distractors

- Difference in response to auditory stimuli can be perceived as stress (noise) or relax (music)
- External: noise and bystanders – may interfere with crucial tasks and might adversely influence patient outcomes

Krage R, et al. "Does individual experience affect performance during cardiopulmonary resuscitation with additional external distractors?" *Anaesthesia* 69 (2014): 983-989.

Types of Distractors

Environmental

- Auditory: *music, fire alarms*
- Visual/lighting: *dark room, loss of power*
- Equipment set up inadequate: *no code cart, wrong size mask*
- Room location inadequate: *small room, public area*

Socio-emotional

- Physical: *blocking care*
- Verbal: *screaming, crying*
- Multitasking: *confederate overloaded*
- Conflict: *argument with leader*
- Ethical: *use of ethical issues, DNR*

Use of Distractors

Benefits

- Enhance fidelity
- Ability to modify standard scenario for advanced learners
- Provides relevance for interdisciplinary sessions
- Can identify areas for improvement in system based practices

Challenges

- Increase cognitive load to learners
- Increased development time
- Potential increased costs
- In extreme, jeopardizes fiction contract with learners
- Could undermine the scenario learning objective(s)

The Wrong Place at the Wrong Time

By

The Texas Children's Hospital Simulation Team

Lisa Caplan MD, Priscilla Garcia MD, William Waldrop MD, Kale Wayman MD, & David Young MD

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FADE IN:

INTERIOR Perioperative Evaluation Clinic- DAYTIME

RESPONDER #1 is trying to locate the MANIKIN (12 year old boy) in the waiting area of the perioperative evaluation clinic. RESPONDER #1 finds a 12-year-old boy (MANIKIN) on the floor of the waiting area of the perioperative clinic. The boy appears to be in the waiting area alone.

RESPONDER #1 immediately recognizes something is amiss, and runs to the side of the MANIKIN. RESPONDER #1 shakes the VICTIM's shoulder.

RESPONDER #1
Hello! Are you OK?

RESPONDER #1 performs a rapid assessment. The VICTIM is not breathing, has no pulse, and quickly initiates chest compressions:rescue breathing at a rate of 30:2 and screams for help. As this is transpiring, RESPONDER #2, a coworker, happens to be entering the clinic.

RESPONDER #1
Help! This child is not breathing! Call a code blue and get the clinic Automated External Defibrillator [AED]!

RESPONDER #2
I will call for a code blue, and get some help!

RESPONDER #1 continues CPR, by him/herself, at a rate of 30:2 for a total of 2 cycles. When 2 cycles are complete, RESPONDER #2 arrives back at the clinic waiting area with RESPONDER #3 and RESPONDER #4. RESPONDER #1 is still performing CPR.

RESPONDER #2
I called a code blue with the page operator, and found our coworkers in the breakroom. We located the AED and brought it with us.

RESPONDER #1

Thank you! I was on about to call this patient into the exam room when I found him on the floor. He is 12 years old, and has orthopedic surgery scheduled here in 2 weeks. I am not sure where his parents are. I don't have any medical history on him. When I checked, he was non responsive, had no pulse, and was not breathing. So I started CPR at a rate of 30:2 and called for help. Is the code team on the way? Can someone help me with CPR, I am getting tired?

RESPONDER #3

I can take over CPR.

RESPONDER #4

I will apply the AED.

RESPONDER #2

The operator said the code team was called. I'll stand outside the clinic door to ensure the code team gets here easily.

RESPONDER #3 takes over performing CPR on the MANIKIN at a rate of 30:2.

RESPONDER #4 attaches the AED pads to the MANIKIN, plugs the pads into the device, and turns it on. The machine alerts that a shock is advised.

RESPONDER #4

The AED is going to shock the patient. Everyone stand clear from the patient. I'm clear, you're clear, we're clear.

RESPONDER #4 will deliver the advised shock from the AED.

FADE OUT

Simulation Scenario Distractor Selection Worksheet

Scenario Name:_____

Scenario Cognitive (i.e. knowledge) and Technical (i.e. psychomotor skills) key learning objectives:

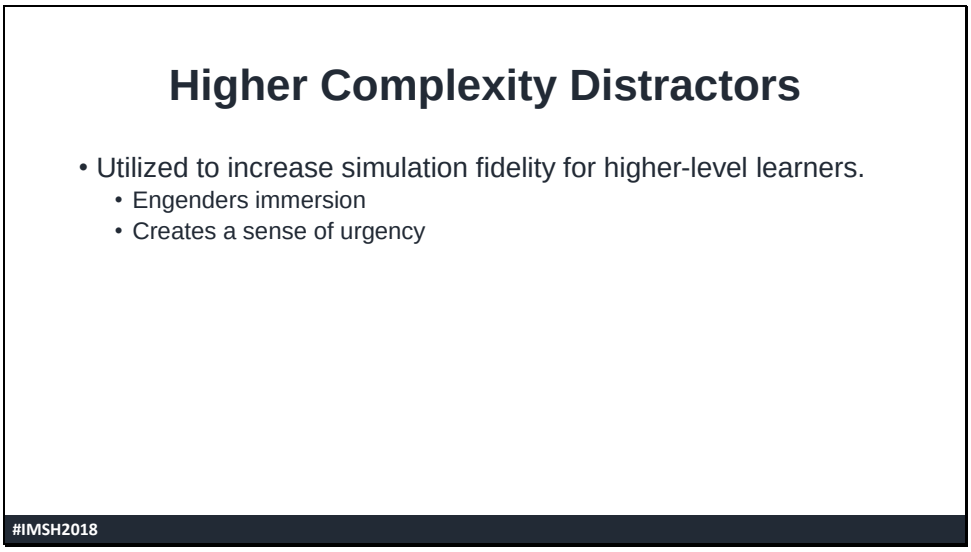
1. Cognitive:

2. Technical:

Check box[es] of selected distractor[s]	**Distractor Type**	**Corresponding Confederate role[s]** **[What role does the confederate have?]**	**Trigger On** **[What is the trigger for the distraction to start?]**	**Trigger Off** **[What is the trigger to end the distraction?]**
Socioemotional				
	Physical [i.e. physically in way of learners, blocking care, etc.]			
	Verbal [i.e. screaming, crying, asking questions, language barrier]			
	Multitasking [i.e. confederate overloaded resulting in mistakes]			
	Conflict [i.e. argument or disagreement with leader and confederate]			
	Ethical [i.e. use of ethical issues, DNR, Jehovah, etc.}			
Environmental				
	Auditory [i.e. music, fire alarm, etc.]			
	Visual/lighting [i.e. dark room, loss of power, etc.]			
	Equipment setup inadequate [i.e. no code cart, wrong size mask, etc.]			
	Room location inadequate [i.e. small room, public area, etc.]			

<u>Details of the distraction[s]:</u> [Describe the key details of the distraction; i.e. will start asking many questions, screaming, crying, talking in non-English language, etc. Remember to have who, what, where, when type details in your description].

Developing higher complexity distractors



Fidelity

- Socioemotional Fidelity
  - How emotionally engaged are learners?
- Physical Fidelity
  - How real does the environment look to a learner?
- Functional Fidelity
  - How well does the simulated environment mimic real life?
  - Greatest effect on learning[1]

- Allen J, Buffardi L, Hays R. The Relationship of Simulator Fidelity to Task and Performance Variables: Report no. ARI-91-58. Alexandria, VA; Army Research Institute for the Behavioral and Social Sciences; 1991.

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Socioemotional

- High Complexity:
  - Multiple confederates creating multiple distractions for multiple learners
  - Confederates who will not be calmed and are directly disruptive to team efforts
  - Confederates who use foreign languages

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Fidelity

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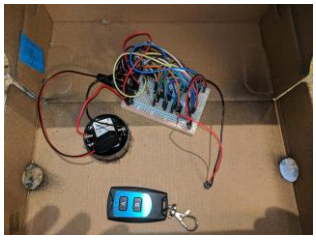
Line Isolation Monitor



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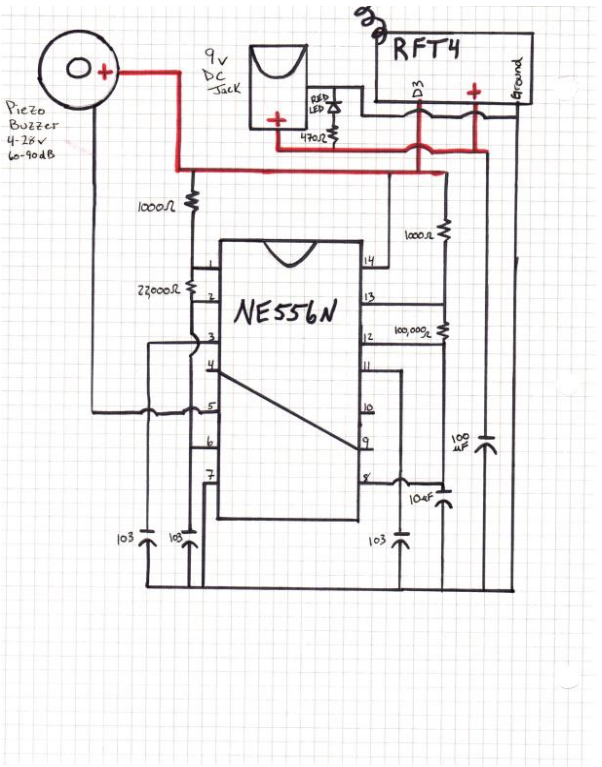
Line Isolation Monitor

PiezoElectric Buzzer used as a Line Isolation Monitor

- Parts list:
- 556 dual timer chip
- 1000 Ohm resistor x 2
- 22,000 Ohm resistor
- 100,000 Ohm resistor
- 470 Ohm resistor
- 103 ceramic capacitor x 3
- 10 uF capacitor
- 100 uF capacitor
- Piezo Buzzer, 90 db, 4-28V
- RTF4 wireless receiver switch with remote
- 9v DC jack
- Red LED
- Bread board or other circuit board
- Jumper wires
- Box for Housing



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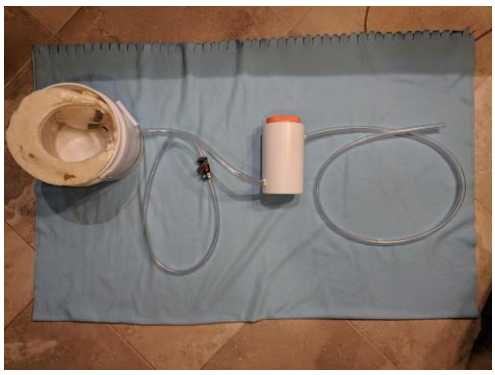
Dry Ice Smoke Cannon



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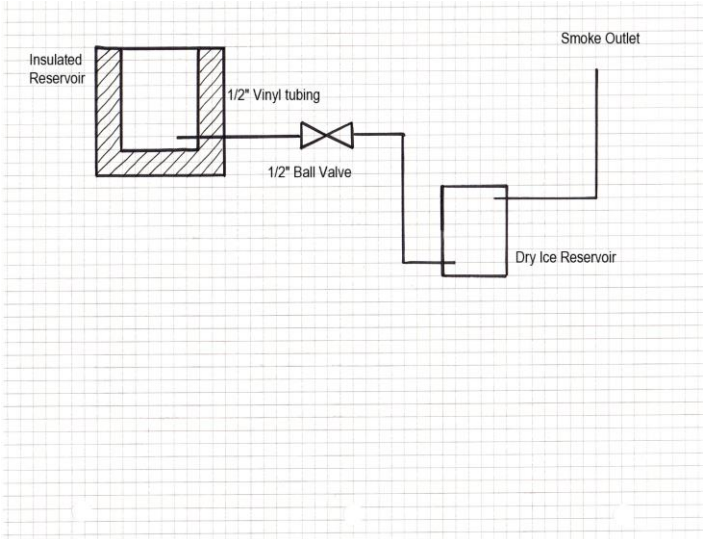
Dry Ice Smoke Cannon

- Parts List:
- Insulated reservoir
- ½” Vinyl tubing
- ½” Ball valve
- Secondary Reservoir for Dry Ice
- ½” hose clamp x 2



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Under Development

- Microcomputers (Arduino, Raspberry Pi)
- Point of care US integration

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Microcomputers

- Arduino

- Raspberry pi

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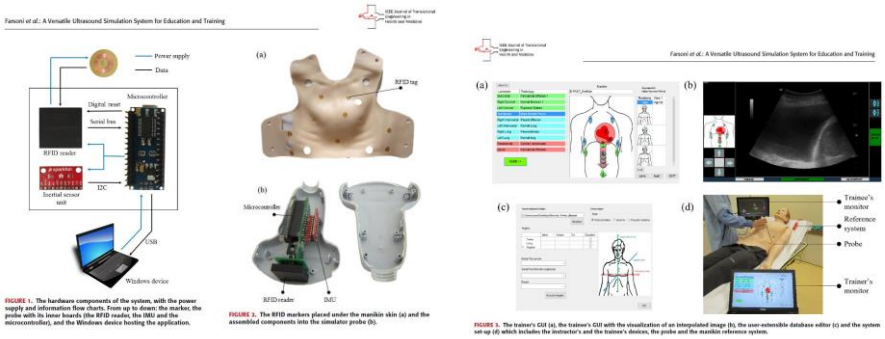
Ultrasound Simulation



- Farsoni et al.: A Versatile Ultrasound Simulation System for Education and Training. *IEEE Journal of Translational Engineering in Health and Medicine.* Vol. 5, 2017.

Ultrasound Simulation

- HTML based video player responsive to RFID tags scanned by simulated US probe.
- An open access version of the simulator application is available at the following URL: https://drive.google.com/file/d/0B7FPzgyHC6cGZHpBa3BFNlpfLVk/view.

- Damjanovic, et al. An easy-to-build, low budget point-of-care ultrasound simulator: from Linux to a web-based solution. *Crit Ultrasound J.* (2017) 9:4.

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Scenario Overview

Name of Scenario ____Wrong place at the wrong time_____

Learning Objectives of Scenario:

Cognitive:

1. The learner will recognize the benefits from incorporating socioemotional and environmental distractors into an interprofessional perioperative simulation scenario.
2. The learner will distinguish the differences between socioemotional and environmental distractors when utilized to enhance simulation fidelity.
3. The learner will develop a strategy to select the most appropriate distractor(s) to enhance fidelity of an interprofessional perioperative simulation scenario.

Technical:

1. N/A [examples would include making an objective to appropriately utilize an Automated External Defibrillator].

Behavioral:

1. The learner will recognize the enhanced emotional fidelity from incorporating socioemotional and environmental distractors into a perioperative simulation scenario.

Patient Description:

History (Medical, Surgical, Social): A 12 year old boy (34kg) with unknown medical history has been found unconscious in the preoperative clinic.

Baseline Vital Signs: The patient is unconscious, not breathing, and has no palpable pulse.

VS T 97.5 HR 0 BP 0 RR 0 SPO2 0

Baseline Lab Values: None will be given.

Target Trainees (Learners):

Simulation workshop participants at the IMSH with varying degrees of medical knowledge.

Anticipated Duration:

Scenario Time: 5-10 minutes

Debriefing Time (typically 2-3x scenario length): This will be linked into the group discussion portion after the participants demonstrate their scenario.

Scenario Set-Up

Room Configuration (set up): chairs to simulate perioperative clinic.

Equipment Needed:

1. AED
2. High or low fidelity simulator manikin
3. Airway equipment- BMV or face shields [3]; adult or possibly infant size

Mannequins/ Task trainers/ Standardized Patients Needed:

A high or low fidelity manikin/task trainer for CPR

Patient Medical Chart Information:

12 year old boy (34kg) with unknown medical history has been found unconscious. There are no family members or witnesses to give any additional information.

Miscellaneous:

The rescuer will need to activate the code blue system to receive additional help.

Demonstration Items needed for Debriefing:

Basic Cardiac Life Support Algorithm from AHA.

Scenario Logistics

Expected Scenario Flow [reference Participant Script for BLS Scenario]

The scenario will begin as the rescuer is brought to the side of a 12 year old boy who is unconscious on the floor of the perioperative evaluation clinic. The 1st responder will discover absent pulses and respirations while performing a limited physical exam. She/he will commence basic life support by providing 30:2 compressions:breaths, and having the 2nd responder activate the emergency response system. After 2 cycles of CPR have been administered, 2 additional responders will arrive. The 1st responder will give a brief synopsis to the team, and assign roles. Responder #3 will assume chest compressions and responder #4 will apply the AED. The AED will advise a shock is indicated, and the scenario will end after the 1st defibrillation has been administered.

Expected Interventions of the Participants:

1. 1st responder—Initiate CPR and rescue breathing, become the team leader when the other responders arrive.
2. 2nd responder—Activate the code blue system. Return to the scene with responders #3 and 4. Be looking out for the code team which is in-route.
3. 3rd responder—Take over chest compressions.
4. 4th responder—Apply AED, and defibrillate when a shock is advised per the AED.

Expected Endpoint of the Scenario:

The scenario will end after the 1st defibrillation.

Distractors within Scenario [please reference Distractor Development Worksheet]:

The participants will work together to create either a socioemotional or environmental distractor to enhance the fidelity of this scenario. Examples of distractors will be given to the participants to use during their brainstorming session.

Optional Challenges for Higher Level Learners:

The scenario can continue past the 1st defibrillation and onto medical management and administration following the AHA PALS Cardiac Arrest Algorithm.

Videotaping Guidelines:

None

Roles of Participants/Trainees:

The workshop participants will be given the opportunity to reenact this scenario utilizing the above roles. Confederates from the workshop may fill in resuscitator roles in the scenario depending on the group sizes. The key purposes of this workshop is to appreciate the benefits and provide the ability to add a distractor to a preexisting simulation scenario.

Roles of Confederates (if applicable):

Confederates from the workshop may fill in resuscitator roles in the scenario depending on the group sizes.

Debriefing Points:

Cognitive: as above

Technical: as above

Behavioral: as above

Scenario Support Materials, References, Pre and Post Tests, Evaluations

Reference List:

1. Wong AH, Gang M, Szyld D, et al. Making an "Attitude Adjustment": Using a Simulation-Enhanced Interprofessional Education Strategy to Improve Attitudes Toward Teamwork and Communication. Simul Healthc. 2016 Apr;11(2):117-25.
2. Hinde T, Gale T, Anderson I, et al. A study to assess the influence of interprofessional point of care simulation training on safety culture in the operating theatre environment of a university teaching hospital. J Interprof Care. 2016 Mar;30(2):251-3.
3. Kosik E. A Briefing Regarding In-Situ Simulation: An Emerging Educational Safety Tool for Anesthesiology and Perioperative Medicine. Int Anesthesiol Clin. 2015 Fall;53(4):98-114.
4. Sorensen JL, van der Vleuten C, Rosthoj S, et al. Simulation-based multiprofessional obstetric anaesthesia training conducted in situ versus off-site leads to similar individual and team outcomes: a randomized educational trial. BMJ Open. 2015 Oct 6;5(10).
5. Murray AW, Beaman ST, Kampik CW, et al. Simulation in the operating room. Best Pract Res Clin Anaesthesiol. 2015 Mar;29(1):41-50.
6. Palaganas JC, Epps C, Raemer DB. A history of simulation-enhanced interprofessional education. J Interprof Care. 2014 Mar;28(2):110-5.
7. Tullmann DF, Shilling AM, Goeke LH, et al. Recreating simulation scenarios for interprofessional education: an example of educational interprofessional practice. J Interprof Care. 2013 Sep;27(5):426-8.
8. Weinstock PH, Kappus LJ, Garden A, et al. Simulation at the point of care: reduced-cost, in situ training via a mobile cart. Pediatr Crit Care Med. 2009 Mar;10(2):176-81.
9. Robertson J, Bandali K. Bridging the gap: enhancing interprofessional education using simulation. J Interprof Care. 2008 Oct;22(5):499-508.
10. Adesunloye BA, Aladesanmi O, Henriques-Forsythe M, et al. The preferred learning style among residents and faculty members of an internal medicine residency program. J Natl Med Assoc. 2008 Feb;100(2):172-5.
11. Norman GR. The adult learner: a mythical species. Acad Med. 1999 Aug;74(8):886-9.
12. Krage R, Tjon Soei Len L, Schober P, et al. Does individual experience affect performance during cardiopulmonary resuscitation with additional external distractors? Anaesthesia. 2014 Sep;69(9):983-9.
13. Keast T, Forrest AE, Sleigh JW, et al. A randomized study of the effect of external distractors on the quality of ventilation in a simulated adult cardiac arrest. Crit Care Resusc. 2015 Dec;17(4):274-9.

14. Nyström S, Dahlberg J, Edelbring S, et al. Debriefing practices in interprofessional simulation with students: a sociomaterial perspective. BMC Med Educ. 2016 May 17;16(1):148.

15. Hunziker S, et al. Dynamics and association of different acute stress markers with performance during a simulated resuscitation. Resus. 2012 May; 83 (5): 572-8.

16. Bjoshol CA, et al. Effect of socioemotional stress on the quality of the cardiopulmonary resuscitation during advanced life support in a randomized manikin study. Crit Care Med. 2011 Feb; 39 (2): 300-4.

17. Marsh, SCU, et al. Human factors affect the quality of cardiopulmonary resuscitation in simulated cardiac arrests. Resuscitation. 2004 Jan; 60(1): 51-6.

18. Park, CS. Simulation and quality improvement in anesthesiology. Anesthesiol Clin. 2011 Mar; 29(1) 13-28.

19. Leblanc, VR. The effects of acute stress on performance: Implications for health care education. Acad Med. 2009 Oct; 84(10 Suppl):S25-33.

20. Arora S, et al. The impact of stress on surgical performance: A systematic review of the literature. Surgery. 2010 Mar; 147(3) 218-30.

21. Fernandez, R et al. The presence of a family witness impacts physician performance during simulated medical codes. Crit Care Med. 2009 Jun; 37(6): 1956-69.

Pre-test: None

Post-test: None

Cognitive Aids to be reviewed by trainees before participation in the simulation:

Copy of the AHA BLS algorithm (optional)

Evaluation [post-course]:

1. Since participating in this workshop, have you incorporated distractors into your simulation activities?

Yes/No

2. If you HAVE NOT incorporated distractors into your simulation activities, please select the reason(s) below?

a. Does not provide added value

b. Unable to develop effective distractor

c. Lack of resources

d. Other: please describe

3. If you HAVE incorporated distractors into your simulation activities, please describe the type(s) of distractors added to your simulation activities?

4. If you HAVE incorporated distractors into your simulation activities, please rank the impact of the added distractors to the overall fidelity.

1= Strongly Detrimental

2= Slightly Detrimental

3= Neutral

4= Slightly Effective

5= Strongly Effective

5. Please list below any additional comments regarding the incorporation of distractors into your simulation activities:

BLS Healthcare Provider
Pediatric Cardiac Arrest Algorithm for the Single Rescuer—2015 Update