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Simulation Integration

Strategies for the effective implementation of scenario-based training

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•introduction•

A Commitment to Simulation

Long used in the medical and aircraft industries with great success, more and more EMS agencies are realizing the benefits afforded to their systems through the integration of simulation into their education and evaluation systems.

This simulation supplement, sponsored by Laerdal Medical, is designed to give you a historical and current review of the development, use and benefits of simulation training and evaluation in EMS.

Driving forces such as the Commission on Accreditation of Allied Health Education Programs (CoAEMSP) and the *EMS Workforce Agenda for the Future* are setting clear expectations for improved patient care, improved outcomes and improved efficiency. This changing landscape has placed increased demand on EMS educators to train, certify and retrain highly competent EMTs and paramedics and evaluate their performance on a continuous basis.

Through many years of research and science, it's become well known that simulation training offers standardized, measurable learning experiences that allow students to practice and refine critical skills and procedures in risk-free environments that lead to improved competency and patient outcomes. What has been lesser known is the important role that simulation plays in EMS education, how it relates to real world practice and how it can be implemented effectively and in a cost-effective manner.

It's with these questions in mind that the National Association of EMS Educators (NAEMSE) Board of Directors made a commitment to conduct a study to characterize the use of simulation in EMS education. Upon completion of this research, the information and conclusions will be disseminated via the NAEMSE website, educational programs and professional EMS publications.

To follow the progress of this research project and locate resources based on the findings, please visit www.naemse.org.

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Simulated MCI Training

Simulation training for MCIs helps students form a variety of patterns and optimizes their triage performance.

PHOTOS COURTESY PRINCE SULTAN BIN ABDULAZIZ COLLEGE FOR EMS

Paramedic students practice triage & patient care in the Kingdom of Saudi Arabia

By William Leggio, EdD, MS NDR, BS EMS, NREMT-P; Michael Krtek, BS, NREMT-P; Ahed Najjar, MS IPH, BSN, AREMT-FP; Hashim Binsalleeh, MD; Deifallah Alrazeeni, Phd & Khalid Fouda Neel, MD

Simulation training in EMS education is well-known as a learning method that allows students to demonstrate their ability to perform patient assessments and interventions in a safe manner. It's also well known that EMS providers serve as first responders not only to emergencies with a single patient, but also respond to mass casualty incidents (MCI) where multiple patients require triage.

The MCI triage process requires rapid and accurate decision making.[1] Limited data has been collected concerning the ability of EMS to triage patients during MCIs.[2] A known challenge to the formal MCI triage process is that personal judgment can affect the decision-making process, and this can succeed triage instruments.[3]

Though personal judgment could have such an effect on an EMS provider's ability to triage during an MCI, one study found paramedics were better able to triage when combining both a triage scale and personal judgment when compared to the application of one without the other.[3]

Another study evaluating 109 EMS providers on their ability to triage during an MCI concluded the ability of EMS providers of all training levels and experience was less than optimal.[2]

Researchers have assessed the potential benefits of simulated MCI training scenarios and results suggest simulated MCIs:

- Helped students form a variety of patterns and optimized their triage performance;[3]
- Improved triage, intervention scores, speed and self-efficacy by novice learners during a multi-manikin MCI training experience;[1] and
- Improved abilities following a single didactic session on MCI patient triage that persisted one month later.[2]

Therefore, support for simulated MCI training is present in the literature and the scenarios reflect the challenges faced during an actual triage.

EMS (MCI) Olympics

In May 2013, Prince Sultan bin Abdul Aziz College for EMS (PSCEMS) of King Saud University in Riyadh, Kingdom of Saudi Arabia, held its first EMS Olympics, a day designed for students to showcase their research projects, but most importantly, to participate in simulated MCI training exercises.

Forty-two students formed six teams of seven students and competed against each other. The students who competed had already completed EMT training as well as training at the paramedic level in the management of pulmonary, cardiology, medical and trauma emergencies. The aim of the training was to have students triage, demonstrate EMS skills and their ability to both communicate and work together during MCI scenarios.

The Scenario

The MCI training at PSCEMS was held on a floor with three ambulance simulators and open spaces. (See Figure1.) The simulated theme of the MCI was an explosion in an office building. The MCI involved eight patients: a rescue manikin, two high-fidelity manikins and five students acting as patients.

Each team had 15 minutes to respond and manage the MCI. Time was announced over a speaker system throughout the scenario. The speaker system also played a recorded audio of traffic sounds, muffled radio transmissions, first responder sirens, and sounds of aircraft and helicopters flying overhead.

After receiving dispatch information, the teams would respond and were required to enter the scene by climbing up a set of stairs. This prevented the teams from seeing the scene before entering. Upon entering the scene, teams were able to find six of the eight patients.

Patient 1 was an apneic and pulseless rescue manikin who suffered second and third degree burns to his upper body and face.

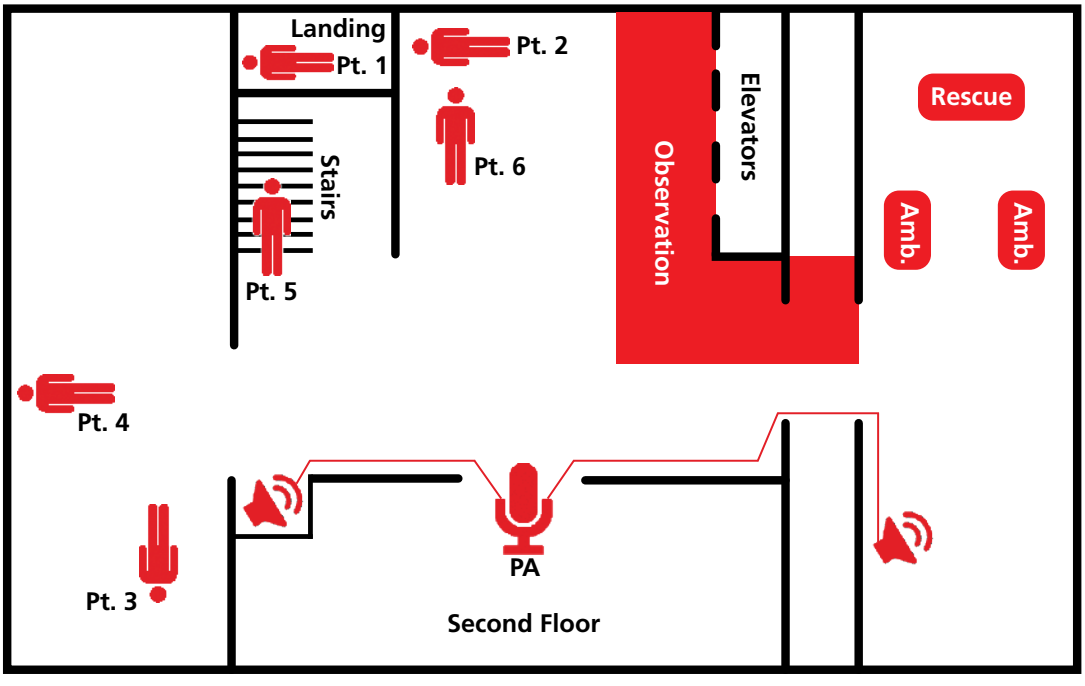
Patients 2 and 3 were programmed high-fidelity manikins. Patient 2 was an unresponsive male with a closed head injury and increasing intracranial pressure who went into cardiac arrest after seven minutes.

Patient 3 presented as semi-responsive and suffering from an eviscerated abdomen and programmed to become unresponsive at five minutes and continue to progress into irreversible shock.

Patients 4, 5 and 6 were student actors. Patient 4 presented on the floor with an open femur fracture. Patient 5 had burns to both hands and patient 6 was emotional and suffering from a closed head injury. Patients 5 and 6 were also instructed to demand that EMS responders help their friends. These two patients were also instructed to follow commands, but told that if left alone in a treatment area, they should reenter the scene and continue demanding help and assistance.

Patient 7 entered the scene by coming down the stairs after three minutes into the scenario. This patient was confused and suffering from a closed head injury.

Figure 1.



Patient 8 entered the scene by coming down the stairs after six minutes. Patient 8 was a friend of patient 4 and was instructed to go to his friend. Once at his friend's side, and after seeing his friend's open femur fracture, patient 8 would faint, fall to the ground and become unresponsive.

Teams, Equipment & Scoring

Students formed their own teams and selected a team leader. Before the first scenario, all the teams met together with the event organizer to receive instructions and confirmed the order in which teams would perform. Before each scenario, teams were given triage tags, five portable radios and instructed to stand by.

Teams were able to carry basic equipment and response bags, but were required to go to the ambulance simulators to gather their stretchers and additional equipment. Two of the ambulance simulators were designated as transporting ambulances and the third was designated as a quick response vehicle that had extra supplies.

A mixture of PSCEMS faculty, local EMS providers and program stakeholders evaluated team performances. Each patient had an assigned evaluator who scored how each patient was triaged and treated. In addition, the team leader, overall team performance and MCI scene management were evaluated.

Two evaluators had portable radios and served as a dispatcher and medical director or receiving ED. Teams were assessed on their communications with dispatch, medical direction and receiving EDs.

Use of Patient Actors, Moulage & Manikins

EMS students who had completed EMT training were asked to volunteer to be patients. Each patient was provided scripted answers to standard assessment questions and instructed to react the same way with each team. Moulage was applied to each actor to create lifelike injuries.

At the conclusion of each scenario, each moulaged injury was inspected and, if needed, reapplied or refreshed to maintain consistency of appearance throughout the training. Manikins were only moulaged with premade products.

The use of the high-fidelity manikins in the MCI scenario were considered to be an element of the scenario that was standardized for all teams. These dynamic patients were programmed to evolve because of scenario time and not treatment rendered or team performance.

Research Findings

Nine EMS students who volunteered to compete in the scenario met with William Leggio, EdD, MS NDR, BS EMS, NREMT-P, or Michael Krtek, BS, NREMT-P, to answer questions regarding the MCI training. Interview questions focused on team preparation, overall experi-

Each patient had an assigned evaluator who scored how each patient was triaged and treated.

Ambulance simulators were designated as transporting ambulances.

ence, personal experience and recommendations for future MCI trainings.

Each interview was recorded and transcribed. Both interviewers reviewed transcripts for possible errors made during transcription. Each participant received their transcript and was asked to review them for possible transcription errors. Transcripts were manually analyzed to identify themes then again using NVivo 10 qualitative research software.

Data and Analysis

In general, participants described the MCI scenario as a great, fun and well-organized experience. The participants recognized the purpose of the MCI scenario and discussed the challenges they faced. They provided feedback by discussing strengths and weaknesses of the training. Four general focus areas that surfaced after data analysis were:

1. Preparation;
2. Good and bad scene elements;
3. Lessons learned; and
4. Future recommendations.

1 Preparation: Participants described field and clinical experiences as one source of being prepared for the MCI scenario. Their field and clinical experiences developed self-confidence in their ability to be a responder and provided experience of approaching actual scenes. The EMT and BLS courses students had completed were also felt to be an additional source of preparation.

Participants felt their EMT training prepared them for the MCI scenario because most patients required more basic interventions and assessment than advanced.

Participants also described the application of interventional skills and patient assessment techniques learned in trauma, medical, cardiology and pulmonary emergency courses as sources of preparation.

Participants stated that they had learned the basics of triage in both EMT and trauma emergencies, but described a need to look for additional sources on the Internet days before the MCI scenario.

2 Good & Bad Scene Elements: Many participants described the use of moulaged patient actors as a strength of the scenario because the patients could answer questions, move freely and made the scenario seem more real. The scene noise playing during the MCI was also described as a strength. One participant felt that the audio created a noisy and rowdy scene.

Participants also felt the use of the high-fidelity manikins was a strength of the scenario. One participant said he wasn't focused on the manikin being real or not but simply, "just doing my job and finishing."

Allowing observers to be too close to the scenario was described as one weakness of the MCI scenario. Participants described that observers were heard making comments and tried distracting other teams. The proximity of the ob-

Moulage was applied to each patient actor to create lifelike injuries.

servers was attributed to the scene layout. The construction of the space available provided limitations of laying out the scene in terms of space for the scenario, observation area and participant entrance.

Participants found it difficult responding with minimal equipment and having to retrieve the rest of their equipment from the ambulance simulators. However, this presented a realistic scenario where equipment had to be retrieved from a vehicle parked outside and away from the incident.

3 Lessons Learned: This MCI scenario provided the participants with an opportunity to learn from their mistakes. After completing this MCI scenario, participants described a boost in their confidence to respond and perform at an actual MCI scene. In addition, they all learned the critical aspect of being able to communicate with team members and the importance of organizing their team by defined roles and responsibilities.

Participants also described learning the importance of time management in providing patient care, being able to manage more than one patient and how to remain open-minded even when prepared for an MCI.

In addition, learning the importance of trusting their team, being a professional and not placing blame on just one team member were described by participants as additional lessons learned. Participants reinforced the learning experience of being part of this simulated MCI scenario and appreciated the value it added to their education.

4 Future Recommendations: Participants identified the need for more triage education and practice before participating in an MCI scenario. They felt that one or two lectures on how to triage and answering examination questions were not enough. Participants identified the need for additional lectures and triage simulation labs.

In addition to simulated triage labs, participants also discussed the need for EMS operation lab sessions that are focused on communicating with a radio, strategic and efficient use of ambulance stretchers and creating treatment zones. Participants embraced the use of both patient actors and manikins. Some participants described the added value of patient actors and encouraged that future scenarios have more patient actors. However, some participants noted the limitations of patient actors such as their inability to control their heart rate or blood pressure which the high-fidelity manikins can do.

The need for outdoor MCI exercises was also discussed by participants because EMS is a profession that's often called upon to work major incidents outdoors, particularly in Saudi Arabia where the environment presents challenges such as desert heat. In addition, participants felt that it would be beneficial to incorporate medical patients or have a medical-themed MCI exercise.

Discussion & Recommendations

This study supported the use of MCI training scenarios that evolve and are dynamic. The data

collected in this study supported findings in the research discussed. Participants reported feeling more confident in their ability to perform triage during an actual MCI after participating in this simulated MCI training.

Likewise, participants described the benefits of using both high-fidelity manikins as well as patient actors during an MCI. The data supported the need for both medical and trauma patients, and though not discussed in the data, the authors recommend the use of pediatric patients as MCIs potentially involve both adults and children.

This training exercise allowed students to perform under pressure, reflect on mistakes and learn in a way that was challenging and fun. In an educational sense, this exercise identified areas for improvement in EMS student education and training.

Developing skills, identifying areas of weakness in education and building confidence ought not to be limited to EMS education. The authors recommend:

1. The use of simulated MCI training for EMS education and emergency responder training;
2. That organizers of MCI scenarios consider the use of audio and both patient actors and manikins in their scenarios;
3. MCI scenarios be conducted in areas conducive to realistic scene creation and the separation of observers from the scenario;
4. Careful consideration should be given to the challenges that outdoor MCI scenarios create for responders, their equipment and the high-fidelity manikins in an extreme environment.

Conclusion

MCI training scenarios hold the potential for a wealth of learning, reflection and professional development, and should become a stronger part of EMS education and provider development. The response from our students, who recognized significant learning benefit from this training, illustrated the value of this training. The role of MCI scenario training in the EMS program at PSCEMS will be increased because of this experience.

MCI scenario training exercises provide an opportunity for students to perform in teams. This, with the opportunity for interdisciplinary training with other first responders and emergency health professions, ought to be embraced.

The authors strongly encourage EMS researchers to continue exploring MCI training scenarios. This study identified a need to research the effectiveness or limitations of patient actors, high-fidelity manikins and MCI training scenarios in general. It also identified the need to research the effectiveness of outdoor MCI training versus indoor. Lastly, the authors advocate for further research on the challenges faced by EMS education and training agencies in being able to conduct MCI training scenarios. ✚

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