Simulation-Based Orientation for Emergency Medicine Residents Participating in EMS Ride-Alongs

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Abstract

Introduction: Emergency medicine resident physicians are required to complete observational ride-alongs with emergency medical services (EMS) units as part of their curriculum as per the ACGME. We created this curriculum to expose emergency medicine residents to the equipment they will encounter in the prehospital setting, discuss basic EMS operations and the challenges of working in the prehospital environment, and review the limitations that restrict care provided by EMS professionals. Methods: We created a series of five simulation cases for resident physicians participating in an EMS ride-along rotation. Each case was implemented with three to four residents at a time. A critical action checklist was used to assess participants during the scenarios. Following each simulation, a debriefing was conducted to discuss EMS operations and the impact on providers. At the conclusion of the session, participants completed a course evaluation survey. Results: Thirteen emergency medicine resident physicians took part in this curriculum from October 2020 through January 2021. Results indicated that the participants gained insight into the prehospital environment, felt more prepared to complete their ride-alongs, and were engaged and satisfied with the introduction to EMS program. Discussion: Simulation allowed emergency medicine residents to be exposed to the complex nature of prehospital care and prepared them for their ride-along sessions. The five cases provided significant breadth and depth of potential prehospital care issues, and the residents were able to discuss the medical, policy, and operational challenges presented as part of each case.

Keywords
Emergency Medicine, EMS, Emergency Medical Services, Ambulance, Paramedics, EMT, Emergency Medical Technician, Simulation

Educational Objectives

By the end of this activity, learners will be able to:

1. Utilize the emergency medical services (EMS) equipment that will be encountered in the prehospital setting.
2. Identify four challenges associated with treating patients in the prehospital setting.
3. Develop an appreciation for the treatment limitations faced by EMS providers as compared to in-hospital care.
4. Discuss the development of EMS protocols used to treat patients in the prehospital setting.

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to the required observational ride-alongs, the ACGME also requires emergency medicine residents to participate in disaster preparedness drills, advocate for quality patient care and optimal patient care systems, work as part of an interprofessional team, and appreciate population-based care. Our curriculum, while focused on EMS, also assisted residents in meeting a number of these additional ACGME requirements.

A search of MedEdPORTAL revealed only limited curricula dealing with the prehospital environment. One curriculum was an introduction to emergency medical skills course that focused on introducing preclinical medical students to the prehospital provider role, and another, older curriculum focused on pediatric resuscitation for prehospital providers. A recent publication included lecture and case-based learning about online medical control for EMS. However, no publications focused on preparing emergency medicine residents for field experiences in EMS with the larger goal of introducing them to managing complex medical and social cases while not having all the resources normally found in the hospital emergency department environment.

Our curriculum provided emergency medicine residents with five simulation scenarios that allowed them to more fully comprehend the challenges of working in the prehospital environment. The cases increased in medical complexity while also forcing the participants to recall and implement lessons learned from previous cases related to policies and procedures. The debriefing sessions focused not only on the medical management of the case but also on scene management and treatment and transport decisions that were necessary.

**Methods**

**Development**

This simulation curriculum was collaboratively developed through the Simulation, Training, Assessment, and Research (STAR) Center at the Icahn School of Medicine at Mount Sinai, emergency medicine faculty who were members of the EMS division, three residents interested in EMS, and the training manager for the Mount Sinai Emergency Medical Service EMTs and paramedics. We conducted a general needs assessment by verbally asking EMS faculty, EMS providers, and residents who had previously done ride-alongs what the most important take-home points were for the rotation. They articulated the importance of physical and psychological safety, knowledge of EMS equipment, the need to appreciate the distinctions between EMTs and paramedics, exposure to the challenge of working within the confines of protocols and policies, and appreciating how EMS systems develop, including how this impacts transport decisions. The STAR Center faculty worked collaboratively with emergency medicine faculty and emergency medicine residents to create five scenarios to meet the objectives identified above. The general topic of each of the scenarios was scene safety, chest pain with transport decision, pediatric anaphylaxis, burn patient with difficult airway, and altered mental status with refusal of care after treatment. This curriculum enhancement was part of the normal educational process and therefore exempt from institutional review board consideration (HS# 20-01201).

**Equipment/Environment/Personnel (Appendix A includes images)**

- **All scenarios**
  - EMS stretcher
  - Fully stocked EMS equipment bag and oxygen bag (we created a simulated oxygen cylinder for safety)
  - Portable monitor
  - Portable suction
  - Two-way radio

- **Appendix B: scene safety—interaction with a hostile bystander**
  - Portable backdrop (brick wall), used to cover the medical headwall permanently installed in the simulation room
  - Two standardized participants (patient and aggressive partner)
  - Table
  - Chairs (one for standardized patient and one turned on its side)
  - Simulated broken glass
  - Cups and plates (paper or plastic) thrown around the room
  - Television with sporting event playing
  - Loud music from an adjacent room
  - Broken bottle or hammer in the adjacent room

- **Appendix C: chest pain**
  - Portable backdrop (brick wall), used to cover the medical headwall permanently installed in the simulation room
  - High-tech adult patient simulator, capable of being connected to a portable monitor and displaying heart rate (HR), EKG, oxygen saturation (SpO2), and blood pressure (BP)
  - Table
  - Recliner—for manikin to be positioned in at the table

- **Appendix D: pediatric anaphylaxis**
  - Portable backdrop (park scene), used to cover the medical headwall permanently installed in the simulation room
- High-tech pediatric patient simulator, capable of being connected to a portable monitor and displaying HR, EKG, SpO2, BP, lung sounds, and cyanosis (child)
- Standardized participant (parent)
- Bench/two chairs, for manikin and standardized patient to be sitting on

- Appendix E: burn
  - Portable backdrop (abandoned warehouse/graffiti wall), used to cover the medical headwall permanently installed in the simulation room
- High-tech adult patient simulator, capable of being connected to a portable monitor and displaying HR, EKG, SpO2, and BP
- Standardized participant (basic-level first responder)
- Moulage equipment, including coffee grounds (soot) and burns

- Appendix F: altered mental status and refusal of care
  - Portable backdrop (brick wall), used to cover the medical headwall permanently installed in the simulation room
  - Two standardized participants (patient and family member)
  - Table
  - Chair

Implementation
Residents participating in the EMS rotation received an email prior to the start of the rotation with rotation-specific information, such as the agenda for the orientation session and other required documents. The only precourse material provided to participants was a link to local EMS protocols included in the email. Participants were expected to manage the simulation cases with the knowledge and experiences they had as part of their undergraduate or graduate medical education.

The EMS orientation day began with a didactic presentation provided by an EMS faculty member about the overall goals and objectives of the rotation. Rotation-specific policies, where to meet the ambulance crews, what to wear, and the role of the resident observer were all reviewed. As the presentation was organization specific, it is not included as part of this publication. Following this hour-long overview, participants came to the simulation center to participate in the scenarios. Upon arriving, learners were greeted and signed into the session. Specific simulation center policies and ground rules were reviewed, including the general purpose of the scenarios, the creation of a safe learning environment, and formal introductions of people in the room. Next, learners were introduced to a high-technology simulator and reviewed the capabilities and shortcomings of the equipment. Next, they were provided with an opportunity to review the equipment available to them. An EMS stretcher with a medical bag, oxygen bag, suction unit, and portable monitor was available for them to inspect (Appendix A).

Following this opportunity to explore the equipment, the participants were provided with a two-way radio. Functionality and how to use the radio were reviewed. The participants were advised they would be given the unit ID 10-Alpha for the remainder of the day. They were advised that all information would be provided by dispatch and that they, the participants, could request additional assistance and/or medical control via dispatch. The team was also informed that the dispatch information would include the location of the patient and type of building (elevator vs. walk-up) and that this would dictate if they could bring the entire stretcher with them or be required to select items to carry into the simulation room.

Each scenario lasted about 8 minutes (Appendices B-F) and concluded when the participants left the room (with or without the patient). The scenarios included the following:

1. A female patient with abdominal pain whose aggressive friend prevented her from going to the hospital.
2. A 56-year-old male patient with chest pain requiring transport to an ST-elevated myocardial infarction (STEMI) center.
3. A pediatric anaphylaxis patient requiring epinephrine administration using a check and inject system.
4. A burn patient requiring airway maintenance, hydroxocobalamin, and transport.
5. An elderly diabetic patient who was resuscitated with glucose but then refused transport.

Resident physician participants were either first- or second-year residents, depending on which residency program they were completing. Each session was completed with three to four residents at a time. If three residents were present, they were given the option of responding to each case in groups of two or three. If four residents were present, they were divided into pairs, and one group participated while the other actively observed via video. The lead faculty member for these sessions remained consistent throughout the implementation. Assistant faculty members who were involved as standardized participants and assistant debriefers were oriented to their role prior to the start of the session. The assistant faculty for this program were involved with the creation of the curriculum, so they had a high level of awareness of the overall program and only needed an introduction to their specific roles for each case. Their roles...
consisted of being a standardized participant that played the role of a bystander, a family member of a patient, or medical control, depending on the case.

Assessment
Each scenario included a list of critical actions that needed to be accomplished by the participants. Each set of critical actions was written by the case writer. The entire case was then shared with the emergency medicine faculty members who were part of the EMS division as well as with the EMS education director. The EMS education director was a state-certified EMS instructor; the emergency medicine faculty were members of the regional EMS councils, served as the medical directors for the EMS division, and were also responsible for developing protocols and policies for the region; and the simulation director was a member of the State EMS Council. The EMS educator provided the group with the State EMS testing sheets, which were used as a foundation for the development of the critical checklists for these scenarios. After the key elements of each case were identified, common elements were listed to ensure they were captured on the checklists. Following this collaborative workgroup, the scenarios were piloted to ensure the checklists captured the key elements. Finally, following implementation, the critical actions sheets were updated and revised as needed to ensure they continued to capture the key elements of safely operating on an EMS scene. The critical action list, if used as a checklist, helped ensure that the participants were meeting the clinical aspects of managing the case and doing so in an organized manner. However, there was also a focus on the operations of working in the prehospital care environment, which were reviewed during the debriefing and were listed as debriefing points following the critical action checklist.

Debriefing
Following each scenario, a debriefing was held. Various debriefing modalities were used throughout the session so as to not become repetitive. The PEARLS model of debriefing,\(^5\) advocacy and inquiry,\(^6\) and plus/delta\(^7\) were all used depending on the faculty member’s comfort. While the exact methods of debriefing were interchangeable, we did make sure to discuss the debriefing points for each case (Appendix G). Approximately 20 minutes was allotted to debriefing following each of the scenarios. For each scenario, the simulation faculty started the debriefing and would then ask either the emergency medicine faculty member or EMS provider to address specific aspects of the case. The emergency medicine faculty member specifically discussed the clinical components of the case and some of the protocols/policies unique to the case. The EMS provider discussed specific operational concerns related to the case, such as treatment on scene versus transport or which destination should have been selected and why.

While the debriefing focused on both medical management and scene operations, the session was also an opportunity to ensure the nonclinical objectives had been met. Utilizing the key debriefing points located in each case file ensured that a discussion was had about these system and policy issues. Discussions could include which hospitals were STEMI/cardiac cath/stroke/burn centers, how they became designated, and why not every hospital could be designated in each area. Other discussions included treatment limitations in EMS and the supporting literature regarding the management of patients in the field, such as the need to intubate versus the use of a laryngeal mask airway. Following the entire session, participants completed a course evaluation form that was standardized for all simulation-based activities at our facility (Appendix H). In addition, 1-2 weeks after the simulation session, participants attended the EMS division administrative meeting and were afforded the opportunity to provide additional feedback about the orientation session since they had had the opportunity to complete a portion of the ride-alsongs. We collected this feedback informally for further refinement of the curriculum.

Results
Thirteen emergency medicine resident physicians (eight PGY 1s and five PGY 2s) from two different emergency medicine residencies took part in this curriculum from October 2020 through January 2021. Following the entire session, an anonymous course evaluation form (Appendix H) was completed by each participant. The course evaluation was completed electronically and was the standard evaluation form used for all simulation-based education programs in our program. Results of the course evaluation indicated that the participants gained insight into the prehospital environment and that they felt more prepared to complete their ride-along. Participants reported that the environment was realistic (4.93 of 6), that what they learned would impact care (3.92 of 4), and that overall the course was excellent (5.92 of 6). Additional results can be found in the Table. Free-text comments from the course evaluation indicated that the residents were engaged and satisfied with the introduction to EMS program, that they recognized the importance of scene safety, and that they appreciated the challenges EMS providers face while working in the field.

Feedback gathered from the residents informally during the EMS division meeting indicated that the scenarios they participated
in were more complicated than the patients they experienced during their ride-along but that the exposure to the topics discussed during the simulation session (both operational and clinical) was extremely valuable in helping them comprehend the bigger picture of prehospital care. In addition, the senior EMS professional who was involved with the simulation session was asked via email about their experience participating in the session. Their feedback was also extremely positive, and they indicated that exposing the residents who were completing their ride-alongs to the prehospital topics addressed in the simulations better prepared them for the time spent on the ambulance and allowed them to appreciate the challenges faced by first responders, even if they did not get exposed to complex or critical patients during their ride-along.

Discussion

This curriculum introduced emergency medicine resident physicians to the world of prehospital care. While health care is often thought of as beginning when a patient arrives to a see a physician, tremendous amounts of care are provided outside of the hospital or doctor’s office. With the Emergency Triage, Treatment, and Transport pilot program being implemented by the Centers for Medicare and Medicaid Services, even more care will be provided by first responders and alternate care sites. Emergency medicine physicians must become familiar with these ever-changing aspects of care, as well as with the possibilities and limits of EMS provider care. While the field observations provided real-world exposure to the continuum of care, allowing emergency medicine residents to briefly walk in the shoes of their EMS colleagues and gain a better picture of how the social determinants of health impact patients arriving in the emergency department was an important part of our simulation. While emergency medicine residents could have this explained to them via lecture, giving them a firsthand experience via simulation allowed for a broader perspective on which to build once they start their ride-along sessions. By conducting the simulation training, we were also able to expose the participants to more complex cases than they might normally see during their ride-along. The complexity of the cases coupled with forcing the participants to make the treatment and transport decisions provided significant opportunity to further engage residents in the many ways they can contribute to changing the health care system in the future. During the debriefings, the residents discussed the role that emergency physicians can have in protocol and policy development, determining the systems of care that are in place within their state, and how EMS have an inside view into important socioeconomic components of care that impact patients.

By running these cases, we found that a proper orientation to the EMS equipment was essential for the participants. As they no longer had nurses and other people to do a lot of the tasks for them, they needed to engage with the patient verbally while simultaneously attaching them to a monitor and also getting medications ready for administration. Orienting the participants to the manikin capabilities and the equipment they were using was essential since there was no standardized participant nurse (other health care provider) available to assist the team as might otherwise be common during emergency medicine resident simulations. In addition, we found, after repeated iterations, that using a vital signs simulator for our cases was necessary. While the manikin was capable of producing ECG and HR readings on a portable patient monitor, SpO2 and BP could not be readily attained. This was because we wanted our participants to use the actual patient care equipment and not the simulated patient monitor supplied by the vendor. We found that using an ancillary device for manikins that did not interface with patient care equipment was necessary to allow us to display all of the vital signs on the actual patient monitor. Alternatively, we could also use a tablet patient monitor display if it was contained within an EMS-type bag, although this would not allow participants to use the actual patient care equipment.

We also found that there were a lot of moving parts with our scenarios. While the 20- to 30-minute debriefing provided ample time to reset and change the room, this required having a dedicated staff member focus on cleaning up and setting up. Furthermore, because we were using backgrounds, it was often necessary to have two people assisting with the setup since the backgrounds were approximately 10 feet square and needed to be hung up correctly for proper visualization. However, we found that using relatively inexpensive backgrounds significantly impacted the buy-in from the participants. Removing the medical headwall and replacing it with a brick wall or graffiti wall allowed

| Question/Statement | Average Rating | Maximum Rating | Rating Range |
|--------------------|---------------|---------------|-------------|
| How realistic did you feel the simulation experience was? | 5.0 | 6.0 | 4.0-6.0 |
| The debriefing session enhanced my knowledge. | 3.9 | 4.0 | 3.0-4.0 |
| The knowledge I gained from the session will be helpful to me in my practice. | 3.7 | 4.0 | 3.0-4.0 |
| What I learned today will help to improve patient outcomes. | 3.9 | 4.0 | 3.0-4.0 |
| Overall this course was: | 5.9 | 6.0 | 5.0-6.0 |

aRated on a 6-point Likert scale (1 = not realistic at all, 6 = extremely realistic).
bRated on a 4-point Likert scale (1 = strongly disagree, 4 = strongly agree).
cRated on a 6-point Likert scale (1 = poor, 6 = excellent).
the participants to more fully engage with the story they were
being told by the dispatcher. We also found that the use of a two-
way radio was important to increase the realism the learners felt. 
Added together, these small details enhanced the believability of 
the environment.

This resource had a few limitations. First was the person-
power required to facilitate this session. While we typically had 
three to four learners participating at a time, we also had three 
facilitators and a simulation operations specialist. Because of 
the complexity of the scenarios and the ambitious nature of 
running five scenarios in approximately 4 hours, we needed 
to have many people involved. We found it necessary to have 
three facilitators because our emergency medicine faculty and 
EMS providers had not yet been trained in proper debriefing 
processes and therefore served as content experts. If one of 
the content facilitators was trained in debriefing, this could 
help reduce the number of staff needed to run this program. As 
we continued to implement this program, we were eventually 
successful in running the five scenarios in about 3.5 hours with 
four personnel (three faculty and one operations specialist).

A second limitation was the availability of equipment. This 
program required obtaining an EMS stretcher, EMS bags, portable 
suction units, and other equipment not typically found in a 
hospital-based simulation center. Working collaboratively with 
our EMS division, we procured an EMS stretcher but still had 
to purchase EMS bags and other equipment from vendors. 
In addition, familiarity of simulation staff with EMS equipment 
had to be accounted for. The medications available to EMS 
providers differ by agency. Therefore, getting an appropriate list 
of medications and creating them required planning on behalf of 
the simulation team.

Finally, a limitation was the availability and knowledge of local 
EMS protocols. We were fortunate to have content experts 
available in our facility. However, if others are utilizing this 
resource, they need to be familiar with the EMS protocols in 
their local areas. Because we expect the participants to act in 
accordance with EMS protocols and policies, facilitators need 
to be aware of which medications are approved and carried 
on ambulances, what the protocols dictate for the various 
conditions, and which hospitals in their area are the appropriate 
transportation destinations for the cases.

We plan to continue to implement these cases with emergency 
medicine residents starting their EMS rotation. We may further 
challenge participants by varying the location of the call so that 
they are not in the immediate response zone of their home 
hospital. This would force them to consult with medical control 
about the appropriateness of their destination decision. Future 
work may also include having medical residents learn more 
about their role as medical control for EMS and providing 
them an opportunity to function in that capacity during a 
simulation.

Appendices

| Appendix Name                          |
|---------------------------------------|
| A. EMS Scenario Equipment and Medication List.docx |
| B. Scene Safety Scenario.docx          |
| C. Chest Pain Scenario.docx            |
| D. Peds Anaphylaxis Scenario.docx      |
| E. Burn Scenario.docx                  |
| F. AMS Refusal Scenario.docx           |
| G. EMS Scenario Debriefing Guide.docx  |
| H. Course Evaluation Form.docx         |

All appendices are peer reviewed as integral parts of the Original 
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