Original Publication

OPEN ACCESS

Entrustable Professional Activity 10: Recognizing the Acutely Ill Patient—A Delirium Simulated Case for Students in Emergency Medicine

Aaron Dora-Laskey, MD*, Harsh Sule, MD, Tiffany Moadel, MD, Nicholas Kman, MD, Laura Thompson, MD, Jamie Hess, MD, Lalena Yarris, MD

*Corresponding author: aaron.doralaskey@gmail.com

Citation: Dora-Laskey A, Sule H, Moadel T, et al. Entrustable Professional Activity 10: recognizing the acutely ill patient—a delirium simulated case for students in emergency medicine. *MedEdPORTAL*. 2016;12:10512.
https://doi.org/10.15766/mep_2374-8265.10512

Copyright: © 2016 Dora-Laskey et al. This is an open-access publication distributed under the terms of the Creative Commons Attribution-NonCommercial-Share Alike license.

Abstract

Introduction: This simulation case was designed to evaluate the ability of third- and fourth-year emergency medicine clerkship students and acting interns to perform the tasks outlined in the Association of American Medical College's Core Entrustable Professional Activity 10, to "recognize a patient requiring urgent or emergent care and initiate evaluation and management." The overarching goal is to assess medical students' ability to recognize and take steps to stabilize a sick patient. **Methods:** In this case, students encounter a physician, simulated with a high-fidelity manikin, who has suddenly become confused. Students are expected to recognize that he is acutely ill, call for help, and begin the initial steps of resuscitation. Bedside testing reveals hypoglycemia, which students are expected to treat. Further examination, history gathering, and diagnostic tests reveal that the patient is suffering from gram-negative sepsis. Students are evaluated on their ability to recognize signs of serious illness, call for appropriate help, perform critical assessment and treatment tasks, communicate their findings to an attending physician, and determine the appropriate patient disposition. Outcomes are measured using critical action checklists. **Results:** Initial trials of this case demonstrated its feasibility. All 13 students who have participated in this session have identified all five critical actions. **Discussion:** In later iterations, the number of roles was streamlined in order to reduce how many personnel were required. As a result of the very high critical-actions success rates of the first two groups of students tested, our case-specific checklist was revised with the goal of improving its discriminatory power.

Keywords

Entrustable Professional Activity, Simulation, Hypoglycemia, Delirium, Sepsis, Resuscitation, Emergency Medicine, Hypotension, Patient Handoff

Appendices

- A. Simulation Case Template Files.docx
- B. Urology Procedure Note .docx
- C. Electrocardiogram.jpg
- D. Chest Radiograph (AP).pdf
- E. Head CT (slice 1).pdf
- F. Head CT (slice 2).pdf
- G. Head CT (slice 3).pdf
- H. Laboratory Studies.docx
- I. Critical Actions Checklist .docx
- J. Sepsis Debriefing Slide Presentation.pptx

All appendices are peer reviewed as integral parts of the Original Publication.

Educational Objectives

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

1. Recognize a patient who requires emergent care.
2. Initiate the evaluation and management of a critically ill patient.
3. Initiate a call for assistance.
4. Obtain a pertinent history using available sources.
5. Initiate the evaluation of a patient with altered mental status.
6. Diagnose and treat hypoglycemia.
7. Recognize signs of sepsis.
8. Demonstrate the appropriate assessment and medical management of the septic patient.
9. Communicate effective patient handoff to an attending emergency physician.
10. Admit the patient to an appropriate level of care.

Introduction

Recognizing when an ill or injured patient needs immediate attention is a fundamental skill for all physicians. Indeed, its importance is stressed as one of the core competencies expected of graduating medical students, and the skill is described in the Association of American Medical Colleges' (AAMC's) Core Entrustable Professional Activities (EPAs) under EPA 10 as being able to "recognize a patient requiring urgent or emergent care and initiate evaluation and management."¹ At the time this project commenced, there were no published tools for directly testing students' abilities to perform the tasks of EPA 10 using this new framework. As the specialty of emergency medicine (EM) is premised on the ability to recognize and stabilize a person with acute, unscheduled illness or injury, we believed that the EM rotation would be a logical venue in which to assess these skills.

In order to provide a useful, evidence-based tool for testing this EPA, we have thus far developed two complementary high-fidelity simulation scenarios aimed at third- or fourth-year medical students rotating in EM. This is the second simulation case we have created to test EPA 10. In this scenario, a group of medical students is asked to help care for an emergency physician who has suddenly become ill. The student being assessed is expected to take a leadership role in assigning tasks to his or her team and is evaluated on the ability to quickly identify the etiologies of the patient's delirium, treat them quickly and accurately, hand off care to an attending emergency physician, and determine the appropriate hospital setting to which the patient should be admitted.

We have endeavored to construct these scenarios in such a manner that they not only address the objectives engendered by the AAMC-published EPA but reflect the educational competencies as detailed in the Clerkship Directors in Emergency Medicine's Emergency Medicine Clerkship Curriculum² and the Level 1 Accreditation Council for Graduate Medical Education (ACGME) Milestones for Emergency Medicine.³ Core EPAs were developed by the AAMC as a response to a broad concern by residency program directors that entering medical school graduates are not adequately prepared to care for patients as junior physicians. By integrating the objectives of this EPA, those of the EM clerkship, and those of the ACGME for EM interns, we believe that this tool will be relevant to medical school faculty and deans, EM clerkship directors, and EM residency program directors alike.

Methods

While medical students may regularly encounter seriously ill patients in the emergency department, these encounters not only are unscheduled (and therefore difficult to rely on with regard to assessment) but may be led primarily by attending or resident physicians. In order to create an opportunity to assess students' abilities to demonstrate this EPA, we have taken advantage of the fact that high-fidelity medical simulation provides a useful medium with which to replicate the decision-making processes inherent in the care of the acutely ill person. Following the design of this simulation scenario, the case was implemented and tested at one institution over two sessions involving a diverse group of fourth-year medical students during their EM rotation/elective. EM faculty administered the case with assistance from senior residents in EM who were familiar with the use of simulation in undergraduate medical education.

Equipment/Environment

The scenario was originally tested at the Rutgers New Jersey Medical School's Clinical Skills Center, in an area simulated to be an emergency department patient bay with audiovisual capabilities. A Laerdal SimMan 3G manikin is utilized for this case. The case is programmed and run by a simulation technician, working alongside an EM faculty facilitator seated in the control area. The manikin does not require any moulage or initial lines. In its initial appearance, the manikin is set with eyes closed and is moaning.

Additional equipment present in the room for use by the students includes the following:

- Cardiac monitor and leads (including pulse oximeter and blood pressure cuff).
- Nasal cannula/oxygen supply.

- Electrocardiogram machine.
- Procedure equipment, including point-of-care glucose meter, intravenous access supplies (including tourniquet, antiseptic solution, over-the-needle IV catheter, extension tubing, saline flush, and transparent dressing), and bladder catheter (indwelling and/or mini-catheter).
- Pharmacological items, including multiple bags of normal saline, simulated IV antibiotics (e.g., piperacillin-tazobactam, cefepime, imipenem), and simulated vasopressors (e.g., norepinephrine).
- Visual stimuli (Appendices B-H), including a prostate biopsy procedure note from the patient's urologist, an electrocardiogram, laboratory results, chest radiograph, and three slices from a noncontrast head CT.

Other props, such as an IV arm or Foley catheter manikin, should be available on request for students not being assessed to simulate performing procedures during the case.

Personnel

As designed, the case requires a simulation technician, a faculty facilitator, and at least one other assistant (simulation facilitator) to help with role-playing. The simulation technician is responsible for executing the program and simulation case and also plays the part of the patient (Alonzo Zink) using the audio capabilities of the Laerdal SimMan 3G. One of the simulation facilitators (may be a faculty, resident, nurse, or paramedic) plays the role of a nurse (Chris) and provides a limited history, solicits orders from participants (if not requested directly), and completes those orders as appropriate (e.g., bedside tests, labs, fluids, medications). The faculty facilitator oversees the entire case with supervision of the simulation technician, while simultaneously voicing other roles (including the patient's spouse, the unit clerk, and Dr. Singh, the teaching faculty receiving sign-out at the end of the case, Dr. Singh). If additional simulation assistants are available, they may take on some of this role-playing, but it is advised that the teaching faculty role be retained by the faculty facilitator so as to directly receive transfer of care (preferably in a standardized format). Specifics of each role are outlined below:

- Patient (Dr. Alonzo Zink): Played by the simulation technician using the Laerdal SimMan 3G.
- Unit clerk (Pat): Played by the faculty facilitator. Calls any requested contacts or consults (e.g., patient's spouse). Orders ECGs and radiology studies, and provides them to students.
- Nurse (Chris): Played by the simulation facilitator. Provides limited history. Prompts student being assessed to take a leadership role, and helps assigns tasks to any additional students (e.g., IV or Foley catheter placement). Performs bedside testing (e.g., point-of-care glucose). Provides copy of urology procedure note if requested. Administers IV fluids and medications. Obtains blood and urine specimens as requested.
- Patient's spouse (Dr. Ezekiel Zink): Played by the faculty facilitator. If contacted, provides more detailed history about recent surgical procedure.
- Teaching faculty (Dr. Satya Singh): Played by the faculty facilitator. Late for didactic session due to weather. Receives handoff from the students on arrival, and assumes care for Dr. Zink.

Supplemental materials are provided. The Simulation Case Template Files (Appendix A) describes specific details about the simulated case, including the history and physical, instructor notes with time line and branch points, and anticipated management errors. Also included are visual stimuli, including a urology procedure note (Appendix B), electrocardiogram (Appendix C), chest radiograph (Appendix D), noncontrast head CT (Appendices E, F, & G), and laboratory studies (Appendix H), including complete blood count, chemistries, urinalysis, and coagulation studies.

Assessment

A universal critical actions checklist (Appendix I) was developed by a panel of medical education experts from EM and anesthesiology using the AAMC EPA curriculum developers' guide.¹ Furthermore, a case-specific critical actions checklist was formulated by the authors of this case using learning objectives from the Emergency Medicine Clerkship Curriculum² and the Level 1 Accreditation Council for Graduate

Medical Education Milestones.³ Checklists are completed contemporaneously during the simulation by the faculty facilitator for the student being evaluated. While the case is designed for the assessing faculty to complete the critical action checklists contemporaneously, some programs may use video-based assessment. Regardless of whether simultaneous or retrospective assessment methods are used, they should be consistent.

Debriefing

Each simulation activity is followed by a 20-minute debriefing session. This includes self-reflection by participants; feedback from the faculty facilitator, simulation assistants, and student observers; and a slide presentation on emergency department management of sepsis (Appendix J).

Results

At the time this scenario was submitted for publication, the initial version had been executed twice. In both sessions, at least three faculty or senior EM residents were required. Session one was run with nine students in April 2016. This cohort was comprised entirely of fourth-year medical students who had matched successfully to EM residencies and was conducted at the end of a 2-week EM boot-camp elective. Students performed alone or in pairs but were assessed individually. All nine students (100%) successfully completed the five critical actions without prompting, regardless of whether performing individually or in pairs. The second trial session was conducted with four students in July 2016. This cohort was composed of students early in their fourth-year of medical school and was not restricted to EM-bound medical students. Given the lack of variation in outcomes from session one, this group participated in the scenario as single group of four students without a preassigned team leader. This group of four students (100%) also successfully completed each of the five critical actions without prompting. No specific areas of difficulty were identified during the debriefing following this session.

Due to the difficulty of distinguishing individuals' performance when being tested in groups, the scenario was changed so that a single student, charged with leading the case, would be evaluated during each session and so that any additional students per session would function as assistants, with the goal of being in an educational (as opposed to assessment) role during the case and debriefing. Along with our revision of the case-specific checklist to make each expected action more discrete, we anticipate that this will better enable faculty to differentiate among different levels of student performance.

In a follow-up debriefing of faculty and students, no specific areas of difficulty with flow or complexity were identified. Faculty feedback identified that close attention to the sequence of simulated personalities appearing in the scenario was required, as the faculty facilitator had to cycle through multiple different roles in the absence of adequate numbers of available personnel to assist with role-playing. We have since reduced the number of separate characters in this simulation in order to limit both the number of actors and the frequency of role-switching required.

Discussion

The AAMC's EPAs were developed to identify the skills and abilities necessary for medical students to successfully transition to residency after graduation. We identified the activity most closely aligned with some of the most important clinical competencies of EM practice, EPA 10, and created high-fidelity simulation cases designed to assess medical students rotating through EM clerkships and subinternships on their ability to identify and stabilize patients with acute, critical illness.

We built on a previously developed simulated sepsis case to focus on those objectives most closely aligned with the EPAs, as well as those identified in the ACGME Level 1 Milestones for Emergency Medicine and learning objectives from a clerkship curriculum developed by leading experts in EM education. This case was specifically designed to place students in the position of having to both make decisions without direct expert supervision and communicate their findings and plans to team members after initial stabilization efforts have commenced.

Our experience with this iteration of our sepsis scenario has been well received. Having excised some roles from our original version (including EM and intensive care unit residents and the patient's urologist), we believe that the overall flow of the case will be improved in future executions. We expect to test this case's flexibility as we expand its use among other institutions in our work group. While small, our initial sample of both early and late fourth-year medical students indicates that this simulation appropriately assesses entrustment as described by EPA 10.

In order to assist faculty assessors in better differentiating student performances (and, in later studies, to analyze interrater reliability among faculty), we have revised our critical action checklist so that it would be both more comprehensive and composed of more discrete (single-barrel) elements. While this has increased the number of checklist items, we believe that our design will accommodate additions or deletions of particular critical actions by individual programs in order to address their specific educational objectives and curricula as part of a formative assessment of EPA 10.

Having modified this scenario so that a single student is being evaluated per case, we believe that additional students participating in the student group will derive educational benefit from the simulated interactions and the debriefing session, as well as performing procedural tasks during the case. Furthermore, in addition to the acute coronary case we also created, we expect to develop at least two more, on gastrointestinal bleeding and ectopic pregnancy, that would enable a group of up to four students to be evaluated on EPA 10 during an afternoon simulation session.

Our next objective will be to test the validity of our checklist-based assessment tool in a multisite study. This will entail comparing students' performance on their EPA 10 simulation evaluation to other assessments completed during their EM rotation (e.g., shift-based evaluations) and measuring the interrater reliability among simulation faculty using these checklists. While our initial version of this case was designed as a formative assessment tool for EPA 10, if our follow-up analyses validate its utility, it could potentially be used in a summative fashion. We expect that once fully developed and implemented, this series of simulated cases will allow clerkship directors and program directors alike to better assess senior medical students' preparation for assuming patient care responsibilities as incoming residents. In addition, by reinforcing the fundamental responsibilities and expectations of medical school graduates, these cases will improve the learners' chances of success as they transition from student to physician roles.

Aaron Dora-Laskey, MD: Clinical Lecturer, University of Michigan Medical School

Harsh Sule, MD: Residency Program Director, Rutgers Biomedical and Health Sciences

Tiffany Moadel, MD: Instructor in Emergency Medicine and Director of Medical Student Simulation, Yale School of Medicine

Nicholas Kman, MD: Associate Professor of Emergency Medicine, Ohio State University College of Medicine

Laura Thompson, MD: Assistant Professor of Emergency Medicine, Ohio State University College of Medicine

Jamie Hess, MD: Assistant Professor of Emergency Medicine, University of Wisconsin School of Medicine and Public Health

Lalena Yarris, MD: Associate Professor, Department of Emergency Medicine, Oregon Health & Science University School of Medicine

Disclosures

None to report.

Funding/Support

None to report.

Ethical Approval

Reported as not applicable.

References

1. Core entrustable professional activities for entering residency: curriculum developers' guide. Association of American Medical Colleges Web site. <https://members.aamc.org/eweb/upload/core%20EPA%20Curriculum%20Dev%20Guide.pdf>. Accessed May 25, 2016.
2. Manthey DE, Ander DS, Gordon DC, et al; for Clerkship Directors in Emergency Medicine (CDEM) Curriculum Revision Group. Emergency medicine clerkship curriculum: an update and revision. *Acad Emerg Med*. 2010;17(6):638-643. <https://doi.org/10.1111/j.1553-2712.2010.00750.x>
3. The Emergency Medicine Milestone Project: a joint initiative of the Accreditation Council for Graduate Medical Education and the American Board of Emergency Medicine. Accreditation Council of Graduate Medical Education Web site. <http://www.acgme.org/Portals/0/PDFs/Milestones/EmergencyMedicineMilestones.pdf>. Published July 2015. Accessed May 25, 2016.

Received: June 17, 2016 | **Accepted:** November 7, 2016 | **Published:** December 2, 2016