Addressing the Systems-based Practice Core Competency: A Simulation-based Curriculum

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Abstract

Systems-based practice is one of the six core competencies implemented by the Accreditation Council for Graduate Medical Education to direct residency educational outcome assessment and accreditation. Emergency medicine–specific systems-based practice criteria have been described to define the expected knowledge and skill sets pertinent to emergency medicine practitioners. High-fidelity patient simulation is increasingly used in graduate medical education to augment case-based learning. The authors describe a simulation-based curriculum to address the emergency medicine–specific systems-based practice core competency. Key words: emergency medicine; computer-assisted instruction; patient simulation internship and residency teaching; clinical competence. ACADEMIC EMERGENCY MEDICINE 2005; 12:1191–1194.

In 1999, the Accreditation Council for Graduate Medical Education (ACGME) endorsed the implementation of six general core competencies “in a long-term effort designed to emphasize educational outcome assessment in residency programs and in the accreditation process.” Accredited residency programs must require their residents to develop the competencies to the level expected of a new practitioner. “Toward this end, programs must define the specific knowledge, skills, and attitudes required and provide educational experiences as needed in order for their residents to demonstrate the competencies.”

The focus of the systems-based practice (SBP) competency is to ensure that residency graduates demonstrate “an awareness of and responsiveness to the larger context and system of health care and the ability to effectively call on system resources to provide care that is of optimal value.” The provisions of this core competency require that residents understand the relationship of their individual medical practice to the context of the health care system as a whole. In addition, residents are expected to learn how to practice cost-effective health care, how to efficiently allocate resources, and how to deal with system complexities such that the quality of patient care is not compromised. The detailed cross-specialty ACGME system-based practice criteria can be referenced at http://www.acgme.org/outcome/comp/compFull.asp.

The specialty of emergency medicine (EM), more than any other field in medicine, requires that practitioners have expertise in SBP because emergency physicians evaluate and treat the entire spectrum of the patient population and interact with all the major services within the hospital. Furthermore, emergency physicians are involved with every significant segment of the health care delivery system on a daily basis, from out-of-hospital/interfacility care to primary patient care, management, consultation, and disposition. EM-specific expertise is also required in the areas of multitasking, team management, medicolegal issues with respect to the Emergency Medical Treatment and Active Labor Act and leaving against medical advice, modifying factors to health care (such as night and weekend resource availability, age, gender, ethnicity, communication, socioeconomic status, and other barriers to health care), disaster management, and patient education. In an effort to stay ahead of the curve, Dyne et al. published EM-specific definitions of the ACGME SBP core competency based on the Model of the Clinical Practice of Emergency Medicine.

High-fidelity simulation (HFS) has been used as a tool for teaching and potentially evaluating some of the ACGME competencies. Simulation is endorsed by the ACGME as a valid tool for training and assessment of resident performance with respect to the core competencies. The ACGME provides a “toolbox” of acceptable assessment methods for educators to use to address the competencies.

The key attributes of simulations are that: they incorporate a wide array of options resembling reality, allow examinees to reason through a clinical problem with little...
or no cueing, permit examinees to make life-threatening errors without hurting a real patient, provide instant feedback so examinees can correct a mistaken action, and rate examinees’ performance on clinical problems that are difficult or impossible to evaluate effectively in other circumstances.

The value of simulation for teaching and assessing core competencies lies in the ability of the simulation environment to reliably and repetitively “bring cases to life.” As is the case when teaching infrequently used but critical skills such as cricothyroidotomy, residents can be placed in scenarios to teach specific knowledge or skill sets.

The advantage of using HFS in the educational curriculum to teach SBP is that the residents need not be subject to the unpredictability of patient presentation to attain these experiences. Simulation sessions are typically prescheduled so that appropriate faculty can be made available to run the simulation and document the resident’s performance. With repeated evaluations, the resident’s clinical development can be documented. Cases can be presented at any time and as often as necessary to achieve uniform exposure to each subtopic of the core competencies during the course of a resident’s training. Postencounter debriefing sessions create additional training opportunities so that residents may, in future encounters, meet faculty expectations.

In the past, SBP-related issues would most likely be taught in a case-based presentation format such as a clinicopathologic conference or morbidity and mortality conference, with the specifics of the case presented retrospectively and the discussion centering on how residents would address the management issues. The value of simulation is that the resident learner can actively manage the SBP issues as they occur in real time, while managing the concurrent medical aspects of the case simultaneously. With respect to the morbidity and mortality conference scenario, the participants can better appreciate the particular difficulties with a case that made it complex (difficult or unresponsive consultant, family issues, or other extenuating circumstances), so there will be less of a tendency to second-guess the original management if the re-creation of the simulation ends with a similar outcome. “The virtual reality environments allow assessment of procedural skills and other complex clinical tasks that are difficult to assess consistently by other assessment methods.”

The purpose of this report is to present a simulation curriculum emphasizing EM-specific SBP core competency topics.

**CREATION, PRESENTATION, AND MANAGEMENT OF THE CASES**

We created cases that emphasized the following: contextual support of the SBP issues, relevance to the practice of EM, and cases in which other diagnostic and management issues could be explored. Special attention was given to Dyne’s “Sample Questions for the Resident Competency Evaluation” in developing the simulation encounters. Because SBP issues arise in the course of the practice of EM, we wished to create an immersive experience with SBP issues arising in line with other significant management issues.

Three case examples are detailed in Appendix A (available as an online Data Supplement at http://www.aemj.org/cgi/content/full/j.aem.2005.06.026/DC1). Each case has a case scenario with script, detailed learning objectives that are linked to the core competencies, a checklist of necessary management tasks, a scenario setup with required equipment and actors, and debriefing plans. This simulation guide was modified from the case template created by the SAEM Simulation Interest Group under the leadership of William F. Bond, MD, in 2003. This format was used to provide structure and ensure future reproducibility and is downloadable from the Interest Group website (http://www.emedu.org/sim). We enhanced this template by predetermining which learning objectives the learner should be able to complete based on level of training as determined by our simulation center faculty. Furthermore, the cases were chosen to emphasize resident exposure to the EM-specific SBP learning objectives (Table 1).

Cases were rehearsed before the actual encounter to ensure that their length was appropriate and that an observer would have an opportunity to document trainee performance. In an effort to create an immersive environment for training and evaluation, our simulation laboratory is comprised of three main rooms. A control room, separated by a one-way mirrored glass, overlooks the simulation area. The control room contains all of the necessary hardware to control the HFS devices. The simulation room has the appearance of an emergency department room and contains all of the equipment one might expect to find in a well-equipped critical care area of the hospital. Audio and video recording devices are strategically located to enhance the ability of the faculty and peers to see and hear all of the trainee’s actions in the simulation room. A third area, set up as a conference room, receives all of the audio and visual output from the simulation room, so that larger groups of peers may also experience the simulation secondhand.

Two residents managed the cases and interacted with a cohort of confederates (typically a registered nurse, emergency department technician, and “family members”) as they acted out the scenario, providing visual and verbal cues and key data (i.e., electrocardiogram, blood test results, radiographs) in a timely fashion to facilitate progression of the case. The remainder of the resident—peers observed the simulation in the conference room via audiovisual feed.
The debriefing session for the residents managing the case and the residents who observed the case entails review of the DVD video recording and group discussion that solidifies the relevant points of the case and fills in the knowledge gaps that may not have been addressed directly in the management session.

APPLICATION OF THE CURRICULUM

During the course of the academic year, we specifically ran cases to emphasize SBP issues such as out-of-hospital care, modifying factors, legal/professional issues, appropriate use of diagnostic studies, appropriate consultation and disposition, prevention and education, and multitasking/team management. Each case was designed to address several of the points listed in the expanded EM definition of SBP. Most cases did not address all the points in one session because of concern for dilution of relevant teaching points and unrealistic complexity. We felt it was more important to address fewer points on a more in-depth level with each session. However, by highlighting different topics in each case, the residents were exposed to the entire SBP curriculum over the course of residency training (Table 1).

Simulation training at our center has repeatedly received high scores from the residents. This is consistent with most results reported using this modality for resident education. Although it is reassuring that the residents seem to be satisfied with the intervention, the significant utility of this educational advance is in the improved documentation of resident exposure to the complex issues contained in the SBP competency. The sessions generate a checklist evaluation form for the resident and a DVD video session that can be placed in the resident’s educational portfolio. This serves the individual resident by documenting progress along the continuum from residency training to the level of the new practitioner and serves the educator by ensuring reliable, uniform, and concrete examples of performance.

TABLE 1. Systems-based Practice Criteria Covered by Case

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<th>10</th>
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</thead>
<tbody>
<tr>
<td>Out-of-hospital care</td>
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<td>Legal/professional issues</td>
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<td>Diagnostic studies</td>
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<td>Consultation and disposition</td>
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<td>Prevention and education</td>
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<td>Multitasking and team management</td>
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Cases 1–3 in Appendix A (available as an online Data Supplement at http://www.aemj.org/cgi/content/full/j.aem.2005.06.026/DC1) correspond to the first three listed cases in the Table. Cases 4–10 are downloadable from the Interest Group Web site (http://www.emedu.org/sim). To cover all of the SBP criteria as outlined, these cases are encountered by the residents over the course of the academic year.

DISCUSSION

Our SBP simulation curriculum was created with several purposes in mind: 1) to supplement resident education in the EM-relevant SBP issues that have previously been delineated by Dyne et al. in 2002, and 2) to provide faculty with an additional tool in the documentation of the residents progressing through residency training to the level of the new practitioner, as described by the ACGME. Significant opportunities exist in the debriefing portion of the encounters for residents to receive feedback on performance in all domains, but the focus is on further review and clarifying issues that arose.

The format incorporates 1) direct observation (by attending physicians and co-residents) of the resident managing the case and performing critical tasks specific to the case, 2) checklist evaluation of SBP competency-specific criteria and links to the other five core competencies, 3) DVD-format videotaping of the encounter to be placed in the resident’s educational portfolio, and 4) debriefing sessions with residents, including didactics, discussion and/or testing of the material.

Community projects,5 case-based presentations,6 interval global assessment of defined criteria,6 and direct observation7 have been described in the EM literature as methods by which the competency can be fulfilled. McLaughlin et al. previously described a three-year simulation curriculum that incorporates the core competencies.8 The benefit of using a simulation-based curriculum to address the SBP core competency is that immersive simulation encounters, by virtue of their emulation of the practice of EM, necessarily integrate systems-based issues into the management of the case. By creating cases with sufficient complexity, these issues may be highlighted in the debriefing room.

We have found that experiences of this type typically require four hours of preparation for each case. Because the cases are “recyclable” (i.e., may be repeated), this is a one-time investment. In one hour of faculty time, one hour of technician time, and one
hour of nurse confederate time, simulation encounters of this type expose a group of residents to a uniform experience that otherwise may take them many shifts to accumulate. In cases where the SBP issue is rarely encountered, this may be the residents’ only exposure to the scenario during residency training.

LIMITATIONS TO THE USE OF SIMULATION

There are several limitations to the use of simulation for training and evaluation in general. Simulation laboratories can be cost prohibitive to develop and maintain. Those centers with simulation laboratories may have a limited number of resources to apply to a broad variety of training needs. Our approach provides a platform in which the SBP core competency may be assessed in combination with other patient care and medical knowledge domains, thus getting more return on the investment of training time.

This may be done with low-fidelity simulation; however, by inserting specific SBP issues into an HFS encounter, you get all of the benefit of an immersive experience replete with opportunities to evaluate the residents’ skills not available in low-fidelity models. Furthermore, residents’ perception of the value of simulation experience and their ability to become vested in participating in the scenario is tied to the degree of reality of the experience to actual patient encounters.

From an outcomes perspective, there are no data to support the efficacy of simulation in enhancing resident performance and competency with respect to SBP. Research is required to assess the effect of the educational model and to determine if performing simulation-based exercises improves performance. There is, however, considerable face and construct validity to the concept of HFS education.

CONCLUSIONS

We present a simulation-based curriculum designed to address the SBP core competency. The advantages of using simulation to teach the SBP core competency, or any of the core competencies for that matter, are several. First, the educator is able to observe how residents, in controlled (or standardized) circumstances, perform and interact in a much more realistic way than with traditional case-based discussion formats. The educator observes what the residents actually do as opposed to what they say they would do when presented with a systems-based clinical problem. Second, the observing residents are able to analyze a simulation encounter in its entirety and derive benefits from the debriefing session even though they were not primarily managing the case. Lastly, the educator can use the video portion of the session and the learning objectives checklist as documentation of clinical exposure to SBP issues and to document progression throughout the course of training. We believe this approach provides residents with a relevant case-based learning experience and creates another mode by which documentation of the SBP core competency may be accomplished.

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References