

Emergency Medicine and Patient Simulation: Opportunities for Teaching, Evaluation, and Scholarship

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The Institute of Medicine's report "To Err is Human" identified patient simulation as an opportunity for enhancing medical safety in the same way that flight simulation is used to enhance quality in aviation. With over 100 million emergency department (ED) visits per year, emergency physicians are uniquely qualified to bring instructive patient encounters or good teaching cases "to life" using simulation technology. In fact, as the 23rd specialty of the American Board of Medical Specialties (ABMS), the field of emergency medicine (EM) has always used simulation in its training and evaluation methods. Most notably, the oral examinations administered by the American Board of Emergency Medicine (ABEM) are based entirely on simulated patient encounters. Other kinds of objective structured clinical examinations (OSCEs) are now widely used throughout undergraduate medical training, and have been adopted as part of the physician licensure process. Of course, situated role-playing and procedural simulation have always played a prominent role in standardized emer-

gency training courses (CPR "mega-code" and procedure labs).

While "simulation" can range from standardized patient encounters to computerized virtual environments, a new generation of sophisticated robot-mannequins—high-fidelity patient simulators—promises to revolutionize medical education worldwide. In the last decade, emergency physicians have played an increasing role in helping to develop the field of medical simulation as a unique forum for teaching, evaluation, and research. Building on years of work by the SAEM Simulation Interest Group (which continues), the SAEM Board of Directors established the Simulator Task Force in 2005 to further explore the role of technology-enhanced simulation in emergency medicine. The Task Force consolidates expertise in three core areas of simulation: medical practice ("animating" core curricular material for training and testing with robot-mannequins); teamwork-communication skills (crisis resource management [CRM] for critical events and disaster manage-

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Patient Simulation...(continued from previous page)

ment); and procedural training (including virtual reality platforms).

Several resources exist to help Emergency Departments and Residency Programs explore and establish simulation capability. Setups can range from a single mannequin-simulator in a small room, to a fully-equipped ED environment with multiple simulator bays. Two of the most helpful resources are listed below, both of which include chapters by EM authors:

- Dunn WF. *Simulators in Critical Care and Beyond*. Des Plaines, IL: Society for Critical Care Medicine Press, 2004. (For starting a simulation lab, see chapters by Loyd GE, "Issues in Starting a Simulation Center" [pp. 84-90] and Kyle RR, "Technological Resources for Clinical Simulation" [pp. 95-113]).

- Loyd GE, Lake CL, Greenberg R. *Practical Healthcare Simulations*. Philadelphia: Elsevier, 2004. (For EM content including curricula and case material, see Chapter 13: Gordon JA, McLaughlin SA, Shapiro MJ, Bond WF, Spillane LL, "Simulation in Emergency Medicine" [pp. 299-337]).

Research on simulator-based teaching and evaluation is limited but growing. Given the number of EM programs now exploring and expanding their use of simulation, there is a substantial opportunity for EM investigators to contribute new knowledge in the field. A white paper detailing an agenda for simulation research in emergency medicine (led by Bill Bond for the Simulator Task Force) is nearing completion. The Society for Simulation in Healthcare (www.SSiH.org)—a new interdisciplinary society conceived and established with input from EM faculty in 2004—just launched a specialty journal entitled *Simulation in Healthcare* (www.simulationinhealthcare.com), published by Lippencott, Williams, and Wilkins. EM physicians serve on the Board of Directors of the Society and on the Editorial Board of the Journal. EM faculty have already published in the initial issue of Journal, and were well-represented at the International Meeting on Medical Simulation in San Diego in January.

An evidence-based review of simulation training in health-care was published last year, covering the years 1969-2003:

- Issenberg SB, McGaghie WC, Petrusa ER, Gordon DL, Scalese RJ. Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review. *Medical Teacher* 2005; 27(1):10-28.

The efficacy of procedural simulation in surgery has been actively studied, and the regulatory implications of such technology were nicely summarized in:

- Gallagher AG, Cates CU. Approval of virtual reality training for carotid stenting: what this means for procedural-based medicine. *JAMA*. 2004; 292(24):3024-6.

Recent work by EM investigators in the field has appeared not only in EM journals, but in other diverse venues such as *Academic Medicine* (the journal of the Association of American Medical Colleges [AAMC]) and *Quality and Safety in Healthcare* (a British Medical Journal [BMJ] publication). EM-specific topics have ranged from curricular design and evaluation methods, to teamwork and disaster training, to human cognition and performance. While simulation comprised a component of the 2004 *Academic Emergency Medicine* (AEM) Consensus Conference and Special Issue on "Using

Information Technology to Improve Patient Care," there is now sufficient interest in EM and simulation to propose an entire AEM Consensus Conference and Issue dedicated to the topic.

One way to foster experimentation and research in medical simulation is by providing a venue for faculty to share their experience in the field, and to receive academic credit for their contributions. To this end, SAEM and the AAMC are collaborating to peer-review and publish a collection of simulator-based case materials on-line. This effort will link the "case bank" developed by the Simulation Interest Group over the past few years (<http://www.emedu.org/sim>, guided and hosted by Interest Group Chair John Vozenilek at Evanston Northwestern Healthcare/Northwestern University) with the AAMC's new on-line publication venue for educational material, MedEdPORTAL (www.aamc.org/mededportal; see accompanying article by the MedEdPORTAL editor). For this special collection, SAEM will provide faculty experts to serve as MedEdPORTAL Associate Editors, and Simulation Task Force members will comprise the peer-review panel. Material can be submitted purely for dissemination and informal commentary (preliminary posting), or for formal peer review. Materials will be dually posted on the SAEM website and on AAMC's site, where they will be indexed and published as material in an electronic journal. Here's the process:

1. If you are interested in submitting a simulator case for review, go to: <http://www.emedu.org/SimGroup/library.asp>.
2. Here you will upload the case description and any supporting materials.
3. You will then indicate whether you wish preliminary review and posting, or formal peer review for publication (you can also ask to receive usage/download statistics as a measure of others' use and interest in your work).
4. After successful submission to the SAEM site, you will be e-mailed a URL with a link to your work. You will then be prompted to register as an author with the AAMC's MedEdPORTAL at www.aamc.org/mededportal (go to "publish resources" to create a password).
5. Once inside the AAMC/MedEdPORTAL submission website, you will use the SAEM URL to identify your submission for the AAMC process.
6. An SAEM-based editor for the AAMC collection will then be assigned to review your work, and peer-review will proceed (if requested) just like a manuscript—with dissemination to at least two SAEM Simulator Task Force members/experts for review.
7. The process will then proceed with discussion and revision of the material—as with any journal submission—culminating either in a preliminary posting (as appropriate), or formal acceptance for peer-reviewed designation and publication on the AAMC/MedEdPORTAL website.

This is an important collaborative experiment between SAEM and the AAMC and may lead to further formal collaboration in areas beyond medical simulation. The goal is to promote and disseminate educational scholarship and to provide peer review and recognition of educational material. Please contact Jim Gordon (jgordon3@partners.org) or John Vozenilek (vozonline@ameritech.net) with any questions.