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This article traces the history of anesthesiology's role in simulation from Resusci Anne and Sim One to the use of simulation today for introducing new products and techniques to otherwise fully trained, practicing physicians. The article also describes the latest efforts of the American Society of Anesthesiologists (ASA) to promote simulation-based instruction. The article focuses in particular on the activities of the ASA Committee on Simulation Education. Many predict that simulation-based teaching will generate the next revolution in health care education. The ASA is hoping to capitalize on anesthesiology's long involvement and leadership in simulation-based health care education to help bring about this revolution.

Does Simulation Improve Patient Safety?: Self-Efficacy, Competence, Operational Performance, and Patient Safety	225
Akira Nishisaki, Ron Keren, and Vinay Nadkarni	

Simulation training is an essential educational strategy for health care systems to improve patient safety. The strength of simulation training is its suitability for multidisciplinary team training. There is good evidence that simulation training improves provider and team self-efficacy and competence on manikins. There is also good evidence that procedural simulation improves actual operational

performance in clinical settings. However, no evidence yet shows that crew resource management training through simulation, despite its promise, improves team operational performance at the bedside. Also, no evidence to date proves that simulation training actually improves patient outcome. Even so, confidence is growing in the validity of medical simulation as the training tool of the future. The use of medical simulation will continue to grow in the context of multidisciplinary team training for patient safety.

Simulation Applications for Human Factors and Systems Evaluation

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Stephen D. Small

Simulation applications have become increasingly common in health care. A convergence of factors has stimulated this growth, including the rapid advance of enabling technologies, demand for improved outcomes and objectively assessed competencies, and translation of lessons learned from other high-risk industries as a function of the patient safety and quality movements. The bulk of the experience gained and resources expended has been focused on education, training, and assessment of clinicians' knowledge, skills, and attitudes. Simulation methods lend themselves to supporting human factors and systems-level investigations, yet work in health care has, to a large degree, been limited to a few experienced centers, interdisciplinary research teams, and isolated novel studies.

Credentialing and Certifying with Simulation

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Amitai Ziv, Orit Rubin, Avner Sidi, and Haim Berkenstadt

Assessment and evaluation are integral parts of any educational and training process, and students at all levels of training respond by studying more seriously for the parts of the course or training that are assessed. To promote and enhance effective learning successfully, simulation and other teaching methods should be both formative and summative, because the ultimate goal is to ensure professional competence. This article describes a model of medical competence, and focuses on the use of medical simulation in assessment and evaluation of different levels of clinical competence using examples from experience.

Statewide Simulation Systems: The Next Step for Anesthesiology?

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Michael Seropian, Dawn Dillman, and David Farris

Statewide simulation networks afford not only the possibility of meeting capacity needs for anesthesiologists, but also provide a venue for training trainers, setting standards, and bringing academic and nonacademic practices together. Furthermore, a statewide network that is appropriately designed opens the door to interdisciplinary activity. Oregon is the first state to implement simulation

education across disciplines throughout the state. The model provides an example of how simulation can be successfully applied across a large and diverse area. The article details the benefits of statewide simulation networks, discusses challenges to implementing such networks, and describes Oregon's statewide efforts.

Crew Resource Management and Team Training

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Eswar Sundar, Sugantha Sundar, John Pawlowski,
Richard Blum, David Feinstein, and Stephen Pratt

This article reviews medical team training using the principles of crew resource management (CRM). It also briefly discusses crisis resource management, a subset of CRM, as applied to high-acuity medical situations. Guidelines on setting up medical team training programs are presented. Team training programs are classified and examples of simulation-based and classroom-based programs are offered and their merits discussed. Finally, a brief look at the future of team training concludes this review article.

Simulation: Translation to Improved Team Performance

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Elizabeth A. Hunt, Nicole A. Shilkofski,
Theodora A. Stavroudis, and Kristen L. Nelson

Traditional medical education has emphasized autonomy, and until recently issues related to teamwork have not been explicitly included in medical curriculum. The Institute of Medicine highlighted that health care providers train as individuals, yet function as teams, creating a gap between training and reality and called for the use of medical simulation to improve teamwork. The aviation industry created a program called Cockpit and later Crew Resource Management that has served as a model for team training programs in medicine. This article reviews important concepts related to teamwork and discusses examples where simulation either could be or has been used to improve teamwork in medical disciplines to enhance patient safety.

Virtual Worlds and Team Training

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Parvati Dev, Patricia Youngblood, W. LeRoy Heinrichs,
and Laura Kusumoto

An important component of all emergency medicine residency programs is managing trauma effectively as a member of an emergency medicine team, but practice on live patients is often impractical and mannequin-based simulators are expensive and require all trainees to be physically present at the same location. This article describes a project to develop and evaluate a computer-based simulator (the Virtual Emergency Department) for distance training in teamwork and leadership in trauma management. The virtual environment provides repeated practice opportunities with life-threatening trauma cases in a safe and reproducible setting.

Virtual Reality Simulations

337

P. Pat Banerjee, Cristian J. Luciano, and Silvio Rizzi

The current virtual reality and haptic technologies being researched for potential use in high-fidelity simulations in anesthesiology are attempting to overcome a number of limitations, such as low resolution, low visual acuity, and lack of robust haptics-graphics collocation. A new prototype device invented by the authors, known as ImmersiveTouch, addresses how to overcome these technologic limitations.

Procedural Simulation

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Aalpen A. Patel, Craig Glaiberman, and Derek A. Gould

In the past few decades, medicine has started to look at the potential use of simulators in medical education. Procedural medicine lends itself well to the use of simulators. Efforts are under way to establish national agendas to change the way medical education is approached and thereby improve patient safety. Universities, credentialing organizations, and hospitals are investing large sums of money to build and use simulation centers for undergraduate and graduate medical education.

Debriefing with Good Judgment: Combining Rigorous Feedback with Genuine Inquiry

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Jenny W. Rudolph, Robert Simon, Peter Rivard,
Ronald L. Dufresne, and Daniel B. Raemer

Drawing on theory and empirical findings from a 35-year research program in the behavioral sciences on how to improve professional effectiveness through reflective practice, we develop a model of “debriefing with good judgment.” The model specifies a rigorous reflection process that helps trainees surface and resolve pressing clinical and behavioral dilemmas raised by the simulation. Based on the authors’ own experience using this approach in approximately 2000 debriefings, it was found that the “debriefing with good judgment” approach often sparks self-reflection and behavior change in trainees.

Integration of Standardized Patients into Simulation

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Mary J. Cantrell and Linda A. Deloney

Standardized participants (SPs) can greatly enhance high-fidelity simulation. The educational experience becomes more realistic than by simply using a simulator. There is very limited literature about the use of SPs with high-fidelity simulation. This article provides an overview of SP methodology and offers suggestions for integrating SPs into medical simulation scenarios.

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