

PERSPECTIVES ON SIMULATION IN EMS

TRY. TRY AGAIN. SUCCEED.

As the flight attendants handed out headsets for the inflight futuristic sci-fi thriller “Edge of Tomorrow” I peered over at my seatmate who was intensely concentrating on what appeared to be an instruction manual. “What are you studying?” I asked. “I’m a pilot for the airline and I’m travelling to headquarters for a simulation flight check. Just making sure I’m up to date on all the latest advances” he replied. Before the movie started we proceeded to talk about the central role of simulation in aviation training ranging from initial training to ongoing sustainment of flight skills. All commercial airline pilots must now regularly demonstrate competence in simulators in order to maintain their credentials.

While increasingly used in EMS, simulation training has not yet reached as central a place in training as it has in aviation. But we may be headed in that direction if current growth continues. In recent years the use of simulation has expanded beyond academic medical centers and has now begun to reach into EMS training programs at all levels. Simulation offers many benefits and can serve as a vital bridge between the didactic learning of the classroom and the rigors of field practice.



EMS simulation directed from control room at the Albany College of Medicine.

EMS simulation encompasses a wide range of activities that aim to improve the safety and effectiveness of patient care services. Simulation can be used to teach a number of aspects of the EMS curriculum including psychomotor skills, teamwork, critical thinking and affective domain competencies. Each of these purposes may be met by combinations of low and high tech tools, including task trainers, patient simulators and standardized patients in a variety of realistic settings from classroom labs to large mass casualty exercises.

Simulation compared to traditional EMS education

Learning in healthcare has traditionally been based on the apprenticeship model. See one, do one, teach one has long been the standard. Through clinical experiences it is assumed that learners encounter enough real patients to insure that they become competent. This can be a haphazard way to learn. By contrast, simulation can provide learning experiences that are difficult to obtain in real life. With the control to portray any clinical situation, learning opportunities can be scheduled and repeated as often as necessary.

Working in a simulated environment allows learners to make mistakes and learn without causing patient harm. Learners see the results of their decisions and mistakes and gain understanding into the consequences of their actions.

In EMS some complex procedures, such as intubation, and rare conditions simply do not present enough opportunities for practice even in high volume settings. Also, as EMS expands into new domains such as Community Care, simulation training methods can help provide an avenue to address training gaps and demonstrate needed proficiency in a safe way.

Simulation Technology

As a relatively new educational media, simulation has specific requirements regarding the efficient use of resources and personnel that must be carefully planned in order to maximize benefits and minimize costs. These go beyond the high tech tools we have come to associate with simulation to include evidence based instructional techniques.

At the core of simulation education are realistic scenarios, engineered recreations of actual clinical situations which allow participants to be immersed in life-like situations and also enable instructors to evaluate real-time performance by learners. Crafting these experiences is a combination of art and science and a balancing act between technology and educational techniques.

Patient simulators are advanced bio-mechanical devices which recreate an increasingly sophisticated range of human physiology. Today's simulators can provide highly accurate physiologic models of cardiac, respiratory, reproductive and other body systems. Simulators now interface with real diagnostic and treatment tools such as defibrillators and allow practitioners to realize the "train as they treat" goal. Improved ease-of-use and sophisticated performance tracking and record keeping functions are additional important developments in the field.

Training in environments that reproduces the context of practice settings has been shown to increase learning effectiveness. The use of realistic settings such as ambulance simulators and recreated field environments is another important trend in EMS education.



Close quarter's paramedic training at Hudson Valley Community College

Virtual Patients or “screen based simulations” are also growing in popularity as a simulation modality that allows learners to navigate through simulated patient encounters and test decision making skills in a convenient and cost-effective manner.

As advances in technology continue to push the boundaries of what is possible in simulation it is not too difficult to envision simulators indistinguishable from real humans in the not too distant future.

Simulation Techniques

Structuring effective simulation exercises requires more than high tech equipment. Key instructional principles must be adhered to in order to achieve maximum effectiveness from what can be a resource heavy training media. Ten key features of instructional effectiveness have been found to contribute to optimum simulation experiences according to Issenberg et al. These features are listed in table 1. below.

Table 1. Key Features of Effective Medical Simulation
1. Feedback
2. Repetitive Practice
3. Range of Difficulty Levels
4. Individualized Learning
5. Curriculum Integration
6. Multiple learning strategies
7. Capture Clinical Variation
8. Controlled Environment
9. Defined Outcomes
10. Simulation Validity

Of these features, feedback or debriefing, was found to be the single most important educational technique of simulation-based medical education for effective learning.

Training in actual healthcare settings does not always allow for the best review of performance, but controlled simulations can be immediately followed by after-action reviews that richly detail what happened. Having a structured debriefing plan and methodology to encourage student reflection on actions is essential for all simulations.

These sessions can be further enhanced with the use of video systems that capture both quantitative and qualitative data on performance. Debriefing provide a solid and necessary feedback mechanism to learners and help instructors target necessary improvements. Educational feedback also appears to slow the decay of acquired skills in experienced providers and allows learners to self-assess, reflect and monitor their progress toward skill acquisition and maintenance.

Current trends in simulation

As EMS simulation comes of age, it is beginning to share much with established methods developed in other high stakes endeavors such as aviation, spaceflight, and the military. When the stakes are high and real settings do not lend themselves to training students, simulation methods will find applications.

EMS simulation has up until now been predominantly adopted for the initial training at large well-funded programs. As the benefits of simulation grow and the technology becomes more

accessible the use of simulation is now moving beyond the early adopters into the majority of programs.

Simulation is also increasingly finding a place in continuing medical education. Sustaining perishable skills and slowing the “forgetting” curve benefit have been shown to also from a simulation approach.



Pre-season simulation training by members of the National Ski Patrol in Glens Falls, NY.

Many organizations are now sharing simulation resources through regional collaboratives and also through mobile simulation efforts. Spreading the initial capital investment across multiple

organizations and sharing the technology has proven to be an effective method for reaching a wider audience with simulation.

Future developments

On the horizon are important changes in EMS certification at the national level. The National Registry of Emergency Medical Technicians (NREMT) is currently conducting a multi-year cross-country study, “The NREMT Paramedic Psychomotor Competency Portfolio Project” on new testing standards. Although much work remains to be accomplished, indications point to increased use of scenario –based testing in EMS.

Also of note, in August 2014 the National Council of State Boards of Nursing (NCSBN) released the findings of its multi-year research study, “The NCSBN National Simulation Study: A Longitudinal, Randomized, Controlled Study Replacing Clinical Hours with Simulation in Prelicensure Nursing Education,” which concluded that substituting high quality simulation experiences for up to half of traditional clinical hours produces comparable end of program educational outcomes for those students whose experiences are mostly just traditional clinical hours and produces new graduates that are ready for clinical practice. Clearly healthcare education in the 21st century is headed in new directions.

As our flight began its descent, the closing credits of Edge of Tomorrow rolled across the screen. In the film, Tom Cruise's character plays an Army officer who is initially outmatched and outgunned in his life and death struggle against an alien threat. Through an imaginative plot

twist, Cruise's character is immediately reincarnated after every failed firefight and gory death. He repeatedly applies the lessons learned from each encounter with the enemy and progresses through to final victory. Try. Try again. Succeed. Wouldn't it be nice if we had infinite mulligans in the real world struggle against accidents and disease? In many ways a disruptive innovation compared to traditional EMS education, simulation now offers a capability for repeated practice to improve skills in a safe environment and improve the quality of patient care. And one day in the not too distant future, it may be all EMS providers too preparing to demonstrate competencies in a regional simulation center as a means of maintaining our edge of proficiency.

References

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