Spring 2011

A Method for Providing High-volume Interprofessional Simulation Encounters in Physical and Occupational Therapy Education Programs

Michael J. Shoemaker PT, DPT
Grand Valley State University, shoemami@gvsu.edu

Jeanine Beasley EdD, OTR
Grand Valley State University

Megan Cooper BS
Grand Valley State University

Ron Perkins BSN, RN
Grand Valley State University

Jeanne Smith BS, BA
Grand Valley State University

See next page for additional authors

Authors
Michael J. Shoemaker PT, DPT; Jeanine Beasley EdD, OTR; Megan Cooper BS; Ron Perkins BSN, RN; Jeanne Smith BS, BA; and Chris Swank MA

▲ A Method for Providing High-volume Interprofessional Simulation Encounters in Physical and Occupational Therapy Education Programs

Michael J. Shoemaker, PT, DPT
Jeanine Beasley, EdD, OTR
Megan Cooper, BS
Ron Perkins, BSN, RN
Jeanne Smith BS, BA
Chris Swank, MA

With an increasing emphasis on interprofessional education within the allied health professions, simulation has potential for being a useful teaching modality for providing collaborative learning experiences for occupational and physical therapist students. However, there are many challenges associated with conducting simulations with large numbers of students. We describe the design, planning, cost, and support staff time required for conducting an interprofessional simulation of the intensive care setting, including a methodology for maximizing resources and student opportunities for participation for 64 physical and occupational therapy students over a 4-hour time period. Qualitative analyses of student experiences are also presented. J Allied Health 2011; 40(1):e15–e21.

INTERPROFESSIONAL EDUCATION (IPE) is defined as "occasions when two or more professions learn with, from, and about each other to improve collaboration and quality of care."[1] Often IPE is incorrectly used interchangeably with multi-professional education. Multi-professional education is defined as "members of two or more professions learning alongside one another in parallel rather than interactive learning."[1] There are advantages to both, however the goal of education programs in physical and occupational therapy is to prepare students to be clinicians.[2] This includes being able to interact with other professionals on an interdisciplinary health care team. According to Kroboth et al,[3] expected student outcomes of IPE include development of a shared language to enhance communication among professions, an understanding of the role of other professions, and an ability to work effectively as a team that uses each member's unique contributions to promote interdisciplinary delivery of healthcare across settings. Simulation provides a method for promoting opportunities for students to develop these critical skills.

Since the inaugural use of simulation for healthcare provider training by anesthesiologists in the early 1990s,[4,5] its use by many other health professions has increased significantly due to its ability to provide students a context in which clinical decision-making and procedural skills can be practiced in a team-based setting without risk to actual patients.[6-10] However, effective use of simulation with regard to use of student and faculty time and resources can be challenging. This paper describes the design, planning, cost, and support staff time required for conducting an interprofessional simulation of the intensive care setting, as well as a description of the students' experiences.

Simulation can be classified with regard to its level of technology and fidelity. Low technology simulators include basic articulated mannequins and mannequins with basic functions such as heart and lung sounds, as compared to high technology simulators such as Laerdal's SimMan™ (Laerdal Medical Corp., Wappingers Falls, NY) and METI's Human Patient Simulator™ (Medical Education Technologies, Inc., Sarasota, FL). Fidelity refers to "the extent to which the appearance and behavior of the simulator/simulation match the appearance and behavior of the simulated system."[11] With regard to standardized patients (SPs), they are classified as low technology, high fidelity simulators. An SP is "a person who has been carefully coached to accurately portray a specific demographic and diagnosis when given the details of the history and physical examination."[12] Standardized patients have been used in medical education to facilitate better patient interaction skills, differential diagnosis decisions, and to assess students' clinical skills.[13-15] Medical schools use SPs in both critical and non-critical care settings.[16] A systematic review of the use of SPs in medical education highlighted key features

Dr. Shoemaker is Assistant Professor and **Ms. Cooper** is a doctoral student in the Department of Physical Therapy; **Dr. Beasley** is Associate Professor in the Occupational Therapy Department; **Mr. Perkins** is Assistant Director in the Simulation Center for Health Professions; **Ms. Smith** is a Multimedia Instructional Designer and **Mr. Swank** is a Learning Resource Coordinator, Grand Valley State University, Grand Rapids, Michigan.

PP1009 – Received July 6, 2010; accepted Sep 3, 2010.

Address correspondence to: Dr. Michael J. Shoemaker, Physical Therapy Program, Grand Valley State University, 301 Michigan NE, Grand Rapids, Michigan 49505, USA. Tel 616-331-3509, fax 616-331-5999. shoemami@gvsu.edu.

Journal of Allied Health (Online 1945-404X)

TABLE 1. Burn Simulation Learning Objectives

1.	Assess the patient's clinical status and readiness for physical and occupation therapy intervention
2.	Discuss all considerations, precautions, potential emergent situations, etc. that will affect physical and occupational therapy intervention
3.	Safely mobilize the patient to sitting edge of bed observing all precautions associated with various lines, leads, and tubes
4.	Assess range of motion, splinting needs, and positioning needs
5.	Perform range of motion and mobilization interventions
6.	Suggest additional interventions that may be beneficial
7.	Initiate discharge planning

that lead to effective learning, including the provision of feedback during the simulation, allowing repetitive practice, integration of curricular content, varying the difficulty of the simulation, incorporating multiple learning strategies, and use of high-fidelity simulators.[14] These types of educational experiences do not replace classroom learning in medicine, but facilitate the development of the necessary skills needed for the clinical education setting.[6,14,16-19]

Considerably less research is available regarding the use of simulation, including SPs, in occupational and physical therapy educational programs. The majority of the research investigated students' perceptions of the experience.[20-22] Others such as Panzarella[21] assessed physical therapy students' cultural competence with SPs, while physical therapy students' clinical decision making skills were assessed by Shoemaker, Riemersma, and Perkins[2] and Ladyshewsky and Gotjamanos.[13] Despite the potential benefits of simulation, Paparella-Pitzel, Edmond, and DeCaro[23] found that only 30% of physical therapy programs in the United States and Canada report using SPs in their curriculum. The most commonly cited reason for not using SPs was restricted funding. However, Hasle, Anderson, and Szerlip[24] found that the cost of using SPs in medical school was no greater than traditional teaching methods.[24] Black and Marcoux[20] investigated the feasibility of using SPs for developing physical therapy students' skills in preparation for their first clinical experience, and found that it was economically feasible within the program's budget, and that students in the group trained with SPs perceived a greater benefit than those trained in the traditional lab group.

One difficulty that may be encountered by health professional education programs' use of simulation is being able to provide every student an opportunity to both participate directly as the clinician and as an observer for peer evaluation. Although Jeffries and Rizzolo[25] suggest that outcomes are not different between the "clinicians" and observers, both Wu and Shea[26] and Shoemaker, Riemersma, and Perkins[2] noted that students wanted more opportunities to directly participate as "clinicians." Wu and Shea[26] noted the desire of occupational therapy students to work with other health care disciplines during the simulated experience. However, due to the increased number of students, designing a simulation experience with more than one discipline poses a significant logistical challenge for providing each student an opportunity to participate.

In summary, there is an increasing emphasis on IPE across health professional education programs, and simulation as a teaching modality provides an opportunity for physical and occupational therapy students to learn from interaction and engagement in simulated, real-time clinical scenarios. However, little information is available regarding the use of SPs by physical and occupational therapy education programs including cost, design, and the incorporation of IPE. Therefore, the purpose of the present paper is to describe the use of simulation in physical therapy and occupational therapy professional education as a modality for IPE, and to describe a methodology developed by the authors for maximizing the number of students who are able to directly participate in a simulation experience.

Simulation Description

Curricular and Institutional Context

The students involved in this simulation were enrolled in physical and occupational therapy graduate programs at Grand Valley State University (GVSU). Doctor of Physical Therapy students were nearing the end of third semester in the first year of the program as a part of an integumentary practice/wound care course. Occupational Therapy Master of Science students were in their second year of their graduate program. Both programs are in the College of Health Professions (CHP), which has the GVSU Simulation Center as a resource. The primary objective of the Simulation Center is to provide opportunities for IPE learning experiences using simulation as a learning modality/methodology. Several interprofessional simulations are regularly conducted between PT, physician assistant, nursing, and OT students. The simulation described in the present paper was designed specifically to provide an IPE learning experience for occupational and physical therapy students regarding the care of patients with severe burns in the intensive care setting.

Simulation Design

According to Wu and Shea,[26] the most important consideration when planning a simulation is the learning objectives, which dictate subsequent decisions regarding level of simulation fidelity, the type of clinical case to be used, the structure and progression of the simulation, and the design of the sim-

FIGURE 1. The simulated clinical environment.

ulation debriefing. Various compromises must then be made with regard to duration and scheduling of the simulation and the amount of time the student is able to interact with the SP/simulator compared to the amount of time, if any, observing other students participating in simulations.

The primary learning objectives for this simulation are outlined in Table 1. Because a central objective to this simulation was student appreciation for the significant psychosocial impact of burns, SPs were chosen as the most appropriate level of technology and fidelity to allow for interpersonal interaction between the student and the SP. Various severities and location of the burns were simulated using moulage and a variety of wound dressings. Vital signs were displayed using the telemetry data simulator from the SimMan™ software (Laerdal Medical Corp., Wappingers Falls, NY). An example of the simulated clinical environment is depicted in Figure 1.

The most challenging simulation design parameter was that of logistics. Only one day of the selected semester was available for the 64 PT and OT students to participate together in a simulation, and the authors placed a high priority on all aspects of simulation participation: interaction with the SP, an opportunity to observe and complete a peer evaluation in the simulated clinical interaction, simulation debriefing, and a self evaluation. The present paper describes the development and initial use of a highly-coordinated simulation schedule termed "the Beasley Method." This method was developed by one of the authors to maximize the use of resources including space, personnel, student time, and SP's time. This schedule was designed to allow the opportunity for students to be both the clinician and peer evaluator, and provide for debriefings after each encounter, as well as an opportunity for the SPs to provide feedback and engage in discussion with all of the students, faculty, and staff.

The resulting simulation schedule using the Beasley Methodology is presented in Figure 2. A total of six SPs representing three cases were utilized. Each peer evaluator viewed the simulation that was video-streamed onto a computer in a separate room. The peer evaluator recorded information regarding specific interpersonal and technical skills displayed by the student clinicians. These peer evaluators and student clinicians were then debriefed following the simulation with a faculty member. The second group of students who were peer evaluators then became the clinicians for the same SP that was observed during the initial evaluation. While this second group of students who were now in the clinician role had the advantage of observing the initial examination, the objective of the treatment session was to implement the treatment plan developed from the initial evaluation, and the SPs were coached to portray a change in pain, motivation, and/or arousal to increase the difficulty level. It was felt that this provided an opportunity to simulate continuity of care both between clinicians and visits. During the first debriefing for the first group of observers and student clinicians, a second group of observers and student clinicians started the same simulation. This method eliminates long periods of inactivity that would otherwise occur during a debriefing and maximizes productive time for the SPs who are paid hourly. Following completion of the simulation, students completed a self-evaluation.

Progression of the simulation was based on the first session which emphasized initial evaluation, and the second session emphasized intervention. This allowed for continuity of the simulated case for each student, where the students who were initially observers were able to initiate intervention during the second round of the simulation when they acted as clinicians. Following the second simulation, all students, faculty, and SPs met in an auditorium for a large debriefing. This provided the opportunity for feedback from the SPs and provided an opportunity for additional discussion of the experience.

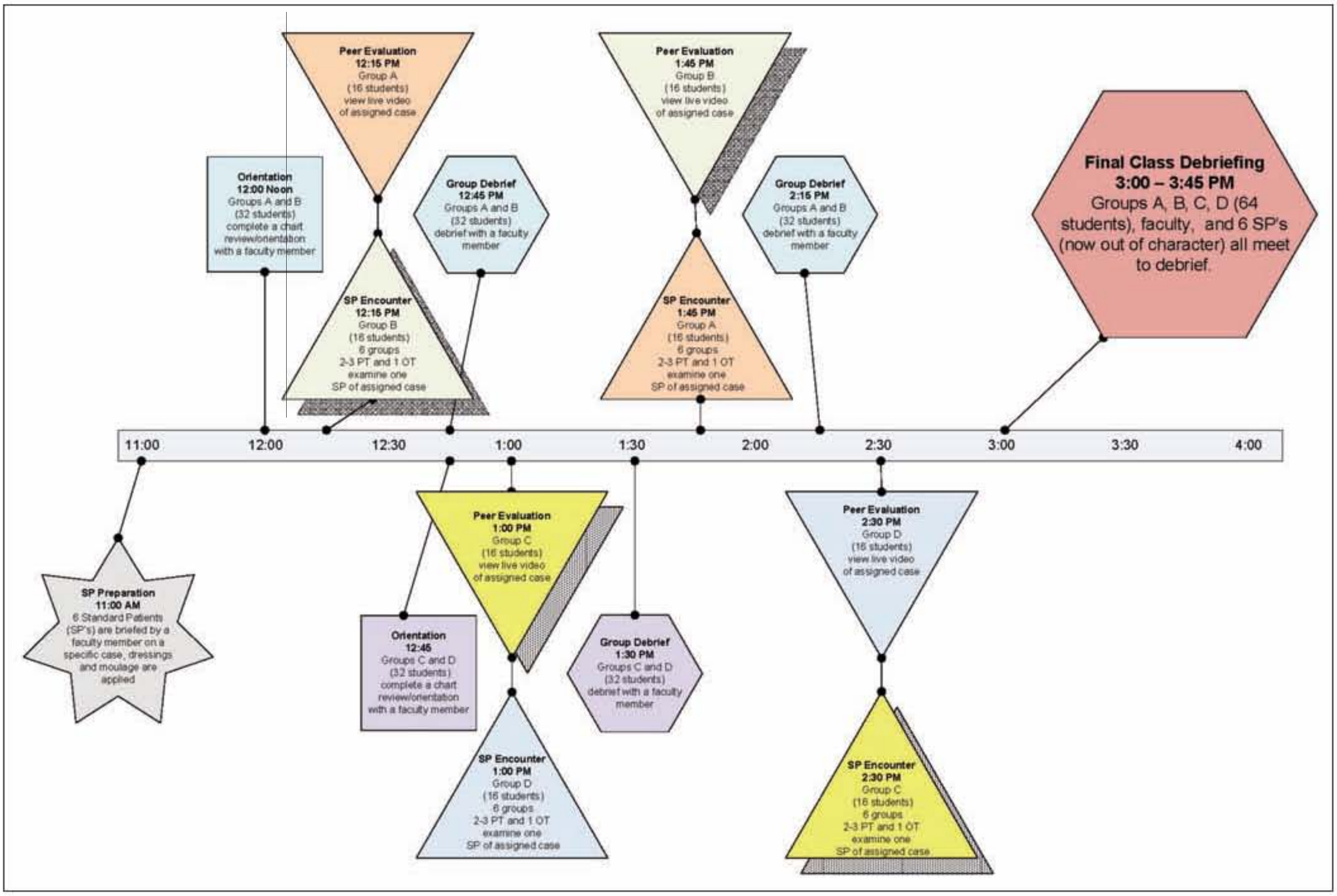

FIGURE 2. The simulation schedule.

All simulation sessions were video recorded for self-evaluation by the student and for qualitative analysis by the faculty. The questions used for the peer and self-evaluation are displayed in Table 2.

CASE SCENARIOS

The case scenarios were developed to represent actual cases (mishandling fireworks, smoking near gasoline, and attempted suicide using natural gas while smoking). The location (and therefore joint involvement) and severity of the burns for each case included partial thickness and deep partial thickness burns with various combinations of the upper extremities, anterior trunk, anterior lower extremities, face and neck. The SPs were instructed to portray their own demographics and social history. They were also instructed on the limitations of range of motion appropriate to their burn location and to demonstrate considerable pain with movement. The psychosocial attributes portrayed by the SPs were that of frustration, anger, and embarrassment for the cases with accidental causes, as well as depression and withdrawal for the attempted suicide cases. All SPs were instructed to also portray considerable drowsiness that was associated with the use of pain medications.

Outcomes

RESOURCE UTILIZATION AND COST

Initial planning for the simulation involved two of the authors. The amount of planning required was not substantially beyond that required for developing a new laboratory activity, but did require considerable coordination and discussion with multiple members of the simulation team, including the assistant director of the simulation center, the multimedia instructional designer, the SP coordinator, and two learning resource coordinators. An overview of their role and time commitment to the simulation is outlined in Table 3. A total of $500 in specific costs, in addition to 61 hours of simulation staff time, were required to deliver this simulation experience for 64 PT and OT students. An attempt was not made to quantify the actual cost of staff time, as this cost would be highly dependent on the staff selected for assisting in designing and implementing the simulation and the salaries in the geographic region in which the simulation occurred. It should be noted that up to eight hours of staff time utilized in this simulation was due to our video server and software system that does not allow for efficient integration of student scheduling, camera scheduling, camera set-up, recording, streaming, and video rendering.

Table 2. Items for Peer- and Self-Evaluation	
Yes/No	**Task**
	Patient/Client greeted was greeted appropriately
	Explained role of respective discipline
	Explained the purpose of the therapy session
	Discussed home environment
	Discussed occupations/interests/patient goals
	Discussed family support
	Discussed functional limitations
	Appropriate eye contact
	Appropriate use of body language
	Respectful tone
	Clear and concise language
	Appropriate volume of voice
	Developed rapport
	Professional behavior (absence of inappropriate comments or interactions)
	Demonstrated active listening
	Displayed empathy
	Used open-ended questions appropriately
	Demonstrated correct techniques for psychomotor skills
	Concluded the session appropriately
	Comments:

Student Peer- and Self-Evaluation

The peer- and self-evaluations were qualitatively reviewed initially by one of the authors, then confirmed by another author, for themes pertaining to interprofessional collaboration. Two primary but apparently contradicting themes emerged: interprofessional collaboration vs. dominance of one individual. The students noted in the self- and peer-evaluations that the PT and OT students planned and conducted comprehensive and efficient evaluations and that they worked well together to establish treatment goals. Conversely, they also reported instances where the communication was awkward between disciplines due to the lack of experience in this setting and unfamiliarity with each other. They also observed that one discipline played a dominant role. More often it was reported that the PT student played more of a dominant role, though there were instances of dominance by OT students as well.

Overall Group Debriefing

The final group debriefing with the SPs, students, and faculty was recorded, transcribed, and analyzed independently by two authors for common themes. Collaborative analysis of this data into themes was completed as described by Miles and Huberman where the comments were manually coded by underlying key terms, restating key phrases, creating clusters, and identifying themes.[27] Five themes were identified and are described below.

Theme: Range of Motion Measurement

An SP asked the students about measurement of range of motion, noting that some students used a goniometer while others did not. Comments by both PT and OT students reflected a general consensus by both disciplines that the emphasis needs to be on functional range of motion by estimation, especially given that the patient had bulky dressings (that the students did not remove as might occur if the evaluation was performed at a time other than during a dressing change) and that the patient would be undergoing skin grafting in the near future, minimizing the need for precise measurements. The few PT and OT students who did perform goniometry cited the need to have accurate baseline measurements to monitor change over time.

Theme: Patient-Centered Care

Sub-Theme: Expression of Caring. The SPs reported both positive and negative examples of how students explicitly and implicitly expressed caring or a lack caring. They noted that caring was evident in the students recognizing non-verbal expressions of pain, the appropriate use of humor, and genuine expressions of empathy. A negative example of caring

TABLE 3. Simulation Team Resource Utilization

Resource	Monetary or Staff Time Cost
6 SPs @ $15/hour for 5 hours each	$300
Moulage and gauze dressings	$200
Training in moulage application, 6 staff, 2 hours each	12 hours
Advance preparation of SPs by SP Coordinator	1 hour
Final preparation of SPs, including dressings and moulage, 6 staff, 1 hours each,	6 hours
Technical set-up of laptop computer and telemetry monitors	2 hours
Student scheduling (including student notification of group and room assignment)	4 hours
Video streaming schedule and camera set-up	1 hour
Video recording rendering and production	3 hours
Team meeting and table-top practice exercise, 5 staff, 2 hours each	10 hours
Execution of simulation, 5 staff, 4 hours each	20 hours
Simulation clean-up	2 hours

SP, standardized patient.

was noted by an SP regarding students' disregard of the SP's repeated requests for a cigarette.

Sub-Theme: Communication. Positive and negative feedback was provided on the students' use of technical terms/jargon and students' providing explanations of what was about to occur during the encounter.

Theme: Role Delineation and Teamwork

Sub-Theme: Patient Perspective. The SPs universally reported favorable experiences with students introducing themselves and their respective disciplines, sharing roles without conflict, and appearing to provide seamless transitions between measurements or procedures. The SPs expressed surprise that the PT and OT students had not previously met or collaborated on prior simulations or projects.

Sub-Theme: Student Perspective. Despite the appearance of a "seamless" collaboration, the PT and OT students expressed some discomfort and concern for "stepping on the other person's toes." Some students remarked on the "contagiousness" of confidence or fear within their groups and that strong expressions of either emotion seemed to affect the other students in the group.

Theme: Simulation Logistics

Students commented on the difficulties encountered by not being familiar with a simulated intensive care environment with regard to location of supplies, such as extra pillows, gowns, alcohol wipes, etc. Additionally, students quickly realized that the vital sign information displayed on the monitors were not responsive to their interventions.

Discussion

Previously reported observations[2,26] that students desired more opportunities to directly participate in a simulation (versus observation alone) and more interprofessional experiences[26] served as the basis for this descriptive paper on a method for allowing 64 OT and PT students to have a direct SP exposure within a short, feasible timeframe (< 4 hours). When not included in the direct SP contact, these students were completing peer evaluations by observing their peers in real time using a live video stream or were in a debriefing with a faculty member. This minimized student "down time" and maximized student involvement. In addition, the simulation was videotaped for a self evaluation by the student. According to Issenberg, McGaghie, Petrusa, and Gordon,[14] the majority of the learning from simulation encounters occurs following the simulation. This recording of the simulation session, according to Wu and Shea,[26] "allows for students who may have missed key elements of the client interactions as they occurred in real time or simply required more processing time to review and understand the key elements of the scenarios."

While the structure and logistics of this simulation design seemed to be effective for allowing a large number of learning opportunities for a high volume of students in a short period of time, one aspect of scenario fidelity warrants further discussion. The vital sign data displayed on the telemetry monitors was not manipulated in response to the activity of the SP for two reasons. First, monitoring and responding to vital sign changes was not an objective in this scenario as the PT students had not yet been fully trained in this aspect of patient examination and intervention by that point in their curriculum. Second, the faculty and simulation staff had not yet experienced a high volume simulation and did not anticipate that sufficient staff and training could be available for running six monitors. However, the authors have subsequently been able to demonstrate the ability to effectively manipulate the telemetry data in response to the students' interaction with the SP, and future iterations of the simulation discussed in this paper will include these real time changes in vital sign data.

A variety of student learning outcomes were achieved as evidenced by the qualitative analysis of the overall debriefing and the students' peer and self evaluations. With regard to interprofessional collaboration, the students had an opportunity to struggle internally with role delineation while being able to present an appearance to the SP of skill and experience in collaborating with the other discipline. The opportunity for students in different yet closely related disciplines to be challenged in this way provided an opportunity to begin thinking and discussing how to most effectively manage and negotiate the professional relationships that are critical to daily practice in many settings. It was interesting to note the general agreement among both disciplines for approaching the assessment of range of motion in this setting and patient population, indicating a shared decision-making process related to this foundational examination skill. We believe this highlights the possibilities for the use of this simulation design in promoting interprofessional understanding and collaboration. For example, future scenarios might be developed that are designed to elicit discussion about elements of PT and OT practice philosophy that might differ substantially, such as the nature of diagnosis by PTs and OTs and the use of disablement/enablement models and their impact on intervention selection or the unique intervention skills offered by each discipline.

Another significant student learning outcome from this simulation was that of patient-centered care. A variety of psychosocial attributes were imbedded in the SP portrayals of the case scenarios, allowing the students to discover through self-evaluation, peer-evaluation, and SP feedback how well they were able to communicate and interact with these challenging "patients" while trying to accomplish basic clinical examination and/or intervention procedures. Unfortunately, one critical element of patient-centered care, cultural diversity, was not incorporated into the simulation as there was no diversity of race or ethnicity in either the SPs or the cases they portrayed. While there is no evidence that these types of experiences result in students becoming better clinicians, it may assist in preparing students for clinical education experiences and reducing student anxiety about their preparation.

Conclusion

Simulation-based learning is highly-valued and well-liked by students, but requires considerable staff and monetary resources beyond the time the primary faculty member might spend developing a new laboratory or learning activity. The actual cost of a simulation could vary considerably between institutions depending on the level of fidelity and technology available or desired, the salary of the staff that are utilized to plan and conduct a simulation, and the availability and quality of technological infrastructure (e.g., video servers, cameras).

References

1. Freeth D, Hammick M, Reeves S , Koppel I, Barr H: Effective interprofessional education: development, delivery, & evaluation. Blackwell Publishing, Oxford, UK, 2005.
2. Shoemaker MJ, Riemersma L, Perkins R: Use of high fidelity human simulation to teach physical therapist decision-making skills for the intensive care setting. Cardiopulm Phys Ther J 2009;20(1):13-18.
3. Kroboth P, Crismon LM, Daniels C, et al: Getting to solutions in interprofessional education: report of the 2006-2007 professional affairs committee. Am J Pharm Educ 2007;71(6):1-8.
4. Howard SK, Gaba DM, Fish KJ, Yang G, Sarnquist FH. Anesthesia crisis resource management training: teaching anesthesiologists to handle critical incidents. Aviat Space Environ Med 1992;63:763-770.
5. Gaba DM. Improving anesthiologist's performance by simulating reality. Anesthiology 1992;75:491-494.
6. Ladyshewski R, Gotjamanos E: Communication skill development in health professional education: the use of standardized patients in combination with a peer assessment strategy. J Allied Health 1997;26(4):177-186.
7. Steadman RH, Coates WC, Huang YM, et al: Simulation-based training is superior to problem-based learning for the acquisition of critical assessment and management skills. Crit Care Med 2006;43:151-157.
8. Hravnak M, Beach M, Tuite P. Simulator technology as a tool for education in cardiac care. J Cardiac Nurs 2007;22:16-24.
9. Fox-Ribichaud AE, Nimmo GR. Education and simulation techniques for improving reliability of care. Curr Opin Crit Care 2007;13:737-741.
10. Hunt EA, Nelson KL, Shilkofski NA. Simulation in medicine: addressing patient safety and improving the interface between healthcare providers and medical technology. Biomed Instrum Technol 2006;40:399-404.
11. Maran N, Glavin R: Low to high fidelity simulation- a continuum of medical education? Med Educ 2003;37(suppl 1):22-28.
12. Barrows H: An overview of the uses of standardized patients for teaching and evaluating clinical skills. Acad Med 1993;68:443-451.
13. Ladyshewsky R, Baker R, Jones M, Nelson L: Evaluating clinical performance in physical therapy with simulated patients. J Phys Ther Educ 2000;14(1):31-37.
14. Issenberg SB, McGaghie WC, Petrusa ER, et al: Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review. Med Tchr 2005;27(1):10-28.
15. Barrows HS, Abrahamson S: The programmed patient: a technique for appraising student performance in clinical neurology. J Med Educ 1964;39:802-805.
16. Barrows HS: An overview of the uses of standardized patients for teaching and evaluating clinical skills. Acad Med 1993;68(6):443-453.
17. Swartz MH & Colliver JA: Using standardized patients for assessing clinical performance. Mt Sinai J Med 1996;63(3):241-249.
18. Ainsworth MA, Rogers LP, Markus JF, et al: Standardized patient encounters: a method for teaching and evaluation. JAMA 1991;266(10): 1390-1396.
19. Sharp PC, Pearce KA, Konen JC, Knudson MP: Using standardized patient instructors to teach health promotion interviewing skills. Fam Med 1996;28(2):103-106.
20. Black B, Marcoux BC: Feasibility of using standardized patients in a physical therapist education program: a pilot study. J Phys Ther Educ 2002; 16(2):49-56.
21. Panzarella KJ: Beginning with the end in mind: evaluating outcomes of cultural competence instruction in a doctor of physical therapy programme. Disabil Rehabil 2009;31(14):1144-1152.
22. Blanchard S, Steward CL: Forward chaining: using standardized patients for clinical education. OT Practice 2000:27-28.
23. Paparella-Pitzel S, Edmond S, DeCaro C: The use of standardized patients in physical therapist education programs. J Phys Ther Educ 2009;23(2):15-21.
24. Hasle JL, Anderson DS, Szerlip HM: Analysis of the costs and benefits of using standardized patients to help teach physical diagnosis. Acad Med 1994;69(7):567-570.
25. Jeffries PR, Rizzolo MA. Designing and implementing models for the innovative use of simulation to teach care of ill adults and children: a national, multi-site, multi-method study. National League for Nursing. New York, 2006. Stillman PL: Technical issues: logistics. Acad Med 1993;68(6):464-470.
26. Wu R, Shea C: Using simulations to prepare OT students for ICU practice. American Occupational Therapy Association, Inc. 2009;19(4):1-4.
27. Miles MB, Huberman AM. Qualitative Data Analysis. 2nd ed. Sage Publications, Thousand Oaks, CA, 1994.