ORIGINAL ARTICLE

Perceptions of High-fidelity Simulation Teaching by Non-specialist Doctors in an Emergency Department in Singapore

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ABSTRACT

Simulation training was introduced in 2008 as part of the core education program for non-specialist doctors posted to our department. It aims to help them improve clinical knowledge and skills, as well as to facilitate teamwork and communication. A survey was conducted to elicit their views on this training technique. All the participants felt that it was most effective in improving knowledge base in resuscitation work while 97 % felt that the session allowed them to train their critical decision making skills. Only 57% felt that the session helped them to improve their patient and doctor communication skills. Simulation training has been generally well received and deemed beneficial by the participants in our study.

Keywords: high-fidelity, medical education, perceptions

INTRODUCTION

Simulation training in medical education has grown tremendously over the past 5 years in the US, with over 80% of the residency programs now using high-fidelity simulation[1]. High-fidelity patient simulators are sophisticated full-scaled mannequins that possess auscultatory breath sounds, heart tones, palpable pulses, reactive pupils and even a voice transmitter. The learner can intubate the simulator, perform cricothyroidectomy, insert a chest tube, and perform venepuncture or bladder catheterisation. Drugs and other therapy can be instituted on the mannequin, resulting in physiological real time changes in the vital signs and clinical conditions that can be seen, heard, felt and experienced by the learner. Training modules with such simulators can be designed for a single learner or a team of learners, depending on the objectives of each training programmes. As such, this modality of training has the ability to enhance the development of clinical competency as well as team organisation and communication skills.

The Emergency Department (ED) is a high-risk environment that constantly requires medical personnel to manage a broad spectrum of critical cases in a timely manner. An essential combination of clinical competency, good teamwork and effective communication is vital for optimal management of such cases. For medical staff who are new to the ED environment, the learning curve is particularly steep and challenging.

Together with the other EDs of public hospitals in Singapore, our department receives a new group of non-specialist doctors — who are varied in clinical experiences — at least twice a year. Most of these doctors are posted to the ED for a 6-month rotation, either as a part of their respective specialty training programmes or as part of the national manpower allocation to meet service needs. In order to help the newly-posted doctors assimilate into the work at our ED, an intensive induction programme that includes online learning, didactic lectures and case discussion is conducted in the early phase of each 6-monthly posting. These are particularly

useful for orientating them to the management approaches to common clinical presentations and the workflow processes at our ED. However, these teaching modalities may not be ideal for developing teamwork and communication skills, which are essential in the management of critically ill patients in the ED setting. To this end, high-fidelity simulation training sessions were introduced in 2008 as part of the core education programme for every cohort of non-specialist doctors who are posted to our department.

High-fidelity simulation training is currently expanding locally in undergraduate and postgraduate medical training programmes in fields such as physiology, pharmacology, critical care, anaesthesia and obstetrics. In Emergency Medicine (EM), there is still a paucity of data on the perceptions of non-specialist doctors to this modality of teaching. As a first step in exploring the potential of high-fidelity simulation teaching in the field of EM, we conducted a survey of non-specialist doctors who are posted to our ED to better understand their perceptions of this educational technique.

METHOD

Five cohorts of non-specialist doctors over 2.5 years from November 2008 to January 2011 were included in the study. These doctors were all part of the Medical Officers Posting Exercise (MOPEX). Doctors who had gone through the simulation session before due to repeat posting in the same department were excluded.

These groups of non-specialist doctors from Changi General Hospital attended 2 sessions of 4-hours scenario-based high-fidelity simulation training programme, which were conducted during the first 2 months of each 6-month rotation. Each participant was tasked to lead a team of 4–5 other colleagues in one resuscitation scenario. In this way, each participant would get to experience 4 or more scenarios per session, either as a team leader or member. The scenarios were based on core clinical cases encountered, and included common surgical and medical emergencies.

Learners could interview the patient, perform physical examinations, obtain and interpret relevant laboratory, radiographic or electrocardiogram data; perform procedures and administer medications. Communication with team members and relatives were also incorporated into the programme. They could also have the imagined ability to utilise the resources available in the hospital i.e. send a patient to the cardiac lab, or activate the trauma team for assistance. Facilitators, who would have been briefed on specific objectives prior to the session, would observe the residents through a one-way mirror in the control room. Feedback sessions were held immediately after each scenario, and residents were debriefed against a preformed checklist. Residents would then observe how their actions affected the simulated patients in real time with the aid of video playback.

A survey form, to be completed by the non-specialist doctors, sought the individual doctor's perception of benefit in the following areas: (1) clinical knowledge; (2) clinical skills; and (3) teamwork and communication skills. They were asked to express the above in a Likert score of 1 to 5 — 1 being "strongly disagree" and 5 being "strongly agree" — to standard statements regarding the above areas. The feedback was obtained after the session, and the feedback was anonymous.

We used ECS (Emergency Care Simulators) and these sessions were held at the Institute of Medical Simulation and Education (IMSE) at the Singapore General Hospital in Singapore.

This study was reviewed by the Institutional Review Board of Singhealth and was exempted from a formal review.

RESULTS

There were 59 participants in total, with 1–5 years of clinical experience. They were made up of non-specialist doctors aged 23 to 33, with 2 emergency medicine, 5 family medicine, 1 radiology trainee, with the majority being non trainees. All have had Basic Cardiac Life Support (BCLS) and Advanced Cardiac Life Support (ACLS) certification. (See Table 1 for participants' responses.)

The participants felt that simulation was most effective in improving knowledge base in resuscitation work (100% agreed or strongly agreed). Ninety-seven per cent of the participants also indicated that the session allowed them to train their critical decision-making skills. The same percentage felt that it was more effective

Table 1. Responses of 59 non-specialist doctors to their experience with high-fidelity simulation teaching.

	Strongly Agree (%)	Agree (%)	No Opinion (%)	Disagree (%)	Strongly Disagree (%)
Knowledge					
1. This activity is helpful in improving my knowledge base in resuscitation work.	39	61	0	0	0
2. This session effectively bridged the gap between knowledge and clinical practice.	31	64	3	2	0
3. Simulation teaching is more effective than classroom teaching in acquiring knowledge about A&E medicine.	32	63	5	0	0
4. Simulation teaching enhances overall learning experience, and should be implemented as routine learning method in the A&E curriculum.	29	69	2	0	0
Clinical Skills					
1. This session allowed me to train my critical decision making skills.	34	63	3	0	0
2. This teaching will certainly influence and impact how I practise the clinical components of medicine.	37	59	2	2	0
3. Simulation teaching is more effective than classroom teaching in of practical aspects -of A&E medicine.	37	60	3	0	0
4. The experience boosted my confidence as a doctor and this confidence will be effective in my training as a doctor.	14	54	14	2	0
Teamwork and Communication Skills					
1. This session helped me to improve patient and doctor communication skills.	3	54	24	17	2
2. This session helped me improve working in a team environment.	15	66	17	2	0
3. The session taught effective communication with other doctors.	14	71	12	2	2
General Aspects					
1. The session was organised and conducted clearly for learning to occur.	40	58	2	0	0
2. Overall the session achieved the learning objectives.	30	68	2	0	0
3. The session is effective in identifying areas that I can improve.	40	56	3	0	0
4. This activity helped role play the position of a doctor in the emergency medicine department well and helped me to understand what it means to be a doctor in the A&E.	22	76	2	0	0

A&E: Accident and Emergency

than classroom teaching in the practical aspects of A&E medicine. Only 57% felt that the session helped them to improve patient and doctor communication skills.

DISCUSSION

High-fidelity simulation can bridge the gap between the classroom and bedside patient care by ensuring that residents are exposed to core clinical scenarios faced to ensure competency at work[2]. As high-fidelity simulation offers cognitive stimuli that enhance perceived realism, it may be best suited for complex tasks such as resuscitation. Hence it has a special role in emergency medicine education. Using simulation, the teacher can apply many of the principles of adult learning by creating a risk free environment for learners to learn practical material[3].

Using high-fidelity simulation, we were also able to teach our non-specialist doctors to learn "whole procedure" practice, since the procedure becomes a component of the overall management of the patient. They were allowed to practise procedural techniques, which included tasks like intubation, and proper application of cervical collar and log roll for trauma patients. These critical time sensitive skills were practised without risk to the patient or the learner. This is especially important, as patients do not want their own clinical care to be an opportunity for skills training. A patient preference survey showed that if given a choice, only 42% would allow a medical student to perform their first venepuncture on them. Approximately 50% of patients would never let a medical student perform a lumbar puncture, central line, or intubation on them at all[3].

Junior doctors often lack confidence due to their lack of clinical experience. A survey of internal medicine residents done by Hayes *et al*[4] showed that residents felt unprepared as leaders of cardiac arrest teams in teaching hospitals in spite of having attended the advanced cardiac life support course. They felt that additional training involving full-scale simulation would be most effective in increasing their skills and confidence. This is similar to the findings in our study, in which 85% felt that simulation training boosted their confidence as a doctor.

Surveys and statements from learners in simulation literature have reflected that simulation is helpful and learners typically enjoy it as a training modality[1]. In a survey of third and fourth year medical students undergoing an emergency medicine clerkship by Gordon *et al*[5], 85% of students indicated that simulation should be a mandatory component of their medical curriculum. This is similar to our local findings; almost all the students felt that simulation should be implemented as routine learning method in the department

Teamwork skills such as communication, co-ordination and co-operation are critical to patient safety, as they serve as barriers to error in medical care[6]. Training these skills in EM education programmes are especially important due to the often complex and time pressured nature of EM. As mentioned above, one of the objectives of developing the simulation programme was to supplement the learning of teamwork and communication skills. However the feedback was not as positive as we had hoped for. Only 57% felt that the session helped them to improve patient and doctor communication skills and 81% felt that the session helped working in a team environment. This was somewhat unexpected and will need further exploration on our part to see why that was so. It would be a good opportunity to apply the event-based approach to training (EBAT) methodology to future programmes, which systematically links the content of training scenarios and measurements to teamwork competencies trained[8].

For simulation teaching to be a success, both the faculty and learners need to be prepared with clear objectives. Quality debriefing and feedback needs to be given after each session. Most of the learners (98%) felt that our sessions achieved the learning objectives. High-fidelity simulation is similar to a theatrical production, as it involves actors, props, scripts and people to work behind the scenes[7]. It is time- and labour-intensive, and this is its primary limitation. The current challenge is to maximise the efficiency of high-fidelity simulation teaching with the resources available, to utilise it for consolidating knowledge within the higher level skills like critical decision making, and procedural skills and team-work and communication training. Didactic lectures and low-fidelity simulation are still necessary and more efficient for the teaching of simple facts and procedures[2].

Ideally, to gauge the success of high-fidelity simulation training, it should be measured by the

outcome achieved. To objectively do so, it will require more than surveys and feedback. Perhaps future studies can compare the competency of doctors who undergo a simulation programme with those who do not. Ways to do so would be to measure a junior doctor's ability to manage a difficult airway, or handle a trauma case. The challenge is to determine if this training programme results in an improvement in patient outcomes.

The challenge at Singhealth is to incorporate high-fidelity simulation into current graduate training programmes. It would be ideal to have a high-fidelity simulation teaching programme tailored to the needs of each department's medical officer teaching or residency programme. This is definitely possible as evidenced by the many programmes running at the IMSE. These include the TEAMS workshop, Crisis Management Course, and the Basic Obstetric and Gynecology Emergency Course. KK Women's and Children's Hospital already has a well-established paediatric simulation programme to train its medical officers. Other programmes for residents are also in the works. In addition, Singhealth will also be expanding its simulation labs with the relocation of the Singhealth Academy in 2013 and educators should be equipped to fully utilise them.

There is currently already a wealth of experienced clinicians within Singhealth who are actively involved in graduate teaching. Their expertise in clinical content and giving feedback should be tapped on. Dedicated training should be provided to the current and future generations of educators, so that simulation can become a prevalent part of our medical officer and resident training programmes. This is because only when faculty is familiar with the advantages and disadvantages of high-fidelity simulation as an education tool can they be familiar with an approach to creating simulated and appropriate experiences using high-fidelity simulation[2]. Training is available through many courses worldwide, and is already being provided locally at the institutional level with the pool of local experts available. Simulation faculty should have knowledge and skills in adult learning theory, objective writing, and curriculum design. They should also be taught simulation specific skills such as scenario design, debriefing of high-fidelity mannequin based simulation and some technical knowledge about the simulator[2]. The IMSE holds many such courses regularly, and faculty should be availed and encouraged to attend them

Singhealth institutions can consider the use of high-fidelity simulation as a teaching and assessment tool. Its use can be especially useful now since there is a restriction in the work hours with the introduction of the residency programme. Residents may now have less opportunity to be exposed to a wide variety of clinical entities. Cases can be developed to ensure trainees are exposed to core clinical problems, and help them to acquire complex skills prior to actual practice, to make up for the lack of actual clinical exposure. It would be important to define which of the ACGME (Accreditation Council for Graduate Medical Education) core competencies are most amenable to simulation-based education.

High-fidelity simulation can also be used in formative or summative assessments for graduate programmes. When used formatively, it can help provide a medium by which faculty can identify areas of strength and weakness in the learner. These may be easier to develop for a start, as they are more content based. Summative simulation-based assessments would be more challenging logistically, especially for high stakes examinations, as they would need be reproducible, valid and reliable and feasible.

CONCLUSION

The integration of high-fidelity simulation training into our curriculum for non-specialist doctors aims to help them to improve clinical knowledge and skills, as well as facilitate teamwork and communication skills. It has been generally well received and deemed beneficial by the participants. It allows learners to translate clinical knowledge to practise, and to hone critical time sensitive skills without risk to patient or learner.

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