SciForschen
Open HUB for Scientific Research

ISSN 2470-0991

Journal of Surgery: Open Access

Guest Editorial Volume: 2.1 Open Access

Simulation Based Training and its Role within Foundation Training Programme: Does it Benefit us all?

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Received date: 19 October 2015; **Accepted date:** 22 October 2015; **Published date:** 26 October 2015.

Citation: Gilchrist J, Mirza O, Kumar BN (2015) Simulation based training and its role within Foundation Training Programme – does it benefit us all? J Surg Open Access 2(1): doi http://dx.doi.org/10.16966/2470-0991.e103

Why Simulation training?

Simulation-based training is a form of experiential learning, and can be used to teach basic skills right up to specialized techniques [1]. It is gaining greater acceptance within the medical field after several demonstrated positive studies, and is further supported by similar high-fidelity training platforms used in training other highly-skilled professionals, such as in the field of aviation where great advances in airline safety have been achieved [2]. Simulation has a recognized role in both clinical skills training and assessment, through utilizing repetition to assist trainees in reaching a level of expertise [1, 2]. It is also thought that simulation quickens the acquisition of skills by reducing the learning curve as suggested by Dreyfus and Dreyfus. In their model of skill acquisition, they identified the five stages of learning; novice, advanced beginner, competent, proficient and expert [3]. Simulation training allows deliberate practice in a safe environment facilitating progression through each of these stages in order to ultimately achieve expertise [4].

Medical training has evolved over recent years from more of a time-based apprenticeship to a competency-based model of training [5]. However, with the restrictions of the European Working time Directive, a greater need to maximize learning, reduce learning curves and meet the educational needs of trainees within the confines of a 48-hour working week has been identified [1, 3]. Junior trainees especially are at a unique stage in their careers where the timely development of essential examination, communication and procedural skills are imperative to foster confidence and ensure a firm foundation is established for their onward training and development. Simulation is an ideal technique that is able to provide the opportunity to learn, practice and refine appropriate skills and accelerate learning before even stepping into the clinical environment. Indeed several studies have shown simulation to be far superior to traditional methods of medical teaching in accomplishing specific skill acquisition goals [2, 3]. Furthermore by delivering teaching in a low-risk, controlled environment, competence may be attained without jeopardizing patient care, having an overall positive impact on the delivery of safe and effective healthcare [2, 6, 7].

With the traditional time-based model of training, trainees would have had an estimated 25,000 to 30,000 hours of training before reaching consultant level, compared with current competency-based training thought to be only 6000 hours [8]. Ericsson suggested 10,000 hours of training is necessary to attain a level of expertise in a certain field [9]. As a result, postgraduate medical training curricula has evolved to incorporate alternate educational methodology such as simulation, in order to bridge this gap and compensate for the significant reduction in the time for training. Furthermore, simulation offers the opportunity to objectively measure performance, track progress and complete work based assessments (WBAs) in order to demonstrate trainee competence.

There are various methods of simulation that have been identified in the literature, including verbal simulation (i.e. role play), anatomical models, simple computer-based patient simulation, and more complex virtual or computer-based patients [10]. These can be further sub-classified to designate the method of simulation more precisely, reflecting the breadth and ongoing development in this educational field. Fidelity is one example, which refers to the perceived reality of a simulator, which could be described as either high fidelity (e.g. virtual reality sinus surgery trainer) or low-fidelity (e.g. urinary catheterization on a plastic model) [11]. Factors which may modify fidelity include environmental, psychological and equipment factors [12]. The validity of a simulation method is a further example, however, that the transfer of what is learnt through simulation back to the clinical environment is particularly difficult to measure [13]. The aim of simulation is to mimic a device or an exercise as closely as necessary, or indeed possible, in order to reproduce phenomena likely to occur in the clinical environment [14]. Choosing the most appropriate method when designing a simulation-based teaching session depends on a number of variables, including the intended learning outcomes, participant profile, equipment availability and cost implications. By addressing each of these in turn, as well as ensuring high fidelity and high transfer validity, the learning opportunities are maximized and resources utilized appropriately and efficiently.

There may be an initial cost implication associated with simulation, which may involve specialized equipment and resources. However, the general consensus is that it is comparatively more cost effective in the long term, when compared with more traditional educational methods involving the cost of instructors, resources and facilities [15]. Moreover, trainee competence and efficiency, especially with procedural skills, adds to the return on investment achieved by medical simulators [16].

Utilisation within Foundation Training Programme

The foundation training programme is a two year work-based training that bridges the gap between medical school and specialty training. As such, foundation trainees (traditionally house officers or senior house officers) are considered the building block for each specialty and their development during this key period of training forms the basis for their future progression [17]. It is, therefore, in the best interests of all specialties and the medical profession as a whole that training during this period is successful in equipping these doctors with the appropriate skills and competences to safely deliver a high standard of patient care [17].

Simulation in the form of managing acute medical emergencies have really established themselves over the last 15 years, with courses such as Advanced Life Support (ALS®) and Advanced Trauma Life Support (ATLS®) becoming mandatory components of medical and surgical training [18]. Behavioural models have shown high fidelity simulation environments similar to real life can reinforce correct practice. Through appropriate reflection on completing the teaching activity, both positive and negative aspects of a trainee's performance can be analyzed and appropriate practice reinforced. This process of refinement is part of the cognitive development process of learning, where behavioural adjustments are made in order to encompass a new experience [19].

Through simulation an array of other non-clinical skills are also enhanced and developed, such as communication, team working, situational awareness, leadership and managerial skills. These are invaluable in preparing trainees for challenges and scenarios they may encounter as practicing, real-life clinicians. There is also some evidence to support that the incorporation of human factors training within simulation enhances the overall learning experience [20].

As part of our foundation training programme we have organized several simulation based training sessions, which are assimilated into the syllabus. One exciting aspect is the simulation suite including an interactive SimMan® or SimBabyTM mannequin. The mannequin is able to interact with the trainees by talking (controlled by a person in the control room), blinking, demonstrating clinical signs (such as abnormal breath sounds on auscultation or an irregular pulse), altering vital signs and also allowing the performance of certain procedures such as venepuncture, arterial blood gas sampling, chest drain insertion or insertion of airways. The resuscitation room appears similar to the clinical environment, with all the adjuncts normally expected to be found on the ward, thereby increasing fidelity. Trainees take it in turns to work through a given scenario involving an acutely unwell patient, which they then have to manage. As the scenario evolves, the clinical picture also changes depending on the assessment, management and intervention by the trainee. As part of the simulation suite, there is also an observational 'debrief' room where other trainees can watch, listen and appraise trainee performance via a video link, allowing them to both learn by observation, and give peer feedback, an essential part of enhancing the educational process.

Discussion

Our experience in integrating simulation into the educational syllabus for our foundation trainees has been a positive one. There is certainly an educational need, and simulation through the use of computerized mannequins in a high fidelity environment adds to the 'real feel' aspect of this type of training, although validity is difficult to measure. Post-scenario debrief, lead by the trainer and involving observers, helps consolidate the learning process, and identify key steps and specific learning points for onward development.

Participant feedback has also been universally positive. Foundation trainees feel more confident in managing acute clinical situations, and feel more similar sessions would be educationally valuable. By using feedback and suggestions, certain aspects of the simulation sessions have been altered and new features and scenarios incorporated, to meet both the foundation programme syllabus requirements as well as training needs as a group.

An area where simulation has been identified as being potentially greatly effective is providing specific training to ensure trainees have the appropriate skill base, experience and human factor proficiencies to ensure they are able to progress to their next stage of training (e.g. the transition from a foundation trainee to a higher surgical or medical trainee). This is often an area of apprehension for trainees, as the 'step up' is associated with greater responsibilities and clinical expectations from other members of the wider multi-disciplinary team. An intense course prior to starting involving an array of exercises developing both clinical acumen, procedural and communicational skills, as well as leadership and team working skills has been shown to be greatly beneficial in certain trials.

Of course, simulation is being used in an increasing number of and novel ways in other centres and training programmes around the world. Incorporating it into a specific educational programme is helpful as it helps trainees refine and develop key skills within their discipline that are essential to becoming expert. Simulation is able to help meet specific training needs and achieve competencies within a time-restricted programme. It may also provide a cost effective way to deliver training if there are economical constraints, as there may be in certain parts of the world.

Although simulation is an effective educational modality, there is no real substitute for actual clinical experience. However, simulation used alongside more traditional methods of medical training certainly has positive results for both trainees and ultimately the delivery of safe and effective patient care.

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