

Chapter 11

The Use of Medical Simulation to Improve Patient Safety

Stuart Marshall

Monash University, Australia

Jennifer Hogan

Monash University, Australia

ABSTRACT

In healthcare, medical simulation describes a heterogeneous group of methods that aim to replicate some aspect of clinical care. This chapter discusses the extent to which simulation is being used to explore facets of patient safety from the design of specific devices that are being used in the context of clinical work, to the broader organizational design of systems. The most commonly associated aspect of medical simulation is the education of clinicians in relation to improving patient safety. Few studies have attempted to examine how simulation education can affect patient safety; however, there is an emerging body of evidence that simulation training, particularly with regard to the training of teams, can have a positive effect on patient safety outcomes. The barriers commonly incurred with the implementation of simulation training warrant exploration and discussion so that an informed and strategic approach is adopted to allow the future direction of medical simulation in healthcare to be educationally sound and financially sustainable.

INTRODUCTION

Medical simulation comprises a range of techniques that are increasingly being used to modify or redesign work practices to minimize risk to patients. This chapter will describe the current methods of medical simulation that are employed to enhance the design of training as well as improve devices and processes within healthcare systems.

In the health context, simulation describes techniques whereby realistic but controlled scenarios are enacted in order to observe factors affecting participant actions and/or behaviors. These actions can either be investigated to assess the design of the environment, the ability of the participants to manage a particular situation, or to encourage learning at an individual or organizational level. Within the broader description of ‘simulation’, the various simulation techniques each lend them-

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selves to examining specific aspects of education, system design and/or job design.

Recently, it has become increasingly clear that when designing simulation-based activities, considerable attention must be paid to the level of 'fidelity' or 'realism' in the construct of the simulation. Due care must be paid to ensure that the amount of realism is tailored to meet the learning needs of the target audience and to incorporate the learning outcomes of the curriculum.

One of the main benefits of simulation-based education is the ability to remove the training away from direct patient contact, establishing an environment that is free of risk to the patient and clinician. While it is reported that clinical 'in situ' simulation can provide a high level of realism and immersion for clinical staff it is often the case that unrelenting workplace responsibilities can often hamper the ability of clinicians to fully engage in training exercises at the bedside.

In undergraduate training, it is now commonplace to use devices such as part-task trainers, simulators and computerized screen-based simulation packages to learn and practice clinical skills. This is also mirrored in the postgraduate space as simulation is increasingly being used to replicate rare or unplanned clinical events to allow repeated practice of skills to educate clinical teams in patient safety. Deficiencies in teamwork are commonly cited as recurrent reasons for adverse patient outcomes (Undre, Sevdalis, Healey, Darzi, & Vincent, 2006) and simulation in its many forms is a useful way to explore the many factors that encourage and/or hamper the ability to produce effective teamwork activity. There is a growing body of evidence to support improved outcomes for both staff and patients following simulation-based team training, and the features of these programs deserve further examination.

Simulation can also be used to examine the design of tasks at a micro-level as well as the organization at a macro level. Human factors engineering is increasingly being applied to ensure appropriate ergonomic design of workplaces and

devices, and has great promise to reduce error and promote efficiency. Simulation-based testing and the employment of iterative design processes have a major role to play in this.

Despite the apparent benefits of simulation, its widespread use is still controversial. One of the biggest criticisms of simulation involves the transferability of clinical skills. How do we actually know that the lessons learnt in simulation transfer to the real clinical environment? There is a risk that education in a simulation environment merely teaches health professionals to do well at simulation, rather than effectively assist clinicians to transfer skills to improve patient care. Simulation is also suited to small group learning, and when used as a teaching tool, is expensive. When compared to the vast numbers of clinical staff that need to be trained, the demands on simulation to support a widespread education service means that there is likely to be limited accessibility to the service. Moreover, because of the high cost, simulation techniques are often held up to a higher standard of evidence than the more traditional education methods. Removing clinical staff away from the workplace for training challenges the customary 'on-the-job' apprenticeship model where clinical work can still be completed alongside trainee education.

There is no doubt that future research in simulation education needs to explore the areas of medical education that would benefit most from the use of simulation-based methods when financial and educational resources are limited. This is essential to ensure that simulation is supported by sound underpinnings for its ongoing viability. This chapter will begin with a definition of what simulation is and provide an outline of the different simulation techniques that are currently employed in healthcare. We will then discuss the methods of simulation used to improve patient safety and include a summary of the evidence that supports that these techniques are working. Finally, we will explore the barriers to widespread uptake of simulation, discuss the controversies surrounding its use and provide an outline for the future directions of simulation research.

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