

# Chapter 15

## Human Capital Accumulation in Medical Simulated Learning Environments: A Framework for Economic Evaluation

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### **ABSTRACT**

*Economic evaluations of the use of medical simulation in nursing curricula to enhance human capital and positively affect clinical and patient outcomes are rare. This chapter first provides a conceptual model of the use of simulated learning environments (SLEs) in nursing curricula and associated clinical and patient outcomes. Second, it reviews economic evaluation methods in medical simulation drawing from similar fields, such as aviation. Third, it provides a methodological framework for conducting full economic evaluations of SLE programs, which includes the identification, measurement, valuation and comparison of all relevant economic benefits with economic costs for any competing programs. The framework used in this chapter has applicability to any health care field, in which medical simulations are used as an alternative program, to serve as a guide, or be adopted with ease.*

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## **INTRODUCTION**

Theodore Schultz introduced the term “human capital” in the 1960s, believing it could be invested in through education and training, and lead to improvements in quality and level of production (Schultz, 1971). Economists regard expenditures on education, training and medical care as the most important investments in human capital. Through such investments the existing stock of human capital increases, as human capital accumulates in individuals, teams and organizations, regions, nations and globally. A special characteristic of human capital is that it cannot be detached from our knowledge, skills, health, or values in the same way as financial or physical capital. This poses measurement challenges for researchers interested in quantifying both the effects of those inputs that matter for human capital accumulation, and the effects that human capital accumulation itself has on a large array of outcome variables.

Economic evaluations of the use of medical simulation in nursing curricula to enhance human capital and positively affect clinical and patient outcomes are rare, and those involving full economic evaluations are only in their embryonic stage. In this chapter we try to fill the gap by providing a methodological framework for conducting full economic evaluations of SLE programs, which includes the identification, measurement, valuation and comparison of all relevant economic benefits with economic costs for any competing programs. Our framework has applicability to any health care field, in which medical simulations are used as an alternative program, to serve as a guide, or be adopted with ease.

The first objective of this chapter is to provide a conceptual model of the use of simulated learning environments (SLEs) in nursing curricula and associated clinical and patient outcomes. The second objective is to review economic evaluation methods in medical simulation drawing from similar fields, such as aviation. The third and last objective is to provide a methodological framework for conducting full economic evaluations of SLE programs, which includes the identification, measurement, valuation and comparison of all relevant economic benefits with economic costs for any competing programs.

## **BACKGROUND**

Some say the best way to learn how to do something is by actually doing it. That statement resonates even more in a field like nursing where decision-making and problem solving are critically important to safe patient care. Creating realistic scenarios to guide and instruct nurses and other healthcare team members is a valuable part of the education process (Aqel & Ahmad, 2014; Gordon, Oriol, & Cooper, 2004; Jeffries, 2005). The surging interest in medical simulation centers is a global phenomenon. Indeed, the embryonic Sidra Medical and Research Center’s Clinical Simulation Center in Qatar, promises to be one of the leading facilities in the world.<sup>1</sup> At the association level, the American College of Surgeons’ Division of Education has embraced simulation across the spectrum of education and training programs and has established an accreditation program for simulation centers.<sup>2</sup>

The National Patient Safety Foundation (NPSF) views simulation through the prism of its very focused mission: improving the safety of the healthcare system.<sup>3</sup> To support the mission, the foundation has become a unique proponent of simulation – recognizing its value as an educational tool to assist healthcare professionals as they learn and apply patient safety techniques.<sup>4</sup> In medical simulation the training imitates reality, offers almost limitless opportunities to have things “go wrong”, allows practitioners to safely demonstrate how to “do things right”, and provides corrective feedback as a guide to future action (Grant & Marriage, 2011; Good, 2003). Simulation-based education provides an opportunity to practice

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