

## Chapter 80

# Critical Transport: A Serious Game to Teach the Recommendations for the Transport of Critically Ill Patients

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### ABSTRACT

*At present, medical knowledge is experiencing an exponential growth. This results in serious difficulties to healthcare professionals in keeping up to date. At the same time, medical education is mostly taught using traditional learning methodologies, not always the most efficient. Recently however, there has been a significant increase in the use of computer games for both teaching and training as several published studies are showing that serious games can be more efficient when compared to traditional learning methodologies. Although the current number of serious games used in medical education is still very limited, the authors agree that it's application could lead to the improvement of medical knowledge and skills. This paper describes the serious game Critical Transport which is based on the Portuguese Society of Intensive Care's recommendations for the transport of critically ill patients, as well as the results of a pre/post-test study focused in determining the Critical Transport serious game efficiency as a training tool for training medical students.*

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## INTRODUCTION

Healthcare is one of the most important topics across the globe and it is considered a priority by political decision makers. The everyday exponential increase in medical knowledge results in a major challenge for healthcare professionals, from the very beginning of medical school. Most of these professionals need practical experience without putting themselves or others at risk. This principle holds in many medical areas, such as medical decision making, behavioural training, and others, involving dynamism and complexity (Ribeiro et al., 2012).

Traditional medical education, mainly teacher-focused and based on reading, listening or watching, has proved insufficient in adult education as well as inadequate for teaching both technical and soft skills. It has been reported that physicians make mistakes to such an extent that medical errors can be counted amongst the leading causes of death in the United States (Institute of Medicine, 2001; Kohn et al., 1999). Moreover, there is also an increasing awareness of the importance of creating a learning environment that approaches real life as much as possible through simulation and immersive realities, especially in a safety-critical area like medicine.

Rethinking medical education must include the opportunities offered by new information technologies as well as important cognitive style changes of the new generation of trainees, the so-called digital natives. Technological innovations, such as virtual reality simulation and e-learning applications, have led to consistent improvements in learning outcomes, and already play an important role in surgical residency training programmes (Schreuder et al., 2011; Cook et al., 2011; Thijssen and Schijven, 2010; Marks et al., 2007). Video games known as “Serious Games” have attracted a lot of interest in recent years, as a possible solution to answer the challenges currently faced by medical education. A serious game is formally defined as an ‘interactive computer application,

with or without significant hardware component, that has a challenging goal, is fun to play and engaging, incorporates some scoring mechanism, and supplies the user with skills, knowledge or attitudes useful in reality’ (Bergeron, 2006). Serious games differ from conventional video games and simulators in the sense that they are designed to provide a balanced combination between fun and learning. Balancing these two factors is one of the main challenges currently faced by the serious game researcher community (Khaled & Ingram, 2012; Isbister et al., 2010; Malone, 1980).

Serious games have been used successfully as a means to engage patients behaviorally to improve their health outcomes (Høiseth et al., 2013; Hernandez et al., 2012; Kato, 2010) as early reports of case studies, using video games with patients experiencing diseases or physical disabilities, have shown (Kato et al., 2008; Krichevets et al., 1994; Szer, 1983). Nevertheless, there is still a lack of equally successful examples used in formal medical education. Several authors (Graafland et al., 2012; de Wit-Zuurendonk & Oei, 2011), (Kato, 2010) have conducted systematic reviews on the use of serious games for medical education and concluded that there is a lack of scientific evidence of its efficiency and effectiveness. This is compromising the adoption of serious games in medical education.

In this paper we present the results of a one year experiment using a serious game in formal medical education classes in an academic hospital. This paper describes the Critical Transport serious game, which aim is to teach the recommendations for the transport of critically ill patients, elaborated by Portuguese Society of Intensive Care, to undergraduate medical students. This game uses video game technology in order to establish a link between a framework computer-based case with e-learning functionalities. In order to achieve this, different clinical cases are presented, using computer graphics techniques, and they must be solved following the recommendations for the transport of critically ill patients in order to guar-

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