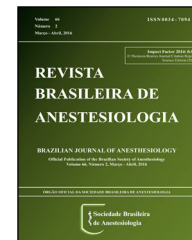




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SCIENTIFIC ARTICLE

Acquiring skills in malignant hyperthermia crisis management: comparison of high-fidelity simulation versus computer-based case study[☆]

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KEYWORDS

Medical education;
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Abstract

Introduction: The primary purpose of this study was to compare the effect of high fidelity simulation versus a computer-based case solving self-study, in skills acquisition about malignant hyperthermia on first year anesthesiology residents.

Methods: After institutional ethical committee approval, 31 first year anesthesiology residents were enrolled in this prospective randomized single-blinded study. Participants were randomized to either a High Fidelity Simulation Scenario or a computer-based Case Study about malignant hyperthermia. After the intervention, all subjects' performance in was assessed through a high fidelity simulation scenario using a previously validated assessment rubric. Additionally, knowledge tests and a satisfaction survey were applied. Finally, a semi-structured interview was done to assess self-perception of reasoning process and decision-making.

Results: 28 first year residents finished successfully the study. Resident's management skill scores were globally higher in High Fidelity Simulation versus Case Study, however they were significant in 4 of the 8 performance rubric elements: recognize signs and symptoms ($p=0.025$), prioritization of initial actions of management ($p=0.003$), recognize complications ($p=0.025$) and communication ($p=0.025$). Average scores from pre- and post-test knowledge questionnaires improved from 74% to 85% in the High Fidelity Simulation group, and decreased from 78% to 75% in the Case Study group ($p=0.032$). Regarding the qualitative analysis, there was no difference in factors influencing the student's process of reasoning and decision-making with both teaching strategies.

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PALAVRAS-CHAVE

Educação médica;
Simulação de
pacientes;
Anestesia;
Educação;
Treinamento por
simulação;
Hipertermia maligna

Conclusion: Simulation-based training with a malignant hyperthermia high-fidelity scenario was superior to computer-based case study, improving knowledge and skills in malignant hyperthermia crisis management, with a very good satisfaction level in anesthesia residents.

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Adquirir habilidades no manejo de crises de hipertermia maligna: comparação de simulação de alta-fidelidade versus estudo de caso em computador

Resumo

Introdução: O objetivo primário deste estudo foi comparar o efeito da simulação de alta-fidelidade versus autoestudo baseado em resolução de casos no computador, a aquisição de habilidades sobre hipertermia maligna em residentes de anestesiologia do primeiro ano.

Métodos: Após a aprovação do Comitê de Ética institucional, 31 residentes de anestesiologia do primeiro ano foram inscritos neste estudo prospectivo, randômico e encoberto. Os participantes foram randomizados para um ambiente de simulação de alta-fidelidade (SAF) ou um estudo de caso (EC) em computador sobre hipertermia maligna. Após a intervenção, o desempenho de todos os indivíduos foi avaliado através de um ambiente de simulação de alta-fidelidade utilizando uma rubrica de avaliação previamente validada. Além disso, uma pesquisa de satisfação e testes de conhecimento foram aplicados. Por fim, uma entrevista semiestruturada foi realizada para avaliar a autopercepção do processo de raciocínio e da tomada de decisão.

Resultados: Vinte e oito residentes do primeiro ano concluíram o estudo com sucesso. Os escores dos residentes na aquisição de habilidades no manejo da hipertermia maligna foram globalmente maiores no Grupo SAF que no Grupo EC, mas a significância foi em quatro dos oito elementos da rubrica de desempenho: reconhecer os sinais e sintomas ($p=0,025$), priorizar as ações iniciais do manejo ($p=0,003$), reconhecer complicações ($p=0,025$) e comunicação ($p=0,025$). As médias dos escores nos questionários de conhecimento pré- e pós-teste melhoraram de 74% para 85% no Grupo SAF e diminuíram de 78% para 75% no Grupo EC ($p=0,032$). Em relação à análise qualitativa, não houve diferença nos fatores que influenciaram o processo de raciocínio e de tomada de decisão dos alunos com ambas as estratégias de ensino.

Conclusão: O treinamento baseado em simulação com um ambiente de alta-fidelidade de hipertermia maligna foi superior ao estudo de caso em computador, melhorou o conhecimento e as habilidades no manejo de crises de hipertermia maligna, com um nível de satisfação muito bom entre os residentes de anestesia.

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Introduction

Anesthesiology practice has become increasingly challenging, especially in teaching environments where residents have to learn new skills in demanding and complex professional environments with more difficult patients from a technical perspective.¹ Furthermore, it is now widely acknowledged that in order to achieve a successful clinical outcome it is also required that anesthesiologists have a wide range of non-technical skills such as effective communication, teamwork and proper resources management.²

Anesthesia Crisis Resource Management (ACRM) has been defined by Gaba as the articulation of principles of individual and crew behavior that focuses on skills of dynamic decision-making, interpersonal behavior, and team

management.³ High fidelity simulation has been well established in anesthesia where it is currently considered a critical teaching tool.^{4,5} Full-scale high fidelity mannequin simulators through simulated scenarios can be used for several training purposes, including teaching technical skills and ACRM, advanced life support algorithms, and particularly simulating rare events, among others.⁶

Despite the widespread acceptance of simulation-based training in anesthesiology, there is still some degree of skepticism about its cost-effectiveness.⁷ In a recent meta-analysis of the current state of the evidence on simulation-based training in anesthesiology, simulation failed to demonstrate superiority over other simulation educational tools.⁸ They conclude that simulation seems to be more effective than no intervention and non-inferior to non-simulator training (computer-based instruction, small group

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