Portuguese National Pedagogical Plan for Anesthesiology Residents' Evaluation: The Participants' Rating

Avaliação do Plano Pedagógico Nacional para Internos de Anestesiologia: A Pontuação Atribuída pelos Participantes

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RESUMO

INTRODUÇÃO: A simulação em anestesiologia tem sido considerada uma formação complementar fundamental para os internos desta especialidade médica. O Plano Pedagógico Nacional do Centro de Simulação Biomédica do Centro Hospitalar e Universitário de Coimbra foi desenhado de acordo com os objetivos curriculares definidos pelo Colégio de Anestesiologia. O objetivo deste estudo é analisar a avaliação dos conteúdos programáticos incluídos nos cursos de simulação, do ponto de vista dos participantes.

MÉTODOS: Os questionários foram respondidos, de forma anónima, por todos os participantes, após a realização de cada um dos módulos. Todas as perguntas foram respondidas numa escala de 0-10. Este estudo foi realizado no Centro de Simulação Biomédica do Centro Hospitalar e Universitário de Coimbra, em Portugal, de fevereiro de 2011 a março de 2018.

RESULTADOS: Foram incluídos 344 questionários respondidos. Os participantes consideraram que todos os temas incluídos nos cursos de simulação são importantes para a formação durante o internato, sendo a farmacologia básica em anestesiologia (Ano I) a menos importante, com uma média de classificação de 5,03 (IC 95% 4,83-5,22). Todos os conteúdos programáticos incluídos no módulo de simulação do ano IV foram classificados pelos participantes com importância superior a 8. Este último ano foi aquele em que a importância atribuída a cada um dos temas é mais elevada.

CONCLUSÃO: Dada a importância atribuída pelos participantes ao conteúdo programático incluído nos cursos de simulação, podemos concluir que o desenho dos cursos foi adequado às necessidades e objetivos dos internos de anestesiologia, como suplemento prático do programa de internato complementar em anestesiologia.

PALAVRAS-CHAVE: Anestesiologia/educação; Anestesiologistas; Competência Clínica; Treino por Simulação

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ABSTRACT

INTRODUCTION: Simulation in anesthesiology has been considered a crucial complementary training for residents of this medical specialty. A National Pedagogical Plan of the Biomedical Simulation Center from Centro Hospitalar e Universitário de Coimbra was designed according to the curricular objectives defined by the Portuguese Board of Anesthesiology. The objective of this study is to analyze the evaluation of the programmatic contents included in the simulation courses from the participants' point of view.

METHODS: Post-course confidential questionnaires were answered by all the anesthesiology residents that attended the different modules. All the questions were answered on a 0-10 scale. This study was conducted at the Biomedical Simulation Center from Centro Hospitalar e Universitário de Coimbra, Portugal, from February 2011 to March 2018.

RESULTS: A total of 344 questionnaires were answered. The students considered that all the topics included in the simulation courses are important for the training during residency, being basic pharmacology in anesthesiology (Year I) the less important one being classified with 5.03 (IC 95% 4.83-5.22). All the programmatic contents included in the simulation module of the year IV were classified by the residents with importance higher than 8. This last year was the one where the importance of the topics is all numerically higher than in the other years.

CONCLUSION: Given the importance attributed by the residents to the programmatic content included in the simulation courses, we can conclude that the design of the courses was appropriate to the needs and the goals of the anesthesiology residents, as a complement of their internship.

KEYWORDS: Anesthesiologists; Anesthesiology/education; Clinical Competence; Simulation Training

INTRODUCTION

In anesthesiology, the team is composed of elements with different levels of training, experience, and skills that work together in an environment with high technological complexity.[1,2] Simulation appears as the tool able to suppress the lacunae in traditional education, available for all the residents in anesthesiology.[3] To build a simulation program, the needs and the goals of the participants should be defined, as well as the learning objectives.[1,2]

These facts, together with a difficult learning curve of the different procedures and a potentially high risk for the patients, lead to the development of a complementary education tool, oriented by the pedagogical goals defined by the Portuguese Specialty College.[3,4]

The implementation of the Portuguese National Pedagogical Plan at the Biomedical Simulation Centre from Centro Hospitalar e Universitário de Coimbra (BSC-CHUC), Portugal, had four main goals: to facilitate the acquisition of theoretical knowledge; to allow the acquisition of technical competencies, to allow the practice of critical situation and to facilitate the team training, communication, and leadership. Therefore, the residents' performance during this simulation course was self-evaluated in its two main components: technical and non-technical skills.[5] Besides this self-evaluation of the competencies acquired during the simulation course, and since the National Pedagogical Plan should be implemented to complement the residency in anesthesiology, the program contents should suppress the lacunae that residents faced during their clinical practice. It is fundamental to analyze the importance and satisfaction of each topic included in the simulation course.

This study aimed to evaluate the importance attributed by the participants to each topic of the National Pedagogical Plan which revealed the satisfaction regarding the simulation courses to suppress the needs faced, by the residents, in the clinical practice.

METHODS

STUDY DESIGN

This prospective observational study was designed to evaluate the impact of the Anesthesiology Simulation Pedagogical Plan from BSC-CHUC, in the self-assessment of confidence, behavior, and training of the Portuguese Anesthesiology residents. Each simulation module was designed according to the program contents of each year of the Anesthesiology Residency Program (ARP), and the scripts/scenarios were previously published.[4,5] A summary of the main contents of each simulation module is included in Table 1.

Questionnaires included questions about learning, behavior, and evaluation of the pedagogical content of each simulation course. In this paper are presented the results of the importance, attributed by the participants, of the pedagogical content of each simulation course performed after the simulation course (Table 2). The complete questionnaires included were published previously.

TABLE 1. Summary of the programmatic content of each simulation module.

Year I	Year II	Year III	Year IV
• Basic pharmacology in Anesthesiology • Basic and advanced airway • Ventilation • Ultrasound in anaesthesia • Central and peripheral cannulation using ultrasound • Neuroaxial anesthesia and local anesthetics • Etiology and prevention of cardio-respiratory arrest • Advanced life support	• Leadership and health management • Difficult airway management • Supraglottic and transcutaneous devices • Fibroscopy principles • Ultrasound in anesthesiology • Ultrasound guided regional blocks • Anaesthetic approach to the burnt patient	• Assessment of a trauma patient • Massive haemorrhage management • Pathophysiology and management of Acute Respiratory Distress Syndrome (ARDS) • ARDS ventilation • Pathophysiology of sepsis • Management of a septic patient • Anatomy-physiological changes of pregnancy • Labour analgesia • Obstetric emergencies	• Effective communication • Crisis resource management in Anaesthesiology • OR emergencies

TABLE 2. Questionnaires applied in each module for each specific year of ARP. These questions were performed post-simulation courses to evaluate each topic's importance in a simulation context.

Year I	
21	Basic Pharmacology in Anesthesiology: topic importance
22	Basic and advanced airway: topic importance
23	Ventilation: topic importance
24	Vascular cannulation in anesthesia: topic importance
25	Ultrasound in anesthesia: topic importance
26	Central and peripheral cannulation using ultrasound: topic importance
27	Neuraxial anesthesia and local anesthetics: topic importance
28	Simulation training on operation room - clinical cases
28.1	Topic importance
28.2	Training impact
29	Simulation training on post-anesthesia care unit – clinical cases
29.1	Topic importance
29.2	Formative impact
30	Etiology and prevention of cardiorespiratory arrest: topic importance
31	BLS algorithm: topic importance
32	ALS algorithm: topic importance
33	Recognition of rhythms: topic importance
34	Defibrillation: topic importance
35	Simulation training on ALS – clinical cases
35.1	Topic relevance
35.2	Formative impact
36	Global evaluation
Year II	
37	Leadership and health management: topic importance
38	Difficult Airway Algorithm: topic importance
39	Supraglottic and transcutaneous devices: topic importance
40	Fibroscopy principles: topic importance
41	Simulation training on difficult airway – clinical cases
41.1	Topic relevance
41.2	Formative impact
42	Ultrasound in anesthesiology: topic importance
43	Ultrasound-guided regional blocks: topic importance
44	Simulation training on ultrasound-guided regional blocks – clinical cases
44.1	Topic relevance
44.2	Formative impact
45	The anesthetic approach of the burnt patient
46	Simulation training on the anesthetic approach to the burned patient – clinical cases
46.1	Topic relevance
46.2	Formative impact
47	Global evaluation
Year III	
48	Assessment of a trauma patient, head and thoracic trauma: topic importance
49	Abdominal trauma: topic importance
50	Massive hemorrhage management: topic importance
51	Trauma in the pregnant: topic importance
52	Simulation training on trauma – clinical cases
52.1	Topic importance
52.3	Formative impact
53	Pathophysiology and management of ARDS topic importance
54	ARDS ventilation: topic importance
55	Pathophysiology of sepsis: topic importance
56	Management of a septic patient: topic importance
57	Simulation training on intensive care – clinical cases
57.1	Topic importance
57.2	Formative impact
58	Anatomy-physiological changes of pregnancy

59	Labour analgesia
60	Obstetric emergencies: topic importance
61	Simulation training on obstetric anesthesiology – clinical cases
61.1	Topic importance
61.2	Formative impact
62	Global evaluation
Year IV	
63	Effective communication: topic importance
64	ACRM: topic importance
65	ACRM principle
66	Simulation training on ACRM – clinical cases
66.1	Topic importance
66.2	Formative impact
67	Emergencies in the Operating room
68	Simulation training operating room emergencies – clinical cases
68.1	Topic importance
68.2	Formative impact
69	Global evolution

ARP – Anesthesiology Residency Program; BLS – basic life support; ALS – advanced life support; ARDS – acute respiratory distress syndrome; ACRM – anesthesiology crisis resource management.

QUESTIONNAIRE'S DEVELOPMENT AND VALIDATION

The process of development and validation of questionnaires were previously described and published.

SETTING AND PARTICIPANTS

This study was an observational study conducted in Portugal, from 2011 to 2018, at BSC-CHUC. The same simulation courses of BSC-CHUC were offered since February 2011. The simulation environment included 3 simulation rooms: an operating room, a recovery room, and an emergency room. Four participants were included in each section with the roles of senior fellow (1st help), fellow, and 2 residents. The residents were active in "hot-seats". The script of the scenarios[5] is related to the content of each module, described in Table 1. Annually, approximately 15 residents of each year participate in the course. Simulation courses were performed during the first trimester of each specific year.

Participants were Anesthesiology residents enrolled in the simulation courses at BSC-CHUC.

Inclusion criteria: All anesthesiology residents enrolled in the anesthesiology simulation courses at BSC-CHUC. Exclusion criteria did not exist.

Ethical approval for this study (Ethical Committee Nº 171/ CES) was provided by the Ethical Committee from CHUC, Coimbra, Portugal (Chairperson Prof. Doutor João Pedroso de Lima) on 18 July 2019. Accordingly, written informed consent has been waived by the Ethical Committee.

VARIABLES AND METHOD OF ASSESSMENT

All variables were collected on an anonymized database specifically designed for the study. The source of all the variables was the specific questionnaires applied after each simulation course. Answers were given on an eleven-point Likert scale (0-10, ranging from null to maximum).

BIAS

The study was only based on self-assessment, which can constitute a source of bias due to intra-personal variability.

QUANTITATIVE VARIABLES

All collected variables were quantitative.

STATISTICAL METHODS

Descriptive statistics were used. Results were presented as mean (95% CI).

RESULTS

Three-hundred and forty-four validated questionnaires were included in the study: 76 from the year I, 89 from the year II, 82 from the year III, and 93 from the year IV. The mean age of the residents in the first year was 26.5 years of age with a minimum of 25 years and a maximum of 29 years.

The mean of the resident assessment for each question of Table 1, regarding programmatic content importance, is represented in Fig. 1. Fig. 1 is grouped in four panels corresponding to each year of the simulation module: Panel A: the year I; Panel B- year II; Panel C- year III and Panel D- Year IV.

DISCUSSION

Our study demonstrated that programmatic contents included in the simulation courses of the National Pedagogical Plan are important and satisfied the needs of residents in anesthesiology. This is of paramount importance since for a complete residency with high-quality standards, all these matters should be addressed, preferably in a safe environment, as simulation training permits.

The perceptions about the role of simulation in anesthesiology training are well documented. Simulation has a positive effect on the technical and non-technical skills of the students, namely in anesthesiology residents.[5-8]

Our results are part of a study that englobes technical and non-technical skills training in anesthesiology, in which the impact of a 4-year simulation course designed specifically on curricular goals defined for the Portuguese Anesthesiology Residency Program was evaluated. For that, the simulation modules were proposed to be performed in the first trimester of each year. This is

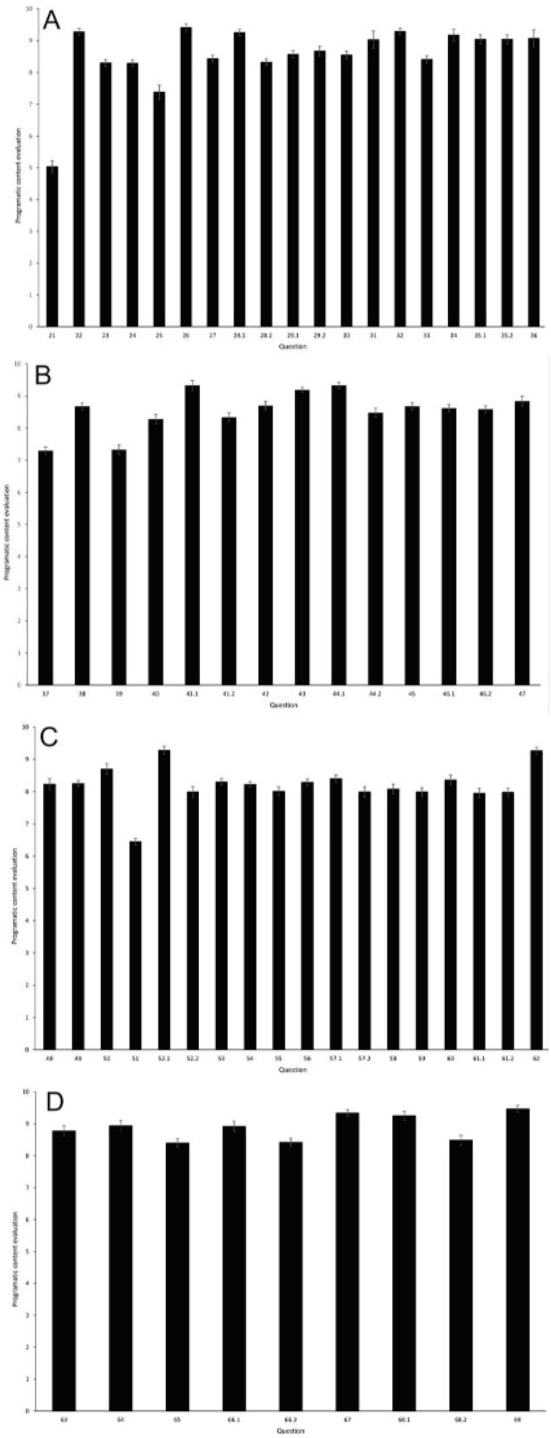

FIGURE 1. Residents' evaluation of the importance of each topic addressed in the simulation course. Results are presented in mean (IC95%). A- year I. B- year II. C- year III. D- year IV.

an unique way, allowing to accomplish the main objective of simulation: to learn in a safe environment, without risk for the patient,[7] since the first contact with each programmatic content occurs in a simulation environment. Simulation-based training is resource-intensive and there is a need to prioritize the contents and to adapt the courses to the immediate needs and lacunae of the participants,[1,2] therefore, it is crucial to understand the perception and satisfaction of the students about the contents included in the simulation training. This is the reason why, in this paper, we presented the evaluation performed by the students of the importance of each pedagogical included in each simulation module. Thus, the questions were only answered after participation in the simulation course.

From the analysis of Fig. 1, we can conclude that is essential for the students to practice each of the programmatic content in a simulation context, including the clinical cases in which the students evaluated the formative impact beyond the topic importance.

The year I was the one in which more programmatic contents were addressed and consequently had more questions. Basic pharmacology in Anesthesiology is the topic to which was given less importance: with a mean of approximately 5 and a low dispersion, showing a high concordance between the students. Interestingly, this topic was not included in the final prioritized list of 30 procedures' groups for simulation in anesthesiology, recently developed by a Consensus Panel.[2] Nevertheless, the study of pharmacology in anesthesiology has been associated with more effective learning and long-lasting retention compared to lectures alone.[9] The global evaluation of the course of the first year is very high.

In year II, different topics were approached. The global evaluation was very positive, and only questions 37 and 39 had a numerically low evaluation, approximately 7. Question 37 can be interpreted as a behavior question: leadership and health management are non-technical skills. Leadership and health management focus on interprofessional team training in healthcare education, together with communication and situation awareness.[1] For good leadership and management, participants should interact with each other, with the environment, and with the manikin ("patient").[1] The evaluation performed by the students could reveal some immaturity since they are at the beginning of their second year and are concerned with technical skills. Nevertheless, it is proven that simulation-based training has the advantage of improving self-confidence, situation awareness, communication, and leadership.[5,9]

Question 39 is related to supraglottic and transcutaneous devices. These devices are an essential second and third-line tool during difficult airway management after a failed tracheal intubation and require sufficient training. Moreover, they are related to a procedure included in the recommended final list of 30 prioritized procedures for the simulation-based training in anesthesiology.[2] Although the indications for using these devices and their prominent role in managing the difficult airway, they are not widely used.[10] A recent study showed that the feasibility of simulation for this training depends on the type of manikin.[11] Therefore, the students' previous knowledge about the scarce use of these devices and a more appropriate manikin could impact the importance given to this theme.

As in year I and year II, the students' general evaluation

of year III was very good. Trauma in pregnancy was the only topic with a mean of less than 7. It is estimated that trauma complicates approximately 1 in 12 pregnancies being vehicle crashes and falls due to instability, the predominant causes of reported trauma during pregnancy. The management of trauma in pregnant women should be done to minimize maternal injury, leading to maternal stabilization.[12] However, in this situation, the medical doctors must deal with a higher stress situation, and simulation could be of extreme importance. The lower importance rating given by residents relate to the fact that, initially, a traumatically injured pregnant woman should be treated as their nongravid counterparts, and therefore the general management of trauma is more important to be included in simulation courses than the management of trauma in pregnancy.

Year IV is the last year of the residency. In the simulation modules of this year, ACRM - Anesthesia Crisis Resource Management, including communication and emergencies in the operating room, are the main explored concepts. All the questions were evaluated by the students with a high score (more than 8), meaning that in the last year of their residency, when exposed to the more challenging situations, they found the learning process based on simulation crucial.

Some limitations of this study have been noted. First, methodologically, and for a more concise analysis of the simulation courses' impact on the residents' learning process, a pre-course questionnaire should be applied to the students. Only with these pre- and post-course results we could analyze how the importance attributed to each programmatic content change due to the simulation course. To overcome this, questionnaires should be applied before and after the courses in future simulation courses.

CONCLUSION

This study showed that from the anesthesiology residents' point of view, most of the topics included in the simulation modules are of utmost importance and should be included in the simulation courses. This allows the residents to fulfill their educational needs, faced in the clinical practice, in a safe environment.

RESPONSABILIDADES ÉTICAS

CONFLITOS DE INTERESSE: Os autores declaram não possuir conflitos de interesse.

SUPORTE FINANCEIRO: Este trabalho contou com o apoio logístico da Sociedade Portuguesa de Anestesiologia.

PROVENIÊNCIA E REVISÃO POR PARES: Não comissionado; revisão externa por pares.

ETHICAL DISCLOSURES

CONFLICTS OF INTEREST: The authors have no conflicts of interest to declare.

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AUTHORS CONTRIBUTION/ CONTRIBUIÇÃO AUTORAL

FM, MM and GN: Study design, data collection, statistical analysis, preparation and critical review of the manuscript

FM, MM e GN: Conceção do estudo, recolha de dados, análise estatística, preparação e revisão crítica do manuscrito

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