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TRAINING BASED ON REALISTIC SIMULATION FOR USE OF THE ELMO HELMET

TREINAMENTO BASEADO EM SIMULAÇÃO REALÍSTICA PARA USO DO CAPACETE ELMO

ENTRENAMIENTO REALISTA BASADO EN SIMULACIÓN PARA EL USO DEL CASCO ELMO

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ABSTRACT

To report the experience of conducting professional training based on realistic simulation for utilization of the Elmo helmet in the clinical management of COVID-19 patients. A report of the experience that comprised the following stages: in the first stage, the presentation of cognitive skills was performed. During the second stage, psychomotor skills were demonstrated in simulation practice stations for handling the Elmo system. In the third stage, each participant had the opportunity to individually practice the handling of the Elmo. In the fourth stage, the simulated practice took place in the station with the clinical scenario built by the facilitators and the debriefing. The training has already benefited more than a thousand health professionals, including physicians, nurses, and physiotherapists from Ceará and other Brazilian states. The innovation using simulation-based teaching for healthcare professionals is of great value for developing the skills required for the clinical handling of the Elmo helmet.

Keywords: *COVID-19; Positive-Pressure Respiration; Teaching; Simulation Training.*

RESUMO

Relatar a experiência da realização do treinamento profissional baseado em simulação realística para uso do capacete Elmo no manejo clínico de pacientes com Covid-19. Relato da experiência que contemplou as seguintes etapas: na primeira etapa, foi realizada a apresentação das habilidades cognitivas. Durante a segunda etapa, ocorreu a demonstração das habilidades psicomotoras com estações práticas do manuseio do sistema Elmo. Na terceira etapa, cada participante teve a oportunidade de treinar individualmente o manejo do Elmo. Já na quarta etapa, aconteceu a estação prática simulada com o cenário clínico construído pelos facilitadores e o *debriefing*. Os treinamentos já beneficiaram mais de mil profissionais da saúde, entre médicos, enfermeiros e fisioterapeutas do Ceará e de outros estados brasileiros. A inovação com o ensino em simulação para os profissionais da saúde é de grande valia no desenvolvimento de habilidades para o manejo do capacete Elmo.

Palavras-*chave:* *COVID-19; Respiração com Pressão Positiva; Ensino; Treinamento por Simulação.*

RESUMEN

Reportar la experiencia de realizar una formación profesional basada en simulación realista para el uso del casco Elmo en el manejo clínico de pacientes con Covid-19. Relato de la experiencia que incluyó los siguientes pasos: en el primer paso se realizó la presentación de habilidades cognitivas. Durante la segunda etapa se demostró la psicomotricidad con estaciones prácticas para el manejo del sistema Elmo. En la tercera etapa, cada participante tuvo la oportunidad de entrenar individualmente el manejo del Elmo. En la cuarta etapa, se llevó a cabo la estación práctica simulada con el escenario clínico construido por los facilitadores y el debriefing. La capacitación ya ha beneficiado a más de mil profesionales de la salud, entre médicos, enfermeras y fisioterapeutas de Ceará y otros estados brasileños. La innovación en la enseñanza de la simulación para profesionales de la salud es de gran valor en el desarrollo de habilidades para el manejo del casco Elmo.

Palabras clave: *COVID-19; Respiración con Presión Positiva; Enseñanza; Entrenamiento Simulado.*

INTRODUÇÃO

Between January and mid-April 2021, the increase in new cases of COVID-19 approached an exponential pattern, which since then has slowed down. The epidemic curve of confirmed cases began to graphically express itself as a plateau due to the downward trend in daily cases, which have remained unchanged since May 2021. In Fortaleza, until July 2021, 253, 320 cases of COVID-19 were registered., by criterion, and cases confirmed by rapid test for detection of antibodies in which there is a coincidence between the date of onset of symptoms and the date of collection, as well as those in which the interval between the date of onset of symptoms and the date of performance of the test was less than seven days, being excluded from the time series[1].

Amidst the chaotic scenario, the efforts of an interprofessional team turned to the objective of thinking about how to minimize deaths in the pandemic. The search for health care technologies soon emerged. It is known that the management of hypoxemic respiratory failure by COVID-19 is very challenging. And one of the therapies to prevent orotracheal intubation and its complications is the use of non-invasive ventilation. However, the use with traditional interfaces increases the risk of aerosolization and, consequently, contamination of health professionals, in addition to the fact that the patient often does not tolerate long periods of treatment[2].

The technologies used in health work are grouped into light, light-hard and hard technologies. The light refers to relationship technologies of the type of bonding, autonomization, reception, management as a way of governing work processes. The light-hard is related to well-structured knowledge that operate in the health work process, such as clinical medicine, psychoanalytic clinic, epidemiology, Taylorism and Fayolism. Duration refers to the use of technological equipment such as machines, norms and organizational structures[3].

The helmet-type interface (helmet), with complete sealing and respiratory isolation of the patient's head, allows the application of positive pressure in the airway, without intubation, in a safe and comfortable way for patients with mild to severe acute respiratory failure, representing a safe alternative for delivering high-flow oxygen to patients with COVID-19. In general terms, the intervention was described as effective, viable and economical, considering the numerous advantages promoted by the technology, among which, the adequacy with practices aimed at caring for patients infected with SARS-CoV-2, such as self-pronation and intervention explored on a large scale by health professionals with patients affected by the disease[2,4].

In this context, in Ceará, a helmet-like interface was developed and called Elmo, for the application of CPAP through the delivery of a mixed flow of oxygen and compressed air gases with less risk of viral dispersion during its use, without the need for mechanical ventilator or even electrical energy, applicable outside the Intensive Care Unit (ICU) and with the potential to prevent up to 50% the need for intubations in patients with moderate to severe hypoxemic (non-hypercapnic) Acute Respiratory Failure (ARI) applied by a properly trained team[2].

Professional competences should increasingly be considered as essential aspects for the development of pedagogical projects and curriculum matrices for courses in the area of Health, guiding the training process. Thus, the competency-based curriculum model is privileged to leverage the changes and needs that have been occurring in the world of work, preparing professionals to better serve the population and services at different levels of health care[6].

The COVID-19 pandemic surprised the world with its unknown pathological mechanism and treatment. The replication of good practices and the development of technologies only became possible in the face of scientific publications by professionals and institutions that, in record time, validated or excluded information, thus subsidizing the practice of other professionals around the world. Publicizing practices and technologies validated as scientific evidence, in the midst of the pandemic that is still ongoing, is an educational contribution that impacts professional practice and results in saved lives, thus demonstrating the justification and relevance of this study.

The aim of this article is to report the experience of conducting training based on realistic simulation for the use of the ELMO helmet for training health professionals (doctors, nurses and physiotherapists) in the clinical management of patients with COVID-19.

METHODS

This is an account of the experience lived by the group of the Realistic Simulation Center (CSR) and Distance Education Center (NEAD) of the Public Health School of Ceará (ESP/CE) in the development and performance of training for professional qualification of Health (doctors, nurses and physiotherapists) who work on the front line of care for patients with hypoxemic

acute respiratory failure due to COVID-19, on the use of the Elmo helmet. The experience described in this article refers to the training developed and carried out by ESP/CE in the city of Fortaleza and in municipalities in the interior of the state of Ceará, as well as in other states in the country, from December 2020 to August 2021.

The execution of training uses the methodology of realistic simulation and other educational support tools, such as: homepage; Virtual Learning Environment (AVA); mobile application (iSUS) for educational support in the teaching-learning dimensions in educational and clinical contexts.

For the execution of the training, there was the collaboration of servers and scholarship holders of the School of Public Health assigned from some centers of the organizational structure of ESP/CE, who made up a team of facilitators for whom a training was initially carried out by the physiotherapists who participated in the team that developed the Elmo device. Later, other professionals (doctors and nurses) were trained and qualified to make up the bank of facilitators for the project.

The training lasts an average of three hours, divided into four educational stages, containing a scenario script based on real clinical cases, in addition to the use of simulated patients who are trained individuals and/or actors, who assume a role portraying a story within the realistic simulation, with the purpose of teaching or evaluating.

Figure 1 – Stage 1 – ELMO Helmet Interactive Mini-Exhibit (Cognitive Skills)

Source – Authorship Photo

In the first stage, the cognitive skill was presented with an interactive mini-exposure, lasting seventeen minutes, at which time the learning objectives, the micro-skills to be worked on and the practical simulated training stations were also exposed, as well as the referenced educational aspects of the training, the team of facilitators, actors, the Elmo website, the iSUS app and the Ceará Public Health School website. The professionals received the instruction manual at the entrance as an educational resource and, soon after, participated in an interactive mini-exhibition about the Elmo system and its indications in clinical management.

Figura 2 – Step 2 – Mounting the Elmo Device (Psychomotor Skills)

Source – Authorship Photo

In the second stage, there was the demonstration of psychomotor skills, divided into three simulated practical stations. At each station, the professionals watched the instructors' demonstrations, using the modeling method (Modelling) in handling the Elmo system, in addition to receiving information about the reprocessing (sterilization and high-level disinfection) of the device.

Figura 3 – Step 3 – Realistic Simulation

Source – Authorship Photo

In the third stage, each participant had the opportunity to individually train their skills through the simulated practical stations already described. Thus, they were individually invited to practice their skills and micro-skills, such as carrying out the assembly, installation and removal of the Elmo, and also received information about sterilization.

Figura 4 – Stage 4 – Debrifieng

Source – Authorship Photo

In the fourth stage, the simulated practical station took place according to the clinical scenario constructed by the facilitators. There was the formation of pairs who attended to the simulated patient, with learning based on problems of practice in contexts of patients with COVID-19. At this stage, the facilitators carried out the observations of the performance evaluation and registration of important educational points observed in the service. Immediately after the season, the participants were gathered in a room for debriefing, which is a time for collective reflection on cognitive, psychomotor and attitudinal actions and skills, as well as the identification of possible difficulties encountered and suggestions for improvement involving the group.

At the end, a training evaluation was applied to point out suggestions and criticisms. Furthermore, there were suggestions requesting the prior distribution of educational/didactic material. At another moment, there was a closing speech, when the orientation was given to, in due time, access the homepage, the AVA and the App, as complementary strategies for teaching and learning.

It is noteworthy that, for learning to take place in simulated scenarios, it is essential that participants contribute voluntarily, in addition to being instructed in advance that they will have their images and voices recorded in real time, so that the learning process is effective. Therefore, each participant is asked by the facilitator to sign an authorization term for the use of image and voice, clarifying that this instrument is for educational purposes only.

RESULTS

The training has already benefited more than a thousand health professionals, including doctors, nurses and physiotherapists. Initially, they were held from Monday to Friday, being later adjusted to Tuesdays and Thursdays, since the other types of training were being held on Wednesdays and Fridays with the increase in requests received.

Some of these trainings were carried out with in situ simulation, at Hospital de Messejana, with the participation of 11 professionals; Hospital São José (10 professionals); Sertão Central do Cariri Hospital (69 trained professionals) and Hospital in the municipality of Sobral (64 trained professionals).

They were also carried out in other states in the in situ modality. The facilitators moved to these states, as follows: Maranhão (67 trained professionals); Minas Gerais (64 trained professionals) and Manaus (74 trained professionals).

The innovation in times of pandemic is noteworthy for having carried out the first skills training in the telesimulation modality with the municipalities Jaguaribara, Alto Santo, Itaiçaba and Pereiro, totaling 45 trained professionals. At the national level, the state of São Paulo and some of its health institutions were reached, with a total of 14 trained professionals.

DISCUSSION

Over the past two decades, simulation-based teaching has gradually increased, becoming today a significant component of health education at the undergraduate, graduate, continuing and continuing education levels. There are many reasons that can be listed for this development. The growing demands for learning stand out, which, combined with time restrictions, limited the availability to offer education7.

With regard to simulation, there are several strategies, among which the following stand out: 1) clinical simulation for skills training; 2) clinical simulation using simulators of different types; (3) clinical simulation with a simulated patient (scenic simulation); 4) the hybrid simulation; (5) deliberate practice in rapid cycles (PDCR); (6) virtual simulation; (7) the in situ simulation; and (8) telesimulation7. For professional training in the use of the Elmo helmet, strategies 1, 3 and 8 were chosen, which will be part of the active methodologies of the teaching-learning process that will be implemented by ESP facilitators at the Realistic Simulation Center that is under construction.

In the facilitation process for professional training of the Elmo helmet, there was a briefing, in order to prepare the participants for the experience of simulated practices, in addition to assisting them in achieving the learning objectives and providing support for the expected results. It is worth noting that, for an effective facilitation, specific skills and knowledge of the facilitator in the simulation methodology are necessary8. Therefore, the expertise of the ESP/CE facilitators in critical patient areas, with an emphasis on the management of Acute Respiratory Distress Syndrome (ARDS), was essential.

The need for intensive care and ventilatory support in many professionals who went to the front lines in the pandemic forced the massive expansion of training of health professionals with cognitive, psychomotor and attitudinal skills for the use of the Elmo helmet in the management of hypoxemia in patients with Covid-19.

The Elmo helmet provides numerous advantages, such as: improved saturation, high

respiratory rate, non-invasive procedure, the dispensing of sedation, no need for a ventilator, good tolerance and the possibility for the patient to change position and self-pronation. Another benefit of the helmet is the non-aerosolization of particles, promoting a less contaminated space and providing health professionals with greater safety[2,9].

At the end of the training, there was a debriefing and each simulation scenario provided an ideal opportunity to provide the candidate with relevant feedback with an individual or group focus, in order to maximize the overall learning experience.

The training made it possible to sensitize professionals to the practical applicability of the Elmo and the management of health services for the acquisition of the device, given that it is essential to avoid endotracheal intubation of patients, in addition to reducing the need for hospitalization in beds by 60%. Intensive Care Unit (ICU), highlighting the optimization of financial impacts and the number of patients saved in times of pandemic[2,4].

It should be noted that education in the area of Health has undergone changes in the context of the pandemic, especially due to the need for speed and qualification of health professionals, without reducing the quality of actions and services. Conditions of social isolation, as one of the behaviors adopted to reduce the transmission of the virus, have triggered digital technologies through remote teaching and permanent distance education10. Thus, the educational strategy of telesimulation deserves to be highlighted, which provides the opportunity to advance in the dissemination of knowledge on a large scale and ratifies the innovative profile of ESP in the context of technologies and health education.

FINAL CONSIDERATIONS

The context of the COVID-19 pandemic strongly highlights, in the educational dimension, the need to integrate technology and innovation for the continuing education of health professionals regarding the development of skills for the clinical management of the Elmo helmet in the treatment of the hypoxemic syndrome caused by the new coronavirus. As a result, the strategy and teaching method with an emphasis on realistic simulation made it possible to train professionals from an interprofessional perspective, developing a safe approach for the professional, favoring a better reach of the learning curve, as well as valuing patient safety.

After experiencing this experience, one can witness how resolute the teaching and learning process is using realistic simulation to develop skills and reach competences in a short period of time required by the COVID-19 pandemic. The telesimulation developed, which expanded the use of the Elmo device nationwide, stands out.

The study had some limitations regarding the tabulation and treatment of quantitative and qualitative information on the study variables.

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