Human Patient Simulator In The ICU: A New Paradigm In Student Learning

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Citation

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Abstract

The intention of this study was to register the initial experience with a human patient simulator, using a computerized manikin for evaluation of practical and cognitive performance of chest physiotherapists. This was a observational study with 8 physiotherapists and students during the simulation in an intensive care unit. None of the participants completed the simulation scene successfully. There was reluctance on the part of the practitioners in requesting help until the scene became critical. In the subsequent simulation the performance was improved in areas before neglected. The acceptance of the citizens to the simulation scenes was considered a useful tool for the learning in chest physical therapy in ICU. The simulator of the human patient is a valuable tool for the education in critical care because individual's errors in performance with relation to the specific theoretical knowledge would be detected.

INTRODUCTION

In the industry of aviation, the training is costly and the error of the operator should be avoided to all cost. The simulators in aviation are regularly utilized for help the pilots in maintain theirs abilities or become familiarized with problematic situations [3, 4].

In the field of medicine, the technology developed in simulation grows every day for students and professionals. Being a world tendency, the use of patient simulators in the medicine field intend to avoid potential errors such as those occurring during invasive procedures, discomforts of the patient, and inherent risks of the procedure carried out [2].

The Chest Physiotherapy has increased the magnitude of theirs actions special in terms of intensive care units, where the patients attended by physiotherapist are clinically unstable.

The system of human patient simulator (HPS) was developed by the Center of Advanced Practices in Physiotherapy (CAPP), incorporating the technology in simulation for the practice of chest Physiotherapy in intensive care units. The system is composed of a RCP manikin and a head office of control. The manikin real adult size has a pulmonary and cardiovascular system who answer automatically to practitioners and environment interventions and can breathe automatically or by mechanical ventilation equipment. The head office of control has the components of regulation from the simulation starting from this local, and the sequence of the events that will be developed by the practitioners. Based in this new practical context of training, this study intend to determine how the use of a patient simulator can influence the learning of basic and advanced techniques necessary to the management of the critic patient during the chest physiotherapy assistance.

MATERIALS AND METHODS

SAMPLE

The sample of this study consisted of 8 subjects, 7 females and 1 male, between 20 and 25 years old. The subjects were professionals graduate (5 subjects) and students (3 subjects) of physiotherapy. The individuals did not have prior knowledge of the settings of simulation to which, they will be submitted.

PROCEDURE OF OBSERVATION

Before simulations with human patient simulator the individuals received during 5 days theoretical information about respiratory therapy in critical patient (interpretation and to monitor the vital signs, mechanical ventilation in specific clinical situations and utilization of the mechanical as a respiratory therapy. After 5 days the students were submitted to 3 days of simulation. After brief orientation about the first scenario, each pair participated of a clinical

standardized setting that simulated an intensive care unit. Immediately before they received a summary about clinical conditions of the patient and the reason by which was requested a respiratory therapy care. Information in real time about homodynamic and pulmonary modifications were given like: blood pressure (systolic, diastolic and medium), wrist, cardiac frequency, eletrocardiographic signs, respiratory frequency and oxygen saturation. This information was developed by computer program (Megacode- Trainer, Laerdal, Germany) and by a monitor of pulmonary mechanics (Ventrak- Novametrix).

Figure 1

Picture 1: pair in a chest physiotherapy maneuver with human patient simulator.

In the moment of simulation the practitioners should put in practice theoretical knowledge acquired such as: evaluate the need of to be instituted a nebulization, oxygen therapy, non invasive ventilation and mechanical ventilation (picture 1). Beyond it carry out take care with the air roads superiors, request and interpret measures from the respiratory mechanics and vital signs. Therefore the practitioner must obey a sequence of events where the manikin evolved since a basal situation until the need of institution mechanical ventilation these events were accompanied by alterations in vital signs, curves of pulmonary mechanics and blood gases. Each pair was evaluated in 8 tasks selected by an observer depending on the setting through a scale that varied in three points. Being 0 (fails in carry out the procedure), 1 (carried out poorly or outside of sequence) and 2 (carried out correctly the sequence of events) (Table 1). The same observer was utilized in all sessions for eliminate the variation in this exercise not blind.

Figure 2

PERFORMANCE NOS COMPONENTES DO CENÁRIO								
PARTICIPANT	A	B	C	D	E	F	G	H
ECT	1	1	2	1	1	1	2	2
P.A	2	2	2	2	2	1	2	1
NBZ	0	2	2	2	2	2	2	2
USE NIV	1	0	2	2	1	1	2	2
RE. NIV	1	0	2	1	1	2	0	1
HELP	0	0	0	1	1	0	0	0
VENT. PARAM	0	2	1	1	0	0	1	2
CARE A.A	1	2	2	2	1	1	2	1
RESULTS	6	9	13	12	9	8	12	11

ECT- ectoscopy, P.A- pulmonary auscultation, NBZ-initiate nebulization, USE NIV-non invasive institution, RE. NIV-remove non invasive ventilation, HELP – ask for help, VENT.PARAM-ventilatory parameters,CARE A.A-artificial airway care.

The procedures evaluation was taken by video cameras connected to a television screen. The system of video was also utilized for subsequent argument between practitioners about the errors carried out by pairs during simulations.

RESULTS

No participant completed with success the two settings of simulation. The averages points were 10, with scores varied from 6 to 12 points (Table 1). The actions that consistently were carried out included: the prescribed nebulization in the appropriated moment used non invasive ventilation in the right time. The pulmonary auscultation was made by all of the participants however, not routinely contributing for some fail of conduct regarding the clinical status of the patient. Others errors included: the difficulty in identify the need of initiate the non invasive ventilation. This subsequently contributed to sudden deterioration of cardiopulmonary status. Beyond that some practitioners fail in initiate the mechanical ventilation at the right time. None of the participants requested for help until the setting of simulation become critical.

The performance in the second setting (mechanical ventilation) was considerably improved in all of the participants. The average of points in the second setting increased of 10 for 20. The evaluation of the participants regarding simulation was positive. Everybody answered the questionnaire saying that the experience from the simulation was “a excellent new modality of training”. Others examples from the final writing evaluation included answers like: “increase the number of simulation settings and the time spend with the simulation was better employee than in conventional hospital training. The negative comments were related to mechanical ventilation equipment which was not micro processed.

DISCUSSION

Computers have changed the ways medicine is practice and

patients are cared for. Reflecting on trends and projections for the future challenges to theoretical learning in health education, it is apparent that a new approach to teach health concepts is need.

In Brazil chest Physiotherapy are among the health professionals most affected by poor centers of betterment in ICU. Ongoing specific ICU education is necessary to these health professional learning new concepts and recycled the older information because they are integral members of the health care team for critical care patients.

A simulator is defined mechanism prepare for training that duplicates artificially the conditions found in some specific situations [1]. The value of the simulators as an educational tool advanced is derived from the work pioneer of John Dewey that in 1938 who designated four concepts for the training: experience, democracy, continuity and interaction. In 1956, Blom defined the educational objectives which were divided in three domains: cognitive, attitude and psychomotor [5]. Gagne 1962 he overhauled the use of simulators in the military training, not barely for pilots more also for visual controller of air traffic, and others technical [3]. Simulators of several kinds have been used by several programs of training in the education of surgeons and doctors that deal with critical care [6]. Being the simulators considered capable in the instructors in the constant analysis of the medical apprentices [1].

CONCLUSION

The learning with the human patient simulator can be compared to real practice since this methodology of teaching health concepts reproduced the exact conditions that the professional will meet in the intensive care unit. The big advantage of this new approach is the possibility to restart the simulation as necessary. Otherwise it is impossible to recreate this kind of repletion with real patients who need most of the time a correct decision. The human patient simulator therefore is a valuable tool for the education of physiothepeutic procedures performed in the intensive care unit. In this manner computed based education and cognitive forcing strategies is essential to formation and training of respiratory therapists.

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