Implementation of the clinical simulation laboratory in a medical school in the interior of the Brazilian Northeast: reflections on the process

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ABSTRACT

This experience report aimed to describe and reflect on the process of implementing simulation in the Clinical Skills and Simulation Laboratory of the Multicampi School of Medical Sciences of Rio Grande do Norte (EMCM), as well as to conjecture on its contributions to undergraduate medical education. In this report, the experiences of EMCM students and professors are recalled, and the practice scenarios, human resources, simulators, target audience, simulated practices, and perspectives for the future are described. It is expected that the implementation of the Laboratory of Clinical Simulation Skills will strengthen the process of internalization of medical education and the EMCM's commitment in the medical education scenario, training doctors with the ability to transform the local reality, improving health indicators and exercising the profession with skill and dedication.

Keywords: Medical education, Simulation training, Clinical competence.

INTRODUCTION

Clinical Simulation is an active learning method that enables the creation of real scenarios, in controlled environments, to practice skills and develop competencies. This strategy can be classified into levels of complexity, depending on the technological level of the simulators used, the objectives and purposes of the activity, the level of experience of the participants, and the content to be covered in the scenarios[1].

In the context of Medical Education, clinical simulation can be employed in different moments of training and in different contexts and practice scenarios[2]. In all realities, learners experience real problems, including those that are difficult to experience in practice settings, and can reflect on their performance in order to identify learning needs in a controlled environment[3].

During the simulated clinical experiences, the scenarios make reference to situations experienced, for example, in a hospital or primary care setting, where cognitive, psychomotor, attitudinal, and communication skills are worked on. In this way, the student develops competencies and skills in a safe environment, minimizing the possibility of errors in medical practice[4,5]. In addition, it increases satisfaction, self-efficacy, and self-confidence in learning[6].

Given this, and the evidence of the high prevalence of medical errors recorded by the Committee on Quality in Health Care in America[7], the National Curricular Guidelines for undergraduate medical courses in Brazil state that the medical student should "learn in protected and controlled situations and environments, or in simulations of reality, identifying and evaluating the error"[8] (p.3). Thus, it became mandatory for medical courses to offer learning environments based on Clinical Simulation, a factor that guided the introduction of this method in the pedagogical project of the Multicampi School of Medical Sciences of Rio Grande do Norte (EMCM) of the Federal University of Rio Grande do Norte[9].

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EMCM is a public higher education institution located in the interior of the state of Rio Grande do Norte, which uses student-centered teaching approaches through Active Methodologies (AM), such as problem-based learning (PBL). The compulsory curriculum is divided into two main axes: the tutorial axis and the skills and community axis, with simulation practices being inserted in the latter axis. These activities take place in the Clinical Skills and Simulation Laboratory, this space being a fundamental element for the effectiveness and maintenance of the School's purposes.

The Laboratories for Clinical Skills and Simulation (LCSS) of the EMCM aims to provide students with the necessary conditions to articulate theory and practice and foster the development of general and specific skills and abilities relevant to medical training. It currently has a state-of-the-art infrastructure, consisting of a significant arsenal of low, medium, and high-fidelity simulators and virtual reality simulators.

The EMCM plays a leading role in the internalization of the teaching of Medicine and Clinical Simulation in Brazil. Simulation, previously seen only in large university centers and in developed countries, now becomes part of the practice scenarios of the most remote regions of Brazil and lacking technological resources for medical education, enabling quality training. Thus, this work aims to describe and reflect on the process of implementing simulation in the Laboratory of Clinical Skills and Simulation of the Multicampi School of Medical Sciences of Rio Grande do Norte, as well as conjecture about their contributions to the undergraduate medicine.

METHODOLOGY

This is an experience report based on the process of implementing simulation in the LCSS of the EMCM. The practice scenarios, human resources, simulators, target audience, simulated practices, and prospects for the future were described.

The reflections were woven concomitantly with a theoretical and documentary research of Resolution No. 01 of February 2019[10], which provides the rules of use of the Laboratory, and the institution's catalog of simulators[11]. Added to this, the experiences of students and teachers in the practices developed in the laboratory.

RESULTS AND DISCUSSION

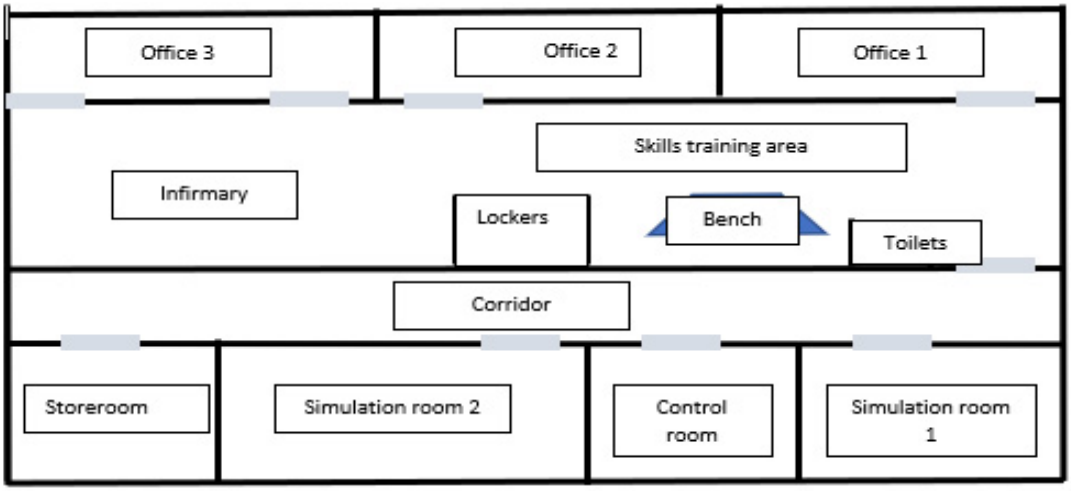
The practice scenario

The LCSS consists of eight spaces: a storage room, a skills training space containing a collective work area and three offices, two advanced simulation rooms, and a control room. All rooms were designed to accommodate the flexibility, ambience and flow management needs that may arise in the creation of the different simulation scenarios.

It is worth mentioning that the laboratory environments do not have a fixed structure, except for the warehouse, which is used to store simulators and supplies. Thus, for the setting of health care scenarios, the laboratory team makes the necessary furniture and assemblies. As in large centers, the possibility of creating and recreating spaces for the scenarios planned by the teachers is of fundamental relevance. Therefore, mobility and flexibility are indispensable aspects of the adaptation process.

The control room is located between the two advanced simulation rooms, and receives this name because it has two mirrored glasses with unidirectional vision that allows the teacher to interact with the simulation rooms, controlling the outcomes of the scenarios during the application. The communication between these spaces occurs through a vocal command system, at a distance, of the high-fidelity simulators. Figure 1 presents a representative drawing of the current structure of the LCSS.

Figure 1 - Structure of the Laboratory of Clinical Skills and Simulation of the Multicampi School of Medical Sciences of Rio Grande do Norte. Caicó, 2020.



The LCSS environments do not yet have their own audio and video capture and recording system. In this sense, there are difficulties in recording the scenarios and the use of video images for the discussion of the cases that were simulated. However, the EMCM Information Technology team provides support to capture these resources when necessary.

In addition, there is an initiative by the students of the Health Technology Innovation Module to develop a low-cost audiovisual system, since the use of resources of this nature favors debriefing, the most important component of any simulation[12], and is recommended by International Nursing Association for Clinical Simulation and Learning (INACSL)[13], international reference organization in the area of clinical simulation. From this perspective, audiovisual resources can contribute to the visualization of attitudes and postures that the learner assumes during the scenario.

It is important to point out that, although recommended by INACSL, this feature is optional, especially for laboratories that work only with undergraduate students. Moreover, its unavailability does not make simulation sessions unfeasible. In the reality in the report, the teachers point to the need to have it in order to film scenarios in practical tests, in medical residency, and even to use this resource in training for professionals in the local health care network.

The debriefing is a structured session that takes place after the realization of the scenario, with the objective of enhancing the lived experience, and potentiating the meaning of what was experienced[3,14,15,3]. In EMCM, faculty members are encouraged to make use of structured debriefing for its interactive, reflective, and motivating nature that allows structured thinking to develop.

Human Resources

The school has technical-administrative professionals allocated to support teachers in setting up the scenarios and equipment. These professionals are also responsible for providing support to monitors and students in practical classes, ensuring proper handling of the simulators. In addition, given the expansion of the laboratory, simulated practices, and the strengthening of simulation in the course curriculum, in 2018 a teaching competition was held to hire professionals with experience in the area of clinical simulation.

The training of laboratory technicians, especially in the handling of simulators, especially the high-fidelity ones, is provided by the companies responsible for the manufacture and/or sale of the product. For teachers who have not been trained in the handling of technologies, and who need to use the simulators, it is the responsibili-

ty of the technicians to train them. This ensures greater durability of the materials, as well as the expanded use of laboratory resources.

Teacher training - regarding the simulation strategy as a pedagogical tool - has also been made possible with the objective of improving, from a methodological and pedagogical point of view, the simulated practices. At EMCM, simulated clinical experiences are present in all modules of the medical course. Therefore, this training agenda is fulfilled by expert faculty members and is of utmost relevance for the improvement of the strategy.

It is known that simulators are resources and that, by themselves, they do not guarantee that the simulation achieves the learning objectives set out in the course plan and curriculum. From this perspective, it is important to be clear that in addition to having different resources such as simulators, it is essential to promote training for faculty.

The simulators

Simulators are classified according to their degree of fidelity: low, medium, and high fidelity. Low-fidelity simulators are models or mannequins used for structure recognition and the practice of simple procedures. Medium-fidelity simulators have limited user-machine interaction capabilities, while high-fidelity simulators are commanded by computers and generate different responses depending on whether or not the users perform the task[16]. In addition, there are still Virtual Reality (VR) simulators. Currently, the School has sixty simulator models, distributed in different fidelity levels, namely: low, medium, and high fidelity; as well as virtual reality simulators.

In addition to the simulators, it is important to highlight the relevance of the standard patient, also called simulated patient. These are actors in the role of patient in Simulation of a real situation[17]. There is a consensus in the literature that simulated patients provide a variety of gains such as self-confidence, conflict resolution skills, improved teamwork, technical and communication skills[18,19,] 20 greater satisfaction, empathy, realism, lower anxiety levels, greater incentive for reflection and critical thinking[17].

At EMCM, there is no bank of actors. However, the monitoring projects linked to the course modules foresee the participation of monitors in activities that require the use of role-playing and simulated patient.

Target Audience

The laboratory and simulation equipment of the EMCM are intended for the development of psychomotor, attitudinal, and communication skills of undergraduate medical students, and of Medical Residency in Internal Medicine, General Surgery, and Family and Community Medicine. Moreover, it can meet the demands of the Multiprofessional Residency in Primary Care, of the Maternal and Child Multiprofessional Residency, and of the Graduate Program in Education, Work, and Innovation in Medicine (professional Master's degree).

In addition to the regular activities promoted by the teachers, students and monitors have access to the lab for training the practices learned during the simulation/skills classes. The movement of students is controlled by the lab technicians who assist them in handling the equipment. There are also internal regulations and flows for scheduling practices and requesting materials/simulators[10].

The process of developing skills and abilities within the laboratory accompanies the undergraduate students throughout their training, with a weekly space reserved for the development of these skills: from the first semester to the internship, from the residency to the master's degree.

The simulated practices at EMCM

For teachers to use the laboratory space, the activity must be scheduled electronically. In addition, those responsible for the simulation build a skills script that contains: identification of the activity; learning objectives; the human, physical and material resources required; a detailed description of what will be done, and bibliographical references.

The skill practices vary in degrees of fidelity and complexity. Some simulate only the per-

formance of procedures, seeking to perfect the student in step-by-step techniques, while others simulate, in addition to technical approaches, the environment and communication with the patient.

The simulations are organized according to the teaching modules, from the first semester of classes. As each module has different objectives, the simulations correspond to the competencies and skills determined in each of these components. Thus, students participate in scenarios of different levels of complexity and fidelity.

In addition to simulators, the school has invested in *moulage* techniques. *Moulage* is a resource that involves modeling and make-up techniques on a live model. In the context of EMCM, one of the main applications has been to faithfully represent skin wound tissues. Thus, it is used in the modules on Emergency and Urgent Care, where it addresses polytrauma and burn patients, and in classes on skin wound management in Primary Health Care and hospitalization.

The School has also invested, for classes and evaluations, in simulated stations that integrate knowledge from the Basic Sciences and the Clinic. For example, after collecting a preventive cervical exam, students are challenged to identify the cytological and microbiological aspects of that collection on a microscope slide. The objective of these practices is to integrate the knowledge.

Skills assessments are performed through Objective, Structured Clinical Examination (OSCE) and Clinical Skills Assessment (CSA). At most stations, students enter individually, receive a command containing fictitious information related to the work environment, the patient, and the task they must perform, for example, performing a procedure, clinical examination, or therapeutic management.

Evaluation forms are built containing the points to be scored in the students' performance throughout the activity. On these forms, depending on the degree of fidelity, students can be evaluated according to their relationship with the patient, their technical performance in performing a given procedure or clinical interview, and whether their conduct was resolute to the problem presented.

There is also an initiative to use clinical simulation as a trigger to open problems in the PBL method. In more advanced modules, students participate in a simulated scenario, in which, for example, they can attend to a patient and then return to the tutorial group to follow up on the steps of the PBL method. The experience has been very positive and well evaluated among students.

Perspective for the future and challenges

Currently, there is a trend toward the use of clinical simulation and simulators in the context of medical training. However, it is worth considering that this method is only one of the possibilities that the teacher can use. Depending on the learning objectives, other strategies can be used during the teaching and learning process.

When opting for simulation and the use of simulators, the teacher needs to be aware of the stages of the strategy, and have an attitude compatible with what is expected of a tutor who uses AM. To this end, teacher training seems to be indispensable. Investment in simulators is also necessary.

The simulation of problem situations allows the student to learn from his own mistakes and successes without this implying iatrogeny to a real patient, this way he will be better able to deal with these situations in a real scenario, having a greater chance of solving the user's health need[21,5,22]. Making use of simulation is also a wise choice from the point of view of equality. At EMCM, due to its multicampus character, students participate in activities in different rotations, health services, and cities. Therefore, it cannot be guaranteed that everyone has equal access to the cases experienced during clinical practice in these services. In this sense, simulation can fill the gap of equal access to the training of skills that are indispensable to medical training[22].

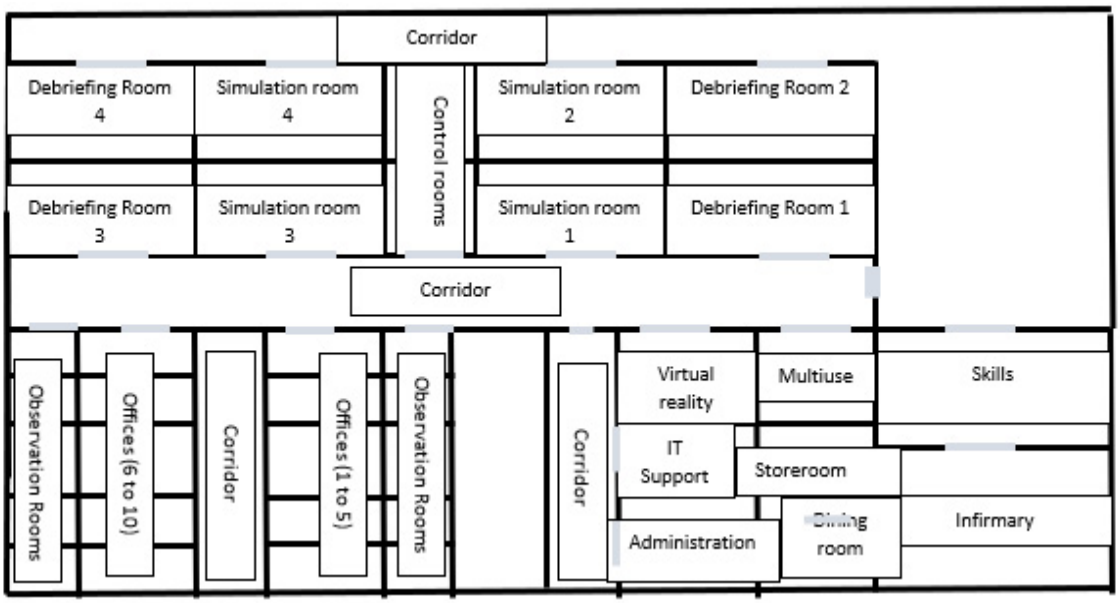
In the reported context, high-fidelity and complex simulations are also used. These characteristics are especially valuable since the student is inserted in the community from the first period of the course. Thus, contact with simulations becomes a tool for improving the skills that will be used and required throughout the medical training process[23,24].

All these opportunities are the fruit of the internalization of medical education and the in-

vestment in the structuring of the Simulation Center. Currently, among federal public universities, the EMCM occupies a privileged place when it comes to simulation and infrastructure for simulated practices.

For the future, it is expected that the new simulation center under construction will be able to meet the demands and the increasing use of simulation by the School's faculty. It is also intended to seek the accreditation title that is provided by the Latin American entities of Clinical Simulation for the EMCM Simulation Center. Figure 2 shows a representative drawing of the new simulation center.

Figure 2 - Structure of the Laboratory of Clinical Skills and Simulation of the Multicampi School of Medical Sciences of Rio Grande do Norte, under construction. Caicó, 2020.



In addition, it is expected that the simulated practices can be present in different moments of the modules of the EMCM Medicine Course and the internship. Investments will also be sought for the acquisition of virtual reality simulators and the creation of an actors' bank.

Added to this is the development of research to measure more concretely the impact of the use of simulation in the educational context that is the subject of this report. The ongoing qualification of the faculty, the acquisition and replacement of simulators and other technologies, the dissemination of successful practices, and the search for funding edicts are also goals for the future.

FINAL CONSIDERATIONS

Clinical simulation has been gaining space in the face of the valorization of curricula that respond to the growing need for comprehensive approaches in health and that enable the approximation between theory and professional practice. The construction of protected and controlled practice scenarios allows the individual to practice exhaustively, to learn, to reflect and to evaluate products and processes of their performance, resulting in the acquisition of important competencies for the health professions; all in an ethical and safe way, also providing the homogenization of learning opportunities.

Not surprisingly, the construction of simulation spaces was valued by the National Curriculum Guidelines for Medicine[10] corroborating the associations made by the literature that point to it as an important pedagogical tool in the development of technical and communication skills, development of problem-solving ability, and interdisciplinary reasoning.

At EMCM, the practice of simulation plays a key role in the teaching-learning process based on the student's protagonism and the re-signification of medical practice of excellence, being one of the methodologies of choice for teaching the skills axis. The School has assumed a leadership role, both quantitatively and qualitatively, among Brazilian federal public universities with respect to simulation and its technologies.

It is expected that the implementation of the Laboratory of Clinical Skills and Simulation of the EMCM may strengthen the process of internalization of medical education and the EMCM's commitment in the medical education scenario. It is expected that future physicians will be able to transform the realities in which they are inserted, improving health indicators and practicing the profession with skill and dedication.

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CONFLICT OF INTERESTS
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