Abstract

Objective: To identify the types, purposes and the contributions of simulation in training in health.

Method: This is a narrative review of the literature in its construction were used studies surveyed in databases Latin American and Caribbean Health Sciences (LILACS) and Scopus, and other data sources.

Results: The types of simulations and simulators are characterized by the degree of organization of landscape and simulator technology: low, medium and high fidelity. These degrees of fidelity enable the development of skills and abilities in students in the context of health education.

Conclusion: Considering the scope and possibilities of its use, the simulation can be a positive tool in health education process.

Keywords
Education; Simulation; Health; Formative Feedback.

Introduction
In the current social climate, it is no longer allowed to learn technical procedures directly in the patient thanks to strong social pressure for quality improvement in education focused on health and against the traditional teaching methods [1]. This social control is due the
biggest impact of medical errors and other health professionals which are translated into thousands of iatrogenic procedures per year causing harm to the users of the health service [2].

It should be considered that in the current educational context, the incessant search for contributory strategies to improve the quality of health care in the Brazilian scenario has led to a diversity of experiences for the purpose of inserting models of active methodologies in the training and qualification of workers Cheers. Active methodologies puts the student at the center of the teaching-learning process in this way he builds the critical and reflective understanding of your work process and contributes to the transformation of the health scenario in which he lives [3] One of these methodologies actives used in this process is the health simulation [4].

In the Brazilian context, now the approval of the Law of Directives and Bases of National Education (LDB), Federal Law 9.394/1996, the process of elaboration and implementation of the National Curriculum Guidelines (DCN), ensuring greater flexibility in curricular organization of undergraduate courses realizes -If remarkable change in health. It is essential that there be changes in health in undergraduate curricula in respect to the use of active methodologies in order to build action of the Unified Health System (SUS). [1] The purpose of health-oriented DCN is to bring the student to learning to learn, thus guarantees the capacity professional action with autonomy, quality and humanization of care to individuals, family communities [5].

In this Otic to the simulation is a methodology used in health education aimed at reproduction or expansion of real experiences guided in a participatory manner [6] Some tools used in the reproduction of reality during simulaction are simulators calls [7] Thus, it allows the approach of the student to the various interfaces of health services promoting cognitive development, skills, clinics competencies, attitudinal and psychomotor [1, 8, 9]. This educational tool is gaining space in undergraduate and graduate lato sensu in Health Sciences in Higher Education Institutions (HEIs) [10, 11].

This tool has four main objectives that support patient safety: Education, Evaluating, research and integration [7] In order to meet these objectives, it is interesting that the simulation as a whole has its stages well defined with directions, introduction to the environment, informative meeting on the simulator, theory input, briefing on the scene, session of simulation and debriefing [4].

Prior to the time of execution of the simulated scene for the progress preparation that occurs in the construction of desired content cenar studied, explanation of available inputs and resources in the simulated universe requiring planning taking into account the curriculum, skills, ability maturity student group [4]. Since those who participate in actively simulation scenario, that is, those who will interact in the scene and or if constructed, are instructed as to the particularities of this case and the tasks to be performed [12].

Simulators are tools that can be part of a simulation scenario, these aim at playing a partial or total situation being categorized as low simulators, medium and high fidelity [11, 13] With regard to fidelity, it has that can be subdivided into physical or engineering fidelity reproducing the real environment, and functional or psychological, and the degree of request psychological processes required in real contexts [7]. In summary, the simulation fidelity is based as it approaches the desired context presenting face characteristics own scenario becoming the parameter of approximation to reality [12, 14].

Historically, the first manufactured simulator, an obstetric simulator was designed by the French midwife Angélique Marguerite Le Boursier du Coudray in the seventeenth century which is now part of the collection of the Flaubert Museum of the History of Medicine in the city of Rouen in France. [15] Already in the nineteenth century, with the development of
various sectors of industry, such as electrical, chemical and steel used for the development of technological devices that leverage health education, including simulators to become more like humans [16]. In addition, the technical and invasive procedures venipuncture and blood collection were also carried out in real patients in the 1970s and 1980s decades in Brazil [15].

Regarding the training of skills and techniques that minimize the occurrence of errors, it is important to mention the role of the laboratory that often the simulations are carried out with their degrees of fidelity to what complementares learning procedures like simple handwashing and venous punctures, thus facilitating the teaching and learning. In short, the return to the laboratory together with previous knowledge of the student reduce errors in services assists [12]. The motivations to develop psychomotor skills have led the colleges laboratories to use the minim Faithfulness low mannequins and [16].

In this sense, considering the importance of using new methodologies in health education, it is necessary to inquire about the possibilities of contributions of this methodological strategy and the difficulties of their use. This study aimed to know the types, the purposes and contributions of simulation in training in health. To do this, we constructed the following question: What kinds, purposes and contributions of simulation in training in health?

Methodos
It is a study of narrative literature, which for Vosgerau and Romanowski [17] is characterized by allowing the identification of recurring themes relating with previous productions, indicating new visions, strengthening the knowledge of a certain area and bringing the essence of pedagogical practices.

The search for studies took place in the computer lab and library sector of the nursing department of the Federal University of Rio Grande do Norte. The literature review was conducted in two databases, namely: Latin American and Caribbean Health Sciences (LILACS) and Scopus, and other data sources as repositories of universities, Brazilian Digital Library of Theses and Dissertations, Virtual Health Library (BVS) and official documents of Brazilian government agencies. For search in databases, we used the crossing of descriptors: simulation, education and health.

He was elected the following inclusion criteria: complete and studies available in Portuguese and English, and these articles, dissertations, theses, complete papers published in conference proceedings and book chapters; studies compatibility with the guiding question published in the years 2011-2016. We excluded repeated studies, abstracts, editorials and studies by theme approach not relevant to the objectives of this study.

At the intersection of the descriptors in the database, it obtained 5,594 studies which added to the studies found in other data sources are 5,615 studies. After application of the inclusion and exclusion criteria, we obtained 40 studies, of which 11 belonged to LILACS, 8 to Scopus and 21 other data sources. The selected studies, 8 studies are 2011 (20%), and 32 the years 2012 to 2016 (80%). The 40 (100%) studies the production of this work, 31 (77.5%) are articles published in national and international journals, 1 (2.5%) study published in National events, 1 (25%) governmental opinion 1 (2.5%) doctoral thesis, 3 (7.5%) dissertations and 3 (7.5%) book chapters. After the sample selection was followed by analysis and discussion of the studies.

A critical and interpretative reading from articles selected presentation of results and discussion of the data obtained for production descriptively and the opportunity of subsidies for application of new contributory methods for professional training in health was held.
Results

Types of simulation and simulators in health education

It is pertinent to refer to the simulation scenario that has the potential construction of possible worlds made known by simulacra, which are images that mimic things or people. Its use goes beyond the visual or sensory similarity reaching levels in the similarity of ideas or conceptual similarity [18].

It is substantial to have a scenario with well-defined educational objectives. [15] This scenario can be accurate and faithfully reproduce reality, or it may just be a collection of components that provide appearance of reality, creating the basis for meaningful learning [19] for example, simulations with low fidelity are used to building skills, the average fidelity for practical scenario, and high fidelity when there is simultaneous use of high-fidelity simulator with a realistic space, environment becomes a “practical scenario” for a “simulated clinical experience” [15, 19].

The low-fidelity simulators are exemplified by static mannequins without response or interaction with the caller. Are represented by the total or partial human body (part task trainers) having anatomy similar with coarse movements of main bodily joints [11, 12]. These static mannequins can be added technology that allow measuring the blood pressure [19].

The average fidelity simulators have some approximation to reality having heart sounds, breathing (physiological and pathological) without chest expansiveness and presents some pre-recorded sounds, such as coughing, vomiting and groans. [11] For this simulation mode enables the maximization of learning, it is necessary that the environment has a significant arsenal with artificial bodily fluids of the patient unit, hospitality goods, for hospital use inputs, and video equipment and microphone for effective assessment and health interventions [19].

The simulators, each type has purpose in teaching-learning process: the use of low fidelity simulators can train technical procedures such as venipuncture, passage of a nasogastric tube, cateterism bladder among others; [11, 12]. The average loyalty, the degree of complexity and features of the equipment are indicated for cardiac arrest identification training, resuscitation, ECG tracing monitoring and research of some pulses [11, 15].

The high-fidelity simulators are subdivided into computerized mannequins, [11, 12] Virtual reality [2, 20] and standard patient use [4, 15].

The mannequins known as patient simulators are similar in anatomy and physiology of the living human body in order to evaluate spontaneous breathing, chest expansiveness, auscultation of heart sounds, lung, intestinal, and further evaluation of the various vital parameters. Besides presenting speech, cyanosis, diaphoresis, acute illnesses, trauma and responses to interventions [11, 12, 15].

Virtual reality is a technology that allows for building a virtual environment offering navigation opportunity and immersing the students through the computer, and exceed the actual barrier and dive into a virtual journey inside the human body. [2] This method reduces costs with physical laboratories that require specialized maintenance and repeat several times without wearing utensils and objects as anatomical parts of corpses [20].

The standard patient use known in other terms, such as simulated patient or Roll Play are actors in patient function in a real situation simulation [15]. Fidelity is optimized in this simulation mode thanks to the scenarios that are derived from actual clinical situations and qualified actors in the context of social and emotional interpretation of patients and families in difficult circumstances. [21]

Another method of simulation consists at the using of two or more types of simulators simultaneously is called Hybrid simulation used to perform procedures without losing actual fact favored by patients [7] exemplified by the use of low fidelity
dummies with standard patient [11, 21] and use of
computerized mannequins and virtual reality featur-
ing Augmented Reality [20].

In turn, the AR can be described as an environ-
ment consisting of virtual objects. This is based on
three main elements, namely: synchronic use of
virtual and real objects, especially of real objects;
real-time interaction between computer and human
being; and 3D recording [20].

Hi-Fi or realistic simulators have been used in
health care as a method in training of procedural
technical skills, such as development of skills and
knowledge, as well as behavioral, such as commu-
nication, attitudes and teamwork [14].

Those who use standard patient aim to obtain
the clinical history, physical examination and com-
munication, and a method that does not require
specific and expensive technologies. This methodo-
logical strategy can be considered an alternative to
institutions that do not have sufficient resources or
adequate structure to run with sophisticated equi-

In another aspect, there surgeries very sensitive
parts of the body with the eye, or even very small
parts, such as the middle ear with that one of the
proposed virtual reality simulators is not only used
for diagnosis as well as for extending those parts
for viewing which is not able to use dead bodies [2].

**purposes and simulation contributions**

When playing perspective of reality, simulation not
the totals in full, however it is necessary that trai-
ners and participants pactuem a fictional contract.
In this contract there is the recognition that the
simulation is also not the reality, but there is also
the commitment to make it as real as possible and
also the abandonment of skepticism acting as if in
a real situation [6]. Fitting into this view, the course
of degree in health degrees of complexity increase
as the requirements of the disciplines that require
skills, so the degree of fidelity of each type of si-
mulator [12].

These competencies and skills are learned in the
labs available to students, which in this context is
defined as a transition from theory and clinical prac-
tice, involving activities such as patient assessment,
psychomotor performance, critical thinking and in-
terdisciplinary [12]. It is in this scenario that simu-
lated the student can study the same case several
times until the desired proficiency [18].

Using the laboratory simulation clinical applica-
tion in the teaching of psycho motor skills, it is
suggested five steps, which can be used in any
technical teaching procedure. These steps are: (1)
motivation, where the students will be aware of
why this ability is used; (2) experience of the pre-
ceptor and the implementation of unexplained te-
chnical, promoting the construction of a mental
vision of the art; (3) after the execution of the

Concerning the contributions to participants,
health simulation allows the control of emotions
increasing confidence, decreasing to overcome fears
and anxieties, and stimulate critical planning and
execution resolving the problems [23].

Attractively simulation also enables to identify the
potential dangers of human nature, systems or equi-

In the case of emotional processes, such as anxie-
ty, excitement, frustration and curiosity, end up
producing cognitive changes which are recorded in
memory for being intense experiences leading the-
therefore to learning [24].
Discussion

Previously mentioned, the active methodologies use the Problem-Based Learning (PBL) and also the problematization as teaching-learning strategies and is triggered by the problem or problem situation [4, 25].

The concept of problem can be understood as a condition that produces the need of individuals to a possible solution. These solutions are characterized as convergent (single resolution) or divergent (different resolutive paths) to three problem species, which are of order (1) or enigmatic puzzle has only one possible answer; (2) structured, requires specific theoretical framework; and (3) unstructured, allows multiple solutions and is not limited to specialties or disciplines, linking knowledge to elucidate the problem situation [25].

In this scenario, the BPA promotes student in building technical skills, cognitive and attitudinal because of the ability to manage their own learning, to actively seek information, meet and engage in new areas of knowledge [26].

In this sense, it is understood by skill as operational knowledge, procedural and competence it is understood as the ability to articulate and employ knowledge possible and feasible solutions in times that are characterized as problems. Thus, the same supporting ability can be multiple skills, which in turn deduced from the use of several different complexities skills [13].

Notoriously, it is noticeable that the skills skills are developed. However, it is worth noting that the psychomotor skills, ie learning to do, can not be taken into account in isolation, but in conjunction with other components of skills such as cognitive-oriented and relational nature, ie knowledge and knowing how to be and be, respectively [13].

Instituting simulation assists in the construction of knowledge, since it is considered an alternative in the arsenal of knowledge [18, 23]. In this view, the simulation brings a strengthening of theoretical content ministered in room classroom in order to fully consolidate knowledge leading the student to build a professional posture through clinical simulation [23].

Then there is the formation of professional identity consisting of a set of attributes, beliefs, values and experiences that the student will fix itself within the chosen profession, which is a complex process of social construction and dynamic at individual level by interactions with other individuals and groups inside and outside the professional environment. These interactions are with professors, health professionals and patients, all contributing to the formation of professional identity in health as a student [27].

In order to promote the contribution form the expansion of knowledge through simulated experience is used a discussion of strategy, called the Debriefing, which occurs between the educator and the participants, both those who interacted scenario, as those observed just having some interaction others [4, 28].

The debriefing If follows that the simulation from an experiential learning experience comes from a process in intentional and essential set to synergies, strengthen and transmit knowledge [29]. It is at this moment you can identify the pedagogical effectiveness of the simulation, it promotes reflection and consolidation of learning by providing valuable information and maximize the impact of learning [4, 30, 31]. At that time the teacher has an important role to transfer information and to guide the simulation experience assisting the expansion of [32] knowledge.

Another important aspect to be considered is the formative assessment where the information derived from the relationship between teachers and students and between the students themselves, they are important for learning, as there will be adjustments in relation to the defined objectives. In this way, the feedback is an educational tool used to meet these objectives, as it enables the students to observe how far or near is the intended objectives [33].
Based on this idea, teacher training is imperative that uses simulation as a pedagogical tool whose strategy is to create new learning environments for the desired development and discussion of ideas and improvement and skills [18].

The poor execution of feedback from the outdated teaching methods are able to commit to training, and stimulate defensive behavior of detachments and impoverish creativity and student intelligence [3, 33]. To avoid these events averse to teaching-learning process is necessary that the teacher has to teach posture and attitude, accept the pedagogical innovation and be open to review its teaching methodology in contemporary society [18,33]. In this sense, it is imperative to modernize education aiming to follow the metamorphoses occurred in the world [3].

The it is also important to mention the role of summative assessment in simulatórios processes that objectively assess whether the student has assimilated the contents taught in the semester, being held so pontual [18]. These evaluations earn names such as Objective Structured Clinical Examination (OSCE) [24] English Objective Structured Clinical Examination (OSCE) [34] and the Professional Practice Simulation Station (ESPP) [10]. These tests are tools that measure clinical skills not restricted to knowledge, but also the ability to apply them in practice [24, 34].

Broadening the understanding of the OSCE, is that it is an examination with several stations where there are specific tasks, exemplified for conducting clinical history and physical examination can be performed in conjunction with other types of evaluation for greater reliability. Conducted individually, this examination has one or more examiners who evaluate the performance of students. In this evaluation method, it is used in simulated scenarios with or without use of standard patient equal to all candidates [35].

The use of actors is another key to a successful simulation of realistic type, as Stopped and the thought of disbelief of the student by the intense interpretation of the role by actor and it is feasible to rethink teaching [7, 21]. The actors can make adjustments that modulate the emotional intensity of the scene, becoming upset by teasing or poor choices of words by participants, outbursts of anger, pacing and crying, just as they can use relief expressions, including laughter is no creation and bond and presence of empathy [21].

However it is pertinent to pay attention to the weaknesses in the use of actors, such as lack of clarity to the medical content, revealing a disadvantage in improvisation medical facts that a real patient normally would. Another point is the real experience lived by the actors as in certain diseases, not knowing distance themselves sufficiently for the interpretation and use adjusting the simulation. In this context, it takes time to test that must be provided for understanding of all relevant information to the scenario and the case [21].

In presenting many benefits, the use of actors can also be utilized in de briefing which provides feedback in the form of patients. They are trained to actively listen to the impressions of students and raise questions for the discussion that follows. It is interesting that at that time, the speech, the actors use verbs in the first person, thus indicate strengths in students, as well as other’s points that need reflection and improvement. [21]

How all this arsenal used in the simulation, which is composed of material, technological, human and intellectual resources, if properly applied, can extract relevant contributions to academic training. These contributions will exemplified by the control of emotions, fears, anxieties, and promoting self - meaning attitudes to solving the problems faced. To achieve contributions aunts, simulation has its purposes, which are served throughout the course, which requires certain levels of skills and competencies, as due management of inputs, communication, physical examination and medical history.
The necessary means to aunts assignments are obtained through the types of simulations, with low, medium and high fidelity. Therefore, it is important to prepare the environment so that it is as real as possible, as all the necessary form inputs to the students feel as a professional in your area. The scenarios should replicate experiences of reality, exemplified environment as all the necessary equipment, whether in offices, medical clinics, surgical or wards.

Corroborating the discussion on the construction of scenarios in simulation types, Galato et al. [24] in their study of high-fidelity simulation of the application in the course of Pharmacy at the University of Southern Santa Catarina (Unisul), used empty boxes of medicines on a shelf, systematically organized to easily find in a simulation service pharmaceutical, and note pad, calculator, dictionary Proprietary and comerciais product prices magazine.

In limiting aspect to the use of simulation, Gomez and Vieira Neto [18] study, pointed difficulties involving the application of this method in vocational training of students, identifying the faculty of resistance evidenced by the lack or absence of enthusiasm and that the age factor as an influence for such disinterest, however finding a greater acceptability of the younger teachers and students themselves.

Referring to the cost of simulators, Oliveira, Prado and Kempfer [11] say the low fidelity simulators have relatively low cost and simple maintenance, as the average fidelity have higher costs than low-fidelity simulators and maintenance requires technical expertise. As for the high-fidelity simulators have much higher costs, the use of mannequins, comparing to other simulators and maintenance demand for specialized professional services [15, 16]. In this approach, one may consider a disadvantage, since these devices require high costs simulators which use advanced technology [23].

By analyzing the perception of students and teachers of a hospital in Rio de Janeiro, Gold and Giannella [31] found that teachers pointed out the gaps and shortcomings in health education in medical school, but also offer solutions such as integration of Learning based Problems with the use of simulation in order to try to turn the reality of the training that should truly be. Students, in turn, have the perception that training on mannequins reduces medical errors that arise when exercising the activity proposed by reflection which is promoted by mistake during the scene under discussion in debriefing.

Under the focus of the simulation capabilities in teaching, Cook et al. [36] concluded in their study that the simulation with use of go along technology has shown better results compared with other teaching methodologies, and increase cognitive efficiency as optimized management of cognitive load, and also the costs over time.

Alluding to the costs of hospital procedures, Barsuk et al. [37] studied application procedure after Based Education Simulation, compare two procedures used in paracentesis: radiological intervention and paracentesis performed the headboard. Patients who visited the bedside procedure were in more serious condition than those who underwent Radiological Intervention procedure, these were infusion of blood products components. This contributes to increase the costs and potential risks resulting in complication of the procedure, such as allergies and infectious diseases. Compared applications, the procedure done at the head was as safe and more economical as the radiological intervention, so there is no costly expenses if used the method the headboard if professionals if passed by proper training.

In a study on the effect of educational intervention with the use of simulation for transportation of patients, O’Donnell et al. [38] say in that musculoskeletai injuries s has been the biggest contributors to the shortage of strength of nursing work. Such transfers are not rare events succeeding several times throughout the day in most hospitals. It is, therefore, subject to interventional studies. Survey participants achieved considerable improvement in
this skill, knowledge and attitude change, while there was no change in the control group after after the training using simulation.

Even in his study, O’Donnell et al. [38] identified regressions in the success of transfer caused by the dilution of the group’s ability thanks turnover of nursing staff by adding new professionals who have not been trained and the fading effect of the intervention. At this juncture professionals already trained and in the exercise of their professions, continuing education is required, which the simulation technologies are important allies in the training process after the professional himself has attended the initial training [39].

Based on this idea, with continuing education, it is essential that the powers and duties of the professionals are continually updated. This updates are provided by simulating that favors the ennoblement of the training process by promoting better quality of care in critical areas of health care and health teams and unit [40].

Conclusions
Overall, this study bring a succinct design of the simulation in a broad aspect in the area of health. In these contemporary times, the simulation has significant applicability being inserted in the teaching-learning process where there is a need to search for active methodologies they give solving the many problems face reality by undergraduate courses related to the formation of the student.

The simulation prepares the student for future situations that may experience in their clinical practice as a professional. During preparation, the students become familiar with these situations experienced by experiences guided with the considerable contribution of the teaching, which acts as a facilitator of knowledge. Therefore, avoid damage to patients that are stemmed from errors in the process decision bringing, as beneficial consequence, the appropriate health assistance quality. Before long, serves to such expectations, that are used types of simulations in accordance with the degree of complexity of the stage of the course.

The simulation has three main types: low, medium and high fidelity. They develop in students the confidence and control of emotions in a broad aspect thanks to repeated numerous times to reach practical and proficiency (skills and competencies) required for the course at any given time. All of this process is done in a secure environment that permits error and reflection.

In Brazil, many studies still need to be carried out in search of more evidence in the various segments of attention to health in various undergraduate and postgraduate health seeking improvement in graduate will more competent professionals, know-how and redo, being critical-reflective practitioners able to conduct their activities and be change agents and multipliers of knowledge necessary to care in their practices.

It is also important to list the limitations that the simulation method faces. The first concerns the teaching preparation for the use of this method, since the unprepared and resistance can meters cause disastrous consequences as it relates to its position, the organization of the scene learning and feedback. And the second concerns the resources financial that are essential its implementation, since some of the types of simulators are expensive.

On the above, it is concluded that the simulation has potential vocational training in health with a positive impact on the quality of health care that are evidenced by all the studies can be found in the literature, as well as point out some limitations in its insertion in health in undergraduate courses.

References


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