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Research Article

Clinical Simulation as a Teaching Strategy for Pediatric Residents in Puebla, México

Yaneth Martínez Tovilla[1,3]*, Miguel Ángel Coral García[2], Aquilino Márquez Toledo[1], Flor Lucía Morales Morales[1], Héctor Alfonso López Santos[4,5] and Manuel Gil Vargas[6]

[1]Academic Body "Pediatric Diagnosis, Treatment and Simulation, School of Medicine of the Benemérita Universidad Autónoma de Puebla, México

[2]Department of Medical Writing, Universidad de la Salud del Estado de Puebla, México

[3]Academic Secretariat, Universidad de la Salud del Estado de Puebla, México

[4]Direction of the Physician and Surgeon Degree, Universidad de la Salud del Estado de Puebla, México

[5]Pediatric Service, Child Rehabilitation and Teletón Integration Center, Puebla, México

[6]Pediatric Surgery Service, "Dr. Eduardo Vázquez Navarro" Puebla General Hospital, México

***Corresponding Author:** Yaneth Martínez Tovilla, Academic Body "Pediatric Diagnosis, Treatment and Simulation, School of Medicine of the Benemérita Universidad Autónoma de Puebla, México.

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Abstract

Introduction: Simulation is a teaching model used to replace or expand real situations, through guided and interactive experiences. During the last twenty years, the use of simulation has been progressively used in the training of physicians and other Health Sciences professionals.

Methods: This work was based on the action research method. The way in which knowledge is acquired in the specialty of Pediatrics was explored of the Benemérita Universidad Autónoma de Puebla, México observing that the theoretical content still prevails, so an intervention plan was applied in which various medical situations were represented by the method called Objective Structured Clinical Evaluation (OSCE).

Results: The residents learned to experience a clinical scenario, controlling their anxiety, favoring their self-knowledge, self-criticism and teamwork coordination, having a new worldview of medical error to achieve meaningful learning.

Discussion: Clinical simulation should be considered a strategy that supports the global trend of making evident the development and evaluation of professional competencies, which are not achieved with isolated moments of instruction, but through very well defined and structured processes.

Keywords: *Clinical Simulation; Resident; Pediatrics; Teaching Strategy; Meaningful Learning*

Introduction

The context of simulation is not new, nor is it only inherent to the medical area, in fact, it has been used in various fields of knowledge, for example, in aeronautics it is used as a training tool for aviation pilots. In 1929 the American engineer Edwin A. Link, considered as the pioneer of aviation, created the "Blue Box" or "Link Trainer" for pilot training, which during the Second World War would grow exponentially. At present, simulation represents up to 40% of pilot training, in addition to the fact that recent models of pilot training are exclusively through simulators.

It is because of the aforementioned that the following question arises: What happens in medical education? According to the publication of the book "Err is Human" of the Institute of Medicine of the United States, it is estimated that there were approximately 100,000 adverse events per year, between deaths and medical errors, in the different hospitals analyzed not counting that a very high economic expense was generated by the damages caused to the patients (Khon, 2000).

At present, the teaching method implemented in the specialty of Pediatrics at a global level is based on the mastery of technical and non-technical knowledge that is required for the knowledge, performance and analysis of the three fundamental aspects that make them up: cognitive, psychomotor and attitudinal; clinical simulation includes all these aspects, which makes it a useful and necessary teaching strategy in their acquisition [1].

Simulators are the means that allow residents of this specialty to achieve their objectives, the merit of this method it is not its complexity, but its usefulness, and depending on the teaching objective, the appropriate simulator must be chosen to establish the realism of the task to be reviewed, that is, to print what is called fidelity, which involves three dimensions: a) team fidelity, b) environmental fidelity and c) psychological fidelity. The latter is the most important to achieve meaningful learning [2], therefore, it is necessary to make known the types of simulators that exist today, according to Ziv [3], these are:

1. Low-tech, specific-use simulators: These are models designed to replicate only a part of the organism.

2. Simulated or standardized patients: Actors trained to represent patients, are used for the acquisition of cognitive, psychomotor and interpersonal skills.

3. Virtual simulators on screen (screen simulation): These are complex computer programs that allow simulating various situations for the teaching of basic and clinical sciences, they can be interactive and non-interactive.

4. Complex task simulators: Three-dimensional models of an anatomical space, using electronic, computational and mechanical devices with high visual, auditory and tactile fidelity.

5. Complete patient simulators: Robotic life-size models, these are linked to computer systems that allow working on multiple physiological and pathological situations and handling complex clinical cases.

It is relevant to make known that currently in México the use of clinical simulation as a teaching strategy has not yet been given the importance it deserves, because at times it is easy to get carried away by the technical possibilities of the tools, and therefore the reasons for using this teaching strategy for certain objectives may not be very clear [4].

Simulation in Pediatrics is more than just taking refresher courses from time to time and then to forget them. According to Peter Dieckmann, when he describes that any simulation scenario is integrated into the context of a favorable environment to this act, it can be a

course, a research environment, a simulation demonstration, and concludes with the following statement "I call simulation environment to all the activities that bring people together in time and space around a simulator" [5].

Thus, according to Dávila [6], the main advantages of simulation in the specialty of Pediatrics are the following:

- Generate multiple scenarios where teachers and residents can perfect their medical act.
- Promote a dynamic environment for the interaction and strengthening of knowledge, skills, aptitudes, attitudes and values.
- Promote the transition from classroom teaching or traditional medical visits to teaching in controlled settings, virtual but aimed at solving real situations.
- Allow residents of the Pediatrics specialty, through clinical simulation as a learning strategy, to improve the following aspects:

    a) Addition to realism and decision making.

    b) Organization and communication of ideas.

    c) Increased confidence.

    d) Change of attitudes.

    e) Benefits of on-site feedback.

    f) Identification of performance levels.

    g) Protection of individuals as research subjects.

    h) Stress management and control of emotions.

Methods

During the implementation of this innovative teaching strategy based on clinical simulation, 10 second-year residents of the Pediatrics specialty of the different Receiving Medical Units endorsed by the School of Medicine of the Benemérita Universidad Autónoma de Puebla, México participated in the period March-April 2018.

For the assessment of the clinical simulation scenarios created for this purpose, excluding rubrics of the Objective Structured Clinical Evaluation (OSCE) were used, whose components are: clinical reasoning and critical judgment, clinical skills and abilities, professional development, interpersonal attitudes and behaviors; the indicators of its rubric were excluding (carried out/not carried out).

Five clinical simulation scenarios were created for the pathologies that are most frequently observed in emergency areas during the Pediatric residency, which were: pediatric polytraumatized with hypovolemic shock (Image 1), secondary pediatric heart attack to severe bronchiolitis, placement of intraosseous access (Image 2), vascular access with EZ-IO drill (intraosseous infusion system), primary and secondary evaluation of the pediatric patient with thermal trauma (Image 3).

Image 1: *(Simulation) Simulation with actor. Injuries due to polytrauma with hypovolemic shock are observed.*

Image 2: *(Simulation) Low fidelity simulation. The placement of an intraosseous access in a piece of chicken is observed.*

Image 3: *(Simulation) Simulation with actor. The primary and secondary evaluation of the pediatric patient with thermal trauma is observed.*

Results

The 10 participants (100%) concluded that the theoretical contents reviewed prior to the realization of the clinical scenarios seemed accurate and adequate. These were reinforced when they had the opportunity to recall their basics in actual practice.

It was identified that this innovative teaching strategy was liked by the participants, especially when working with complex clinical situations. The participants also stated that they observed their "medical errors", thanks to debriefing.

Participating residents expressed a preference for carrying out scenarios of complex clinical situations, as well as having achieved a better level of cognitive and procedural skills, compared to traditional teaching methods (classroom and/or medical visit).

Regarding the innovative nature of this teaching strategy, all residents agreed that the design of the clinical simulation scenarios met the new requirements they expected.

At the end of these clinical simulation scenarios, improvement in procedural skills was noticed in 100% of the residents evaluated, when placing an intraosseous access with Jamshidi needle, in patients whose life was in danger within a real clinical situation (Image 4).

Image 4: *(Real environment) Successful placement of a Jamshidi needle intraosseous access is observed in a pediatric patient.*

Discussion

The clinical simulation scenarios allowed participating residents to analyze, reflect, and evaluate academic content to face situations associated with their professional work, by approaching the clinical reality they will face in the future, achieving in this way meaningful learning and immediate feedback.

The clinical simulation scenarios with complex situations were those that had the greatest impact on the participating residents, since they allowed them to achieve the appropriation of clinical diagnosis, intervention and reflection, which fostered the ability to apply what they had learned in real settings [7,8].

Conclusion

Clinical simulation should not be seen only as a didactic strategy applied in isolation for the development of skills and technical mastery skills, but as a support for the development and evaluation of professional competencies. It is important to mention that comprehensive professional competencies are not achieved with instructions in isolated moments, but through well-defined and structured processes, with curricular sequencing, in order to transform traditional teaching practice.

Finally, clinical simulation is proposed as an innovative teaching strategy, and although its application in hospital settings may be slow, it is also inexorable.

Conflict of Interest

The authors declare that they have no conflicts of interest in relation to this article.

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