

Cite as:

Chávez-Alayo P, Fukuhara-Nakama M, Fernández-Jacinto L. Previous odontological practice of a clinical case in haptic simulation prior to patient treatment. *Rev Estomatol Herediana*. 2024; 34(2): 171-174. DOI: 10.20453/reh.v34i2.5537

Received: October 12, 2023

Accepted: October 23, 2023

Online: June 29, 2024

Conflict of interests: The authors declare that they have no conflict of interest.

Funding: Self-funded.

Ethics approval: Not required since the study was conducted with information obtained from the development of a course.

Authorship Contribution:

All authors contributed to the preparation of this manuscript.

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Previous odontological practice of a clinical case in haptic simulation prior to patient treatment

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ABSTRACT

This descriptive, cross-sectional study addressed students' perceptions of a previous practice of dental preparation for a metal-free crown, performed in a clinical case using haptic simulation prior to patient treatment. The sample consisted of six final year Odontology students who, using haptic simulation with scanned images of the patient's mouth, milled metal-free crowns prior to treatment. The information was collected by means of two surveys. It was obtained that 66.7% (n = 4) of the students considered this experience to be very useful; and 83.3% (n = 5) mentioned that the experience gave them the confidence to perform the intervention on the patient. The results suggest that recurrent practice in haptic simulation of a clinical case, prior to treatment, is favorable for performance and provides greater security to perform it.

Keywords: teaching; Odontology students; perception; computer simulation.

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INTRODUCTION

The term “haptic”, which until a few years ago was unknown, is no longer so, especially for most professionals dedicated to teaching; and in the field of dental education, its use is gradually increasing due to the advantages of this technology. This is not only because it is a practice that simulates real situations without exposing patients to possible risks, but also because it has a feedback system that provides a more standardized evaluation and allows the student to have a more independent training.

Haptic simulators provide the student with recurrent and safe practice on standardized cases. The possibility of repeating it allows correcting errors in each attempt, and it is used as another strategy for the development of clinical skills that positively influences their self-efficacy, which will generate confidence when performing these procedures on patients (1). Haptic simulators are useful for developing many of the manual skills required to perform various dental procedures, such as working with indirect vision with a mouth mirror, removal of carious tissue, dental preparations for fixed prostheses, among others (2).

In the literature, we can appreciate different educational experiences that have arisen with the use of haptic simulators, such as the one reported by a dental training center in Amsterdam, where they introduce practice in these simulators from the first year of studies with activities to develop and enhance their psychomotor skills and whose complexity increases gradually, using direct and indirect vision (3).

On the other hand, the use of intraoral scanners is increasing in the clinical practice of dentistry, which demands their introduction in the contents taught to future professionals in the area. In that sense, many faculties are acquiring this technology as part of the resources used in clinical courses for dental procedures in real cases; however, this technology can be used in combination with haptic simulators to facilitate learning. Therefore, the aim of this study

was to describe students' perceptions of the practice of a metal-free crown tooth preparation of a clinical case in haptic simulation prior to patient treatment.

MATERIALS AND METHODS

This research is a cross-sectional study using a convenience sample of six clinical internship students who agreed to participate voluntarily. They received theoretical and practical training on the procedure for the fabrication of metal-free crowns, which included two master classes and two practical workshops on tooth preparation for metal-free crowns, scanning technique, design, milling, staining and cementation. Subsequently, the cases of their patients who were to undergo this procedure were scanned. This image was exported to the haptic simulator as an STL file and the student performed the dental preparation, which was evaluated by the professor in charge using a checklist prepared by the teachers in the area. The experience was repeated until getting the professor's approval, and then the treatment on the patient was executed.

Students' perception was collected after practice on the haptic simulator and after the patient intervention, using two surveys validated by judges' criteria.

RESULTS

The students' perception of this learning experience is shown in Table 1, which shows that 66.70% (n = 4) considered it as a very useful experience. At the same time, 83.30% (n = 5) indicated that performing the practice on haptic simulators of their own clinical case first gave them maximum confidence to perform it on their patient. The overall experience was rated by 33.30% (n = 2) as excellent and by 66.70% (n = 4) as good. One of the comments collected at the end of the survey coincides with verbal comments made by the participants: “It was a good experience to make a previous carving on the haptics because when you carve on the patient you do it with more confidence and you have a notion of how the carving will look like.”

Table 1. Students' perception of haptic simulation of a clinical case prior to patient treatment.

Aspect	n	%
Usability of milling in haptic simulator		
Useful	2	33.3
Very useful	4	66.7
Effect of practice on the haptic simulator on clinical performance		
Will facilitate it	6	100.0
Student satisfaction with the skills developed in the practice		
Satisfied	3	50.0
Very satisfied	3	50.0
Safety provided by the experience in haptics to carry out the carving process		
Safety	6	100.0
About overall experience		
Excellent	2	33.3
Good	4	66.7

DISCUSSION

In this study, 66.70% (n = 4) and 33.30% (n = 2) of the students found that haptic simulator practice was very useful and useful, respectively. These results are similar to those obtained by Fernández-Sagredo et al. (4), whose objective was to determine the perception of the usefulness of these simulators in dentistry. The authors had as participants students of the last years of the program and professionals, who performed carving practices in a haptic simulator and then a survey was applied to them, where 94% positively valued the use of this tool and considered it very useful for the development of manual skills and that they have much similarity with the real activity in terms of sensitivity.

At the same time, in the present work, it was found that 83.30% (n = 5) of participants considered that previous practice on haptic simulators provided them with maximum safety, and 16.70% (n = 1) perceived that it provided them with safety. These results coincide with those reported by Serrano et al. (5), whose pilot study with a qualitative design consisted of 10 students, who used scanned images and exported them to a haptic simulator to serve as a pre-treatment exercise for the patient. The authors obtained no concrete effects of this experience on confidence over performance; however, all participants valued positively the opportunity to perform pre-practice on a haptic simulator before performing it in the

context of a real case, with the following comments being gathered: "After three attempts in virtual reality I was able to easily perform a proper treatment" and "I was able to practice precisely what I needed for this treatment" (5).

This study was limited by the small number of students who participated in the experience. At the same time, the surveys and the checklist were only validated by judges, so it is necessary to expand the study with a representative number of participants and to complement the validation of the instruments used.

CONCLUSIONS

The recurrent practice of dental preparation in the haptic simulator with the use of the image resulting from the scanning of the patient's mouth prior to the clinical procedure generates greater confidence in the student and contributes to improve his performance when administering the treatment in real cases.

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